



COMPREHENSIVE WASTEWATER MANAGEMENT PLAN DRAFT RECOMMENDED PLAN

Town of Bourne, MA

April 2024



— An Apex Company —

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Terms and Acronyms

208 Plan	The Section 208 Area Wide Water Quality Management Plan, developed under Section 208 of the Clean Water Act in 1978 and updated in 2015, is a framework to restore embayment water quality on Cape Cod. See also CCC.
303(d) List	Massachusetts' list of impaired and threatened waters per Clean Water Act Section 303(d).
ACEC	Areas of Critical Environmental Concern
BBC	Buzzards Bay Coalition
BGS	Below Ground Surface
BMP	Best Management Practice, can describe a stormwater treatment system or standard of care
BOD5	5-Day Biochemical Oxygen Demand measures the organic strength of wastewater
BOH	Board of Health
CCC	Cape Cod Commission is the regional land use planning, economic development, and regulatory agency created in 1990 to serve the citizens and 15 towns of Barnstable County, Massachusetts.
CEC	Contaminants of Emerging Concern
CFR	Code of Federal Regulation
CMR	Code of Massachusetts Regulations
CWA	Clean Water Act
CWMP	Comprehensive Wastewater Management Plan; See Town Website "Frequently Asked Questions" Fact Sheet
DEIR	Draft Environmental Impact Report
DEP	Department of Environmental Protection
DPW	Department of Public Works
DO	Dissolved Oxygen
DRI	Development of Regional Impact
EIA	Enhanced Innovative/Alternative
EIR	Environmental Impact Report
ENF	Environmental Notification Form
EOEEA	Executive Office of Energy and Environmental Affairs
EP	Environmental Partners, <i>LLC</i>
FEIR	Final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FIRM	Federal Insurance Rate Map
GIS	Geographic Information System
GWDP	Groundwater Discharge Permit
GPD or (gpd)	Gallons per Day
I/A	Innovative and Alternative Onsite System
I/I	Inflow and Infiltration, or uncontrolled flow sources into a sewer system. Typically, from breaches in manholes, pipe joints, service connections or illegal connections.
IMA	Inter-municipal Agreement
IUP	Intended Use Plan
JBCC	Joint Base Cape Cod

Terms and Acronyms

LCP	Local Comprehensive Plan, completed in 2019 by Town of Bourne
LiDAR	Light Detection and Ranging; used for gathering terrain and elevation data, typically by drone or aircraft use.
MASSGIS	Massachusetts Office of Geographic Information Systems
MASSTC	Massachusetts Alternative Septic System Test Center
MCL	Maximum Contaminant Level
MEP	Massachusetts Estuaries Project
MEPA	Massachusetts Environmental Policy Act is a public review of potential environmental impacts of projects.
MESA	Massachusetts Endangered Species Act
mg/L	Milligrams per Liter
MMA	Massachusetts Maritime Academy
NEIWPCC	The New England Interstate Water Pollution Control Commission is a regional commission that helps the states of the Northeast preserve and advance water quality.
NEP	National Estuary Program
NEPA	National Environmental Policy Act
NHESP	National Heritage and Endangered Species Program
NOAA	National Oceanic and Atmospheric Administration, a federal department of the U.S. Department of Commerce
NPC	Notice of Project Change
NRCS	National Resources Conservation Service: a federal agency which provides soil data and regional agricultural support
NPS	Non-point source describes water runoff which collects from multiple sources (ground, street, roof) as opposed to a point source or single outlet (effluent pipe or groundwater discharge wick)
PPM	Parts Per Million; see also “mg/L”
PPY	Pounds per year; lbs./year
PRB	Permeable Reactive Barrier
PWSD2	Public Water Supply District #2
RME	Responsible Management Entity
RSF	Recirculating Sand Filter
SAS	Soil Absorption System also known as a leach field
SBR	Sequencing Batch Reactor: a technology used for wastewater treatment
SCADA	Supervisory Control and Data Acquisition; A process control and monitoring system for Water and Wastewater Treatment Facilities
SMAST	School of Marine Science and Technology, University of Massachusetts Dartmouth
SNEP	Southeast New England Program: A partnership of government and non-government organizations all collaborating to innovatively improve water quality and habitats within New England’s coastal watersheds.
SRF	State Revolving Fund
SSO	Sanitary Sewer Overflow
STEG	Septic Tank Effluent Gravity
STEP	Septic Tank Effluent Pump

Terms and Acronyms

TMDL	Total Maximum Daily Load
TN	Total Nitrogen
TR-16	Technical Report No. 16—Guides for the Design of Wastewater Treatment Works by NEIWPCC; Used as guide by engineers and operators for design criteria
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey; A federal agency responsible for soil, groundwater, stream, and environmental data collection.
UV	Ultraviolet; A method for disinfection of wastewater effluent prior to discharge.
WAC	Wastewater Access Chamber
WPA	Wetlands Protection Act
WQS	Water Quality Standard
WWTF or WWTP	Wastewater Treatment Facility or Wastewater Treatment Plant.

EXECUTIVE SUMMARY

In 2021, the Town of Bourne initiated the development of a Comprehensive Wastewater Management Plan (CWMP). This plan has four distinct phases:

1. **Needs Assessment:** During this phase, Bourne assessed the requirements and identified the key needs related to wastewater management.
2. **Identification of Alternatives:** In Phase 2, Bourne evaluated various alternatives for inclusion in the Recommended Plan. These alternatives included both traditional wastewater approaches and a non-traditional option.
3. **Draft Recommended Plan:** The current report focuses on Phase 3, which presents the Draft Recommended Plan. This plan outlines the proposed strategies and actions for wastewater management.
4. **Compliance Review with MEPA and CCC 208 Plan:** As part of the process, the plan will undergo a compliance review following submission of the Recommended Plan to ensure alignment with the Massachusetts Environmental Policy Act (MEPA) and the Cape Cod Commission (CCC) 208 Plan.

During Phase 3, MassDEP updated Title 5 Onsite Wastewater Treatment regulations. Additionally, existing definitions of Nitrogen Sensitive Areas was modified to include Natural Resource designated areas or TMDL watersheds with existing nitrogen impairments. This regulatory change created a pivotal moment for Bourne as they considered the implementation of their chosen alternatives:

- **Default Title 5 Individual Time Constraints:** This option adheres to the standard Title 5 regulations, allowing a five-year timeline (until July 2030) for implementation.
- **Town-based Watershed Permit:** Alternatively, Bourne could elect to apply for a Watershed Permit, which provides a townwide time constraint of twenty years, along with specific operation and reporting requirements.

The Phase 3 Recommended Plan thoroughly examines the implementation of the proposed strategies, considering both perspectives. As of April 2024, the Select Board has not yet decided regarding the Watershed Permit. The town's choice will significantly shape the future of wastewater management in Bourne.

SECTION 1.1 TRADITIONAL WASTEWATER AND NITROGEN MANAGEMENT TECHNOLOGIES

As determined during the Alternatives Analysis, traditional wastewater and nitrogen management strategies include General Use Approved Innovative and Alternative (I/A) Onsite Wastewater Systems, Decentralized Wastewater Treatment Facilities (WWTFs), Centralized WWTFs, and Regional WWTFs. The Town decided to choose General Use Approved I/A Systems and one Core Sewer Area within the existing centralized Town-owned sewer system as part of the Phase 2 conclusion. For now, the Draft Recommended plan estimates General Use I/A systems with the hope that additional technologies will be able to meet the Best Available Nitrogen Reducing Technology limits

in the future. As of February 2024, the MassDEP General Use Approved I/A systems list contains five approved manufacturers with multiple additional systems under Pilot or Provisional permit.

For the current Title 5 requirements, there are no additional implications for the Buttermilk Bay, Pocasset Harbor, or Pocasset River watersheds (they are not designated as Natural Resource Nitrogen Sensitive Areas as of April 2024). Therefore, the number of systems can be implemented steadily over the entire 20-year CWMP Planning period, with a prioritization of those systems with the shortest nitrogen travel time in groundwater (i.e., closest to the watershed) and moving outwards in the watershed (i.e., the longest nitrogen travel time in groundwater). Full page figures, showing distances from the water's edge, are in **Appendix A**.

Table ES-1 summarized the proposed Implementation Timeline required if Bourne chooses to default to the new Title 5 regulations. The table is organized by priority watershed (by number of systems per year, over the first 5 years).

Table ES-1: Title 5 Default GUIA Implementation Timeline

Watershed	Years 1 – 5	Years 6 - 10	Years 11 – 15	Years 16 - 20
Megansett-Squeteague Harbor	285	0	0	0
Phinney's Harbor	1,133	0	0	0
Buttermilk Bay	0	125	125	125
Pocasset Harbor	0	483	483	483
Pocasset River	0	217	217	217
Subtotal # Installations	1,418	825	825	825

If the Town pursues a Watershed Permit for Megansett-Squeteague and Phinney's Harbors, then less than 100 systems need to be installed per year for the watershed permit period of 20 years. The goal would be to spread out implementation across the watersheds evenly, creating a more balanced implementation townwide. The following shows an example Watershed Permit Implementation Table (over 20 years).

Table ES-2: Watershed Permit Example GUIA Implementation Timeline

Watershed	Years 1 – 5	Years 6 - 10	Years 11 – 15	Years 16 - 20
Megansett-Squeteague Harbor	72	72	72	72
Phinney's Harbor	283	283	283	283
Buttermilk Bay	94	94	94	94
Pocasset Harbor	363	363	363	363
Pocasset River	163	163	163	163
Subtotal # Installations	975	975	975	975

The following table summarizes the traditional nitrogen removal summary, excluding the Core Sewer Area as previously identified for Buttermilk Bay. Due to flow capacity concerns and restrictions in the existing Town-owned collection and treatment system, a non-traditional alternative Pilot using Enhanced I/A onsite systems will be used until the Town revisits Regional Alternative opportunities (such as Wareham WWTF or Massachusetts Maritime Academy) instead.

Table ES-3: Traditional Nitrogen Removal Summary

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Estimated Traditional Nitrogen Removal (kg N/yr.)	Amount left to remove (kg N/yr.)
Megansett-Squeteague Harbor	564	504 - 631	63
Phinneys Harbor	1,706	2,001 - 2,182	0
Buttermilk Bay	1,402	588	814
Pocasset Harbor	3,120	2,562	558
Pocasset River	1,289	1,148	141
Total	8,072	6,803 - 7,768	1,576

SECTION 1.2 NON-TRADITIONAL WASTEWATER AND NITROGEN MANAGEMENT TECHNOLOGIES

At the conclusion of the Phase 2 Alternatives Analysis, only Stormwater Best Management Practices was selected as the non-traditional technology for Bourne to utilize as part of the Recommended Plan. After revisiting the Core Sewer Area in Buttermilk Bay, a second technology (Enhanced I/A onsite systems) was selected as a pilot program to implement in the mostly residential neighborhood where Core Sewer Area 1 had been identified. See the Buttermilk Bay revised figures in **Appendix A**. Stormwater Best Management Practices (BMPs) were utilized as a townwide solution and updated to reflect the MassDEP maximum of no more than 20% of the required nitrogen removal loading per year. Adding the EIA Pilot for Buttermilk Bay, the Town can meet its overall nitrogen removal goals using traditional and non-traditional wastewater management technologies. See Table ES-4 below for a summary of the remaining nitrogen removal met by the non-traditional nitrogen removal technologies.

Table ES-4: Non-traditional Nitrogen Removal Summary

Embayment	Nitrogen Removal Remaining (Kg-N/yr.)	Estimated Non-Traditional Nitrogen Removal (kg N/yr.)	Goal Met?
Megansett-Squeteague Harbor	63	113	Yes
Phinneys Harbor	0	341	Yes
Buttermilk Bay*	814	1,084	Yes, with EIA Pilot or Core Sewer Area
Pocasset Harbor	558	624	Yes
Pocasset River	141	258	Yes
Total	1,576	1,616	Yes

SECTION 1.3 IMPLEMENTATION SCHEDULE AND COST

Section 5 of this report reviews in depth the basis for each alternative's capital, operation and maintenance, and total annual cost for the entire (Townwide) implementation and individual

(homeowner) estimated costs. The following table summarizes the traditional and non-traditional solution cost summaries into one comparison table in order of highest total annual cost to lowest total annual cost. The approximate cost per kilogram (kg) of nitrogen (N) removed helps to understand the value of the environmental cost benefit when selecting the appropriate technologies as part of the final recommended plan.

Table ES-5: Draft Recommended Plan Cost Summary

Alternative	Total Annual Cost (\$M)	Individual Total Annual Costs	Estimated Nitrogen Removal (kg N/yr.)	Approximate Cost per Kg N removed
General Use I/A Onsite System	\$22.5M	\$5,800 ¹	6,800 – 7,800	\$2,900- \$3,300
Buttermilk Bay Sewer Alternative 2	\$10.46M	\$16,830	3,000	\$3,490
Core Sewer Area - Alternative 1	\$6.1M	\$9,642	1,160	\$5,260
Pilot EIA Onsite System	\$3.5M	\$10,800	803	\$4,359
Stormwater BMP	\$1.45M	N/A ²	1,616	\$897

1. For General Use I/A systems, the individual cost is the annual cost per parcel. For the sewer alternatives, the individual cost is the annual cost per sewer user (which may also be per parcel, depending on property type).

2. Stormwater BMP individual total annual costs are not applicable as Bourne does not have a stormwater utility where funds are collected townwide for the purposes of stormwater management.

As summarized in Section 6, in order to set an appropriate draft schedule for the recommended plan, the Town is at a critical decision point for its Natural Resource Nitrogen Sensitive Areas: continue with the default Title 5 implementation timeline requirements for new construction and existing systems or choose to apply for a Watershed Permit, to remove 75% of the nitrogen removal goal over the next twenty years. The goal of this draft recommended plan is to get feedback from stakeholders on addressing nitrogen pollution sources while setting sustainable goals.

SECTION 1 NEEDS ASSESSMENT (PHASE 1)

SUMMARY

The first phase of the CWMP, completed in early 2022, outlined the Town's wastewater and nutrient management needs looking ahead twenty years. Considering the Town has a year-round population of 20,500 people, which swells to 40,000 during peak season, the Town of Bourne has unique seasonal wastewater needs. The Town comprises ten distinct villages, each with its own character and development needs. Bourne also balances significant land ownership by Joint Base Cape Cod (JBCC).

Through the needs assessment, we learned that Bourne holds environmental and water resources, including coastal embayment and direct discharge watersheds. There is a high significance of Bourne's wetlands, endangered species, groundwater, soils, and MassDEP's Eelgrass study. There were over fifteen sampling failures over the last five years under the Minimum Standards for Bathing Beaches (State Sanitary Code, Chapter VII). Table 1 shows each watershed's water quality and nitrogen pollution requirements. Priority areas for wastewater management based on Total Maximum Daily Load (TMDL) goals are identified and a systematic approach to addressing nitrogen loading issues is provided.

Table 1: Summary of Bourne Watersheds

Embayment	Nitrogen Impaired?	TMDL Requirement?	Bourne Total Removal Goal (Kg-N/yr.)
Phinneys Harbor	Yes	Yes	1,706
Megansett-Squeteague Harbor	Yes	Yes	564
Buttermilk Bay	Yes	No	1,402
Pocasset Harbor	Yes	No	3,120
Pocasset River	Yes	No	1,289
Buzzards Bay	No	No	TBD
Cape Cod Canal	No	No	TBD
Total			8,072

The Phase 1 report evaluated built systems, specifically the town's current planning demographics, including parcel density, land use, and zoning, as well as existing water and wastewater infrastructure. The Phase 1 report also summarizes the range of public engagement activities completed during the first phase, including workshops, meetings, and the distribution of information materials.

SECTION 2 ALTERNATIVES ANALYSIS (PHASE 2)

SUMMARY

The second phase of the Comprehensive Wastewater Management Plan assessed alternative wastewater treatment technologies and management approaches to improve water quality issues and infrastructure requirements identified during the Needs Assessment. The Needs Assessment completed in June 2022 determined that Bourne needs to remove approximately 8,100 kg of nitrogen annually to enhance water quality across priority watersheds.

For the alternatives analysis, Bourne prioritized five nitrogen-impaired watersheds. Two of these watersheds, Phinney's Harbor and Megansett-Squeteague Harbor, have been allocated a Total Maximum Daily Limit (TMDL). The remaining three watersheds - Buttermilk Bay, Pocasset Harbor, and Pocasset River - although not yet assigned a TMDL, are crucial for water quality improvement due to documented concerns, including eutrophication and nitrogen loading.

Through collaboration between the Board of Sewer Commissioners (BOSC) established a Wastewater Advisory Subcommittee (WAC), the teams developed evaluation criteria, evaluated over one hundred technologies, and rated top technologies on several factors such as design flexibility, environmental impacts, and public acceptance.

The resulting alternatives analysis returned several options for technologies to use across Bourne's nitrogen impaired watersheds. Table 2 summarizes the main alternatives and their estimated nitrogen removal rates.

Table 2: Summary of 2022 Alternatives and Total Estimated Nitrogen Removal

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Primary Alternative for Load Reduction	Estimated Nitrogen Removal Total (Kg-N/yr.)
Phinneys Harbor	1,706	General Use Approved I/A Onsite Systems	2,384 - 2,565
Megansett-Squeteague Harbor	564	General Use Approved I/A Onsite Systems	723 - 850
Buttermilk Bay	1,402	Sewer Alternative 1	1,925
Pocasset Harbor	3,120	General Use Approved I/A Onsite Systems	3,292
Pocasset River	1,289	General Use Approved I/A Onsite Systems	1,363
Buzzards Bay*	TBD	-	-
Cape Cod Canal*	TBD	-	-
Total	8,072		9,687 - 9,995
<i>Additional Removal</i>			<i>1,615 - 1,923</i>

*MassDEP does not currently identify the Buzzards Bay and Cape Cod Canal watersheds as nitrogen impaired and therefore alternatives for these two watersheds will be considered as additions under future adaptive management reviews.

SECTION 3 RECOMMENDED PLAN (PHASE 3)

This CWMP Phase 3 – Draft Recommended Plan report outlines detailed design parameters, potential impacts, and mitigation measures, and develop costs and schedules for each of the alternatives selected through the Alternatives Analysis. In keeping with Bourne’s Local Comprehensive Plan vision to maximize opportunities for social and economic development while retaining an attractive, sustainable, and secure coastline and environment, this CWMP outlines the primary conventional alternatives to be used Townwide. This report develops the screened alternatives further, including their specific character in each watershed, the policy decision needed for their implementation, and their estimated costs.

SECTION 3.1 PRELIMINARY DESIGN CRITERIA

A conventional back up plan must be provided in each sub-watershed where the primary approach for the community is non-traditional technology for nitrogen reduction as the recommended plan. At minimum, the modeled reductions in the MEP TMDL report must be adhered to unless alternative percentage reductions for sub-watershed have been modeled using the MEP model.

The following sections outline the estimated nitrogen removal by technology and include the design criteria for each individual system. Given Bourne’s preference for a decentralized-focused approach to alternatives, the watershed wide implementation will be based on the specifications of the MassDEP General Use Approved I/A onsite systems.

Section 3.1.1 Traditional (Conventional) Technologies

According to MassDEP, conventional back up consists of any traditional wastewater management proven reduction strategy such as municipal sewerage, package treatment facilities, or General Use approved I/A systems. The table below outlines the Summary of Alternatives for Bourne, as determined in the 2022 Alternatives Analysis.

Table 3: General Use I/A Onsite System Estimated Nitrogen Removal Summary

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Number of GUIA Parcels	Estimated Nitrogen Removal GUIA (kg N/yr.)
Megansett-Squeteague Harbor	564	285 - 357	504 - 631
Phinneys Harbor	1,706	1,133 - 1,235	2,001 - 2,182
Buttermilk Bay	1,402	374 - 704	588 - 1,245
Pocasset Harbor	3,120	1,450	2,562
Pocasset River	1,289	650	1,148
Total	8,072	3,892 - 4,396	6,803 - 7,768

General Use I/A Onsite Systems

The General Use I/A onsite system alternative is based on the Title 5 sizing standards for typical residential household flows. Table 4 lists typical Title 5 system design parameters.

Table 4: Typical Residential Title 5 Design Capacity

Residential System	Title 5 Flow Estimate (gpd)	Typical System Size (gal)
2-Bedroom	220	1,000-1,500
3-Bedroom	330	1,000-2,000
4+ Bedroom	550	1,250-2,500

The following manufacturers are on the MassDEP General Use I/A Onsite System List for Nitrogen Removal as of March 2022. The individual system capacities are listed below as well as the estimated nitrogen effluent, which is similar across the General Use I/A System category.

Table 5: General Use I/A Onsite System Design Capacity

Manufacturer/Model	MassDEP Approved Design Capacity (for individual system)	Nitrogen Effluent
Aquapoint: Bioclere	660-2,000 gpd	<19 mg/L
Bio-Microbics: FAST Treatment Systems	550-2,000 gpd	<19 mg/L
Septi-Tech: STAAR 0.5 Denite	660-2,000 gpd	<19 mg/L
Norweco: Singulair	660-2,000 gpd	<19 mg/L
Orenco: Advantex	660-2,000 gpd	<19 mg/L

The treatment processes for each system range from fixed-film bioreactor to aerobic and trickling filter components. The following matrix shows which processes are included in each General Use I/A baseline model:

Table 6: General Use I/A Onsite System Treatment Processes

Manufacturer/Model	Treatment Process			
	Fixed Film	Aerobic	Trickling Filter	Proprietary Media Filter
Aquapoint: Bioclere	X		X	
Bio-Microbics: FAST Treatment Systems		X		
Septi-Tech: STAAR 0.5 Denite		X	X	
Norweco: Singulair		X		X
Orenco: Advantex		X		X

- The Aquapoint bioclere unit is a fixed film reactor consisting of a fiberglass tank containing a trickling filter section with inert plastic media, a clarifier and sump, a fan for aeration, and dosing and recirculating pumps.
- The Bio-Microbics FAST System is a Nitrogen Reducing Aerobic Treatment system, uses a Fixed Activated Sludge Treatment (FAST) to break down organic material and nutrients in wastewater. The MicroFAST module contains blocks of fixed media and an airlift device placed inside a rectangular liner, which produces robust recirculation of oxygenated water throughout the submerged media.
- Septi-Tech STAAR 0.5 Denite system is a recirculating trickling filter with a pre-anoxic phase and a trickling filter media with recirculation happening within the trickling filter and recycled to anoxic tank for enhanced nitrogen reduction.
- Norweco Singulair I/A system consists of enhanced three compartment tank with a pretreatment chamber, aerobic chamber, and settling/filtration chamber with a BioKinetic filter unit. The system removes nitrogen using timed aerobic and anaerobic periods in the second chamber.
- Orenco Advantex I/A onsite nitrogen reduction system has two compartments made of UV protected fiberglass reinforced basins that incorporate re-circulation blend tankage and discharge tankage into a single module, along with an aerobic textile filter media that treats wastewater.

The alternatives analysis concluded that a minimum of 3,900 systems would need to be installed to meet the Townwide nitrogen removal goals across all five of the nitrogen impaired watersheds. However, since the Alternatives Analysis concluded, there have been Title 5 policy changes which affect the timeline of installation of systems in the two Natural Resource Nitrogen Sensitive Areas (the two watersheds with Nitrogen TMDLs). Beginning in July 2025, individual homeowners located in the TMDL watersheds are required to upgrade their onsite systems to be Best Available Nitrogen Reducing Technology (also known as nitrogen reducing system). As the Bourne CWMP Alternatives Analysis has already selected widespread use of the General Use I/A onsite systems, the assumptions for implementation are modeled across two timelines:

- Title 5 Natural Resource NSA Compliance (July 2030): assumes individual homeowners in the Megansett-Squeteague Harbor and Phinney's Harbor watersheds will be responsible for upgrading their system to be Title 5 Best Available Nitrogen Reducing Technology
- Possible Watershed Permit (July 2045, approx.): assumes the Town files a Notice of Intent to apply for a watershed permit, applies for and receives a Watershed Permit for each of its nitrogen TMDL watersheds, and extends the time for compliance to 2045 (approximately). The removal requirement is 75% nitrogen source removal over the permit monitoring period.

To implement the General Use I/A Systems across the Natural Resource Nitrogen Sensitive Areas first, in compliance with the July 2023 revisions to Title 5, approximately 290 systems need to be replaced during the first five years across Megansett-Squeteague Harbor and Phinney's Harbor watersheds.

For the current Title 5 requirements, there are no additional implications for the Buttermilk Bay, Pocasset Harbor, or Pocasset River watersheds (they have not been designated as Natural Resource Nitrogen Sensitive Areas as of April 2024). Therefore, the number of systems upgraded in these watersheds can be implemented gradually over the 20-year CWMP Planning period, with a prioritization of those systems with the shortest nitrogen travel time in groundwater (i.e., closest to the watershed) and moving outwards in the watershed (i.e., the longest nitrogen travel time in groundwater). Full page figures showing the approximate travel time radius by distance from water's edge are included in **Appendix A**. Below is an example summary of the Title 5 Implementation Table (by number of systems per year, over the first 5 years).

Table 7: Title 5 Default GUIA Implementation Timeline

Watershed	Years 1 – 5	Years 6 - 10	Years 11 – 15	Years 16 - 20
Megansett-Squeteague Harbor	285	0	0	0
Phinney's Harbor	1,133	0	0	0
Buttermilk Bay	0	125	125	125
Pocasset Harbor	0	483	483	483
Pocasset River	0	217	217	217
Subtotal # Installations	1,418	825	825	825

If the Town pursues a Watershed Permit for these two watersheds, then less than one hundred systems need to be installed per year for Megansett-Squeteague Harbor and Phinney's Harbors over the watershed permit period. The goal would be to spread out implementation across the watersheds evenly, creating a more balanced implementation townwide. The following shows an example Watershed Permit Implementation Table (over 20 years).

Table 8: Watershed Permit Example GUIA Implementation Timeline

Watershed	Years 1 – 5	Years 6 - 10	Years 11 – 15	Years 16 - 20
Megansett-Squeteague Harbor	72	72	72	72
Phinney's Harbor	283	283	283	283
Buttermilk Bay	94	94	94	94
Pocasset Harbor	363	363	363	363
Pocasset River	163	163	163	163
Subtotal # Installations	975	975	975	975

However, the Town of Bourne has indicated to MassDEP that Buttermilk Bay is the next priority area in need of a linked-embayment model for nitrogen loading, for which the Town would like to understand how to better prioritize nitrogen removal. The next two sections outline additional considerations for Buttermilk Bay implementation strategies for nitrogen removal.

Core Sewer Area – Sewer Alternative 1

As defined by MassDEP, Core Sewer Areas need to be sewered due to the high septic loading produced from a dense area. Core sewer areas can be part of municipal package treatment plants or sewer extensions to larger municipal systems. Core Sewer Areas are not required for every watershed if suitable removal of nitrogen can be met using other conventional alternatives or sufficiently modeled non-traditional alternatives.

The Core Sewer Area in Bourne identified during the Alternatives Analysis is in the Buttermilk Bay watershed. As shown in Figure 1 below, the area outlined in blue was selected as a Core Sewer Area alternative due to its proximity to the Bourne owned and operated Buzzards Bay WWTF and the overall nitrogen impairment in Buttermilk Bay. Approximately 330 residential parcels with an estimated 60,000 gallons per day (Peak Hourly Flow of 125,000 gpd) were selected along the southern portion of Buttermilk Bay, in densely developed neighborhoods.

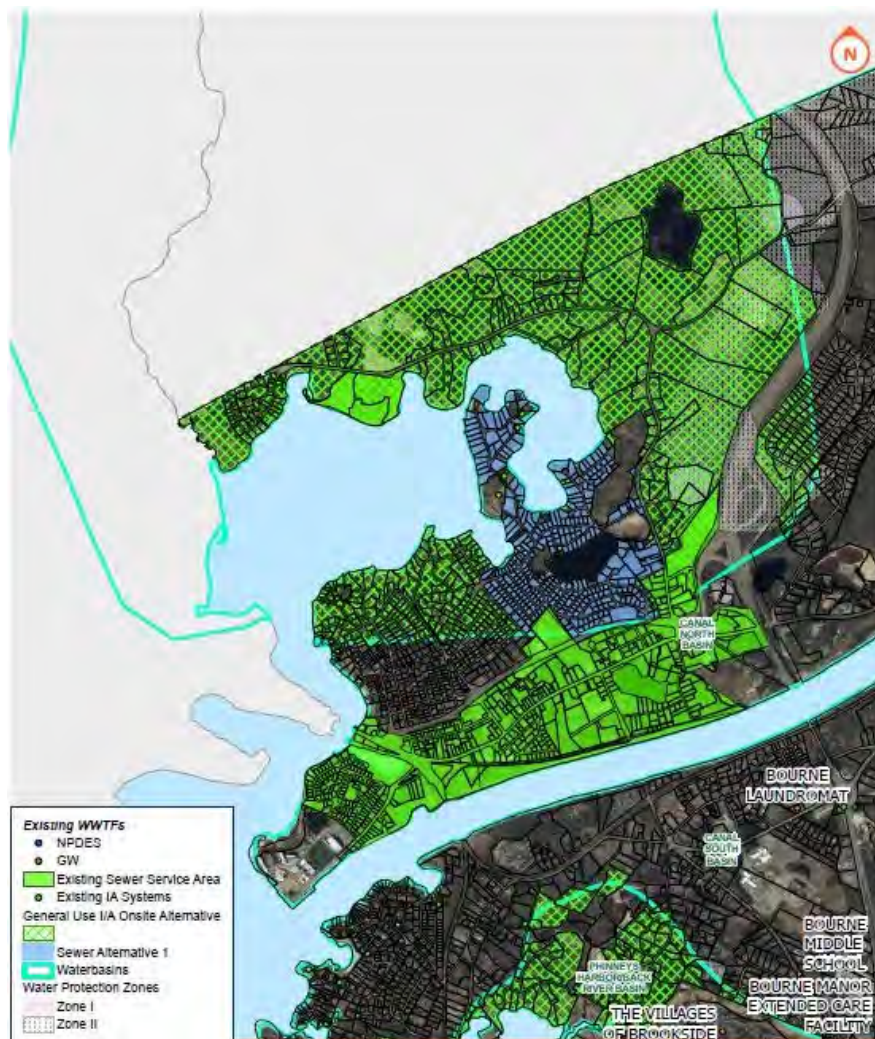


Figure 1: Buttermilk Bay Core Sewer Area - Alternative 1

Buzzards Bay WWTF

The Buzzards Bay Wastewater Treatment Facility (Buzzards Bay WWTF), located at 51 Cranberry Road in Bourne, has an approved design flowrate of 100,000 gpd. Wastewater from the existing collection system in Bourne connects via a diversion in the main gravity interceptor to a pumping station located at the Veteran's Memorial Community Center, across the street from the Bourne Main Street Pump Station.

The influent wastewater from the pump station settles in an equalization tank before screening for solids removal. The main treatment process includes three Membrane Bioreactors, for treatment and removal of organics and contaminants before disposal. The treated effluent is dispersed post-disinfection through a soil absorption system with a daily capacity not-to-exceed 335,000 gpd and loading rate of 3.0 gallons/day/square-foot, in compliance with the MassDEP's approved Groundwater Discharge Permit. Since coming online in August 2021, the Buzzards Bay WWTF operates at a daily flow rate between 20,000 gpd and 60,000 gpd with an average peak daily flow of 38,250 gpd.

Currently, the Bourne Board of Sewer Commissioners (BOSC) allocates available capacity to the Buzzards Bay WWTF through its application according to the Sewer Commission's allocation and reservation policies. As of December 2022, all remaining available capacity to the Buzzards Bay WWTF was allocated for Economic Development use. Therefore, the Core Sewer Area for Nitrogen Removal in Buttermilk Bay requires additional exploration of expansion of the existing Buzzards Bay WWTF footprint or expansion of the Wareham Intermunicipal Agreement (IMA).

Table 9: Bourne Wastewater Treatment Capacity

Treatment Facility	Design Total Capacity (gpd)	Average Daily Flow ² (gpd)	Available Capacity ³ (gpd)
Buzzards Bay WWTF	100,000	38,250	0
Wareham WWTF (IMA)	200,000 ¹	50,000	0
Total	300,000	88,250	0

1. Bourne's Intermunicipal Agreement with Wareham allowance.

2. Estimated based on recorded flow data through 2022.

3.. As of November 2022, all flow has been allocated for economic development to the existing collection system, including treatment at the Buzzards Bay WWTF and all additional flow to Wareham WWTF.

As the Wareham WWTF is currently undergoing improvements for nutrient removal and has limited existing capacity, its recommended that the Buzzards Bay WWTF site be considered for expansion of treatment capacity and increase of groundwater discharge loading and/or expansion of the existing groundwater discharge area.

The Buttermilk Bay watershed is not considered a Natural Resource Nitrogen Sensitive Area as of April 2024. However, the Town has identified Buttermilk Bay as a high priority watershed for nitrogen removal. The Core Sewer Area was estimated to remove 1,160 kilograms of Nitrogen per year (kg N/year) by connecting 330 parcels via low pressure sewer to the Buzzards Bay WWTF. Therefore, as a core sewer area cannot be expanded at this time, a Pilot Project of Enhanced Innovative/Alternative onsite systems is proposed for the former Core Sewer Area, until regional options or expanded Buzzards Bay WWTF treatment and disposal can be considered.

If the Town decides to revisit this alternative and pursue Buzzards Bay WWTF treatment expansion or explore additional regional alternatives, then the following wastewater flow estimates are applicable to the Core Sewer Area (Alternative 1 from Alternatives Analysis) and Alternative 2 – expansion to the entire southern Buttermilk Bay coastline for nitrogen load management. See the full-page figures in **Appendix A**.

Table 10: Bourne Core Sewer Area Flow Gap

Sewer Alternative	Average Daily Flow² (gpd)	Maximum Monthly Flow³ (gpd)	Estimated Nitrogen Removal (kg N/yr.)
Buttermilk Bay Core Sewer Area – Alternative 1	60,000	125,000	1,160
Buttermilk Bay – Alternative 2 ¹	155,000	325,500	3,000

1. Alternative 2 Includes Alternative 1 plus remaining unsewered parcels along the southwestern end of Buttermilk Bay (along Cohasset Narrows).

2. Based on average water per capita use of 198 gallons per day.

3. Calculating using a 2.1 peaking factor of maximum month to average daily flows.

Section 3.1.2 Non-Traditional Technologies

Pilot and Provisional I/A Onsite Systems

Pilot and Provisional I/A Onsite Systems fall into the enhanced onsite wastewater treatment category, with ability to treat to an effluent nitrogen concentration between 10 mg/L and 15 mg/L. While technology vendors state in their marketing materials that they can consistently treat below 10 mg/L, the threshold for the Best Available Nitrogen Reducing Technology remains at 10 mg/L, per MassDEP. As of April 2024, there are no General Use I/A approved technologies which meet the 10 mg/L nitrogen effluent efficiency. However, some Pilot and Provisional I/A onsite systems have demonstrated nitrogen removal performance below 15 mg/L in effluent concentrations.

As part of the Alternatives Analysis, Enhanced I/A Systems were considered within the top 10 alternative technologies chosen by Bourne for consideration as part of a recommended plan. The conventional General Use I/A technologies are able to meet the overall reduction for many of Bourne's embayments, however, due to lack of centralized wastewater treatment capacity at the Buzzards Bay WWTF, the Core Sewer Area as proposed in Buttermilk Bay is unable to move forward on the first iteration of the draft recommended plan. Therefore, the use of a Pilot Enhanced I/A Installation within the Buttermilk Bay watershed to remove the remaining nitrogen to meet the 25%

reduction goal for a non-TMDL watershed is recommended at this time. See full page figure in **Appendix A** for the Pilot Enhanced I/A Onsite System location.

Table 11: Pilot Enhanced I/A Onsite System Summary

Watershed	# of Enhanced I/A Installations	Estimated Nitrogen Removal (kg N/yr.)
Buttermilk Bay	330	803

Stormwater Best Management Practices (BMP)

The Town of Bourne selected Stormwater Best Management Practices as their main non-traditional alternative to employ as part of their Comprehensive Wastewater Management Plan. Considering the Town is responsible for over 161 outfalls that discharge flow into twenty-six known receiving water segments, under their current Municipal Separate Storm Sewer System (MS4) program, the goal is to continue to improve upon the baseline actions already underway. The maximum allowable nitrogen credit for Stormwater Best Management Practices is 20% of the removal goal for each watershed.

To maximize the nitrogen removal credit and continue to maintain compliance with its existing MS4 permit, the Town will continue the following Best Management Practices:

- Sweep all streets and permittee-owned parking lots twice per year including once in the spring and in the fall.
- Annual inspections and maintenance of stormwater treatment structures
- Clean catch basins on an established schedule and report the number of catch basins cleaned and volume of material removed annually.

The Town of Bourne is also preparing a Queen Sewell Pond Watershed Assessment Plan (WAP), to reduce nitrogen and phosphorus runoff into the Queen Sewell Pond. In January 2024, the assessment team completed site soil evaluation and wetlands delineation for green stormwater infrastructure design. Next steps involve finalizing the WAP; designing and permitting green infrastructure to retrofit the public beach parking lot and the corresponding construction plans; community outreach including neighborhood meetings and a rain garden workshop in June 2024. ¹

Bourne has multiple projects which are either underway or completed as part of the Cape Cod Water Resource Restoration Project (CCWRRP) funded by federal, state, and local governments, further maximizing the stormwater nitrogen removal credit. Below is the list of projects completed between 2021 and Present²:

- Fish Passage at Holway Axe Dam (Buttermilk Bay Basin)- Completed

¹ Queen Sewell Watershed Action Plan. Town of Bourne. Web. <https://www.townofbourne.com/conservation/pages/queen-sewell-pond-watershed-action-plan>

² Cape Cod Water Resource Restoration Project Story Map. Association to Preserve Cape Cod. Web. <https://apccatlas.maps.arcgis.com/apps/webappviewer/index.html?id=17b4940a7e9145bcb3a52e35133315e5>.

- Stormwater Treatment Measures at Old Head of the Bay Road (Buttermilk Bay Basin)- Proposed
- Stormwater Treatment Measures at Monks Park (Buzzards Bay Basin)- In Progress
- Stormwater Treatment Measures at North Circuit and Circuit Avenue (Pocasset Harbor Basin)- Proposed
- Stormwater Treatment Measures at Saco Avenue (Pocasset Harbor Basin)- Proposed
- Fish Passage at Red Brook (Pocasset Harbor Basin)- In Progress

As of April 2024, MassDEP is in the process of updating the current Stormwater Regulations for Wetlands Protection Act (310 CMR 10.00) and Water Quality Certification (314 CMR 9.00) for Massachusetts.³ The draft regulations, published in January 2024, outlines the following updated measures⁴:

- Updating outdated precipitation data that reflects increasing storms. Peak runoff and discharge rates will be calculated using NOAA14 Plus and 100- year storm predictions.
- Aligning with EPA MS4's permit conditions including development rules, nutrient removal requirements and annual recharge value assumption changes.

The MassDEP goals in updating the regulation is to align the regulations with MS4 Permit compliance, to promote nature based Environmentally Sensitive Site Design (ESSD) and Low Impact Development (LID) through a revised, more user-friendly Stormwater Handbook, and to assist communities with TMDL compliance. The draft regulation public comment period is open through April 2024. Final regulations will be promulgated Spring 2024, for alignment with the Stormwater Best Management Practices Recommended Plan.

Section 3.1.3 Summary by Watershed

Based on the conventional, non-traditional, and policy-based alternatives summarized in each watershed, the overall town wide nitrogen removal alternatives estimate meeting the town wide nitrogen removal goal of 8,100 kg N per year, with an additional 1,600 – 2,000 kg N per year removal. Only priority watersheds are included in the total estimated nitrogen removal load calculations as Buzzards Bay and Cape Cod Canal load goals will be revisited when additional guidance on removal loading becomes available and as future iterations of Bourne's CWMP evolves. Table below summarizes the estimated alternative removal compared to the total removal goal.

³Stormwater Management Updates. MassDEP. Web. <https://www.mass.gov/info-details/massachusetts-stormwater-management-updates-advisory-committee>

⁴ "Proposed Stormwater Updates to the Massachusetts Wetlands and 401 Regulations." MassDEP. Presentation. Web. <https://www.mass.gov/doc/presentation-proposed-stormwater-updates-to-the-massachusetts-wetlands-and-401-regulations/download>

Table 12: Summary of Recommended Plan Nitrogen Removals

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Estimated Traditional Nitrogen Removal (kg N/yr.)	Estimated Non-Traditional Nitrogen Removal (kg N/yr.)	Total Estimated Removal	Goal Met?
Megansett-Squeteague Harbor	564	504 - 631	113	617 - 744	Yes
Phinneys Harbor	1,706	2,001 – 2,182	341	2,342 – 2,523	Yes
Buttermilk Bay ¹	1,402	588	1,084	1,672	Yes, with EIA Pilot or Core Sewer Area
Pocasset Harbor	3,120	2,562	624	3,186	Yes
Pocasset River	1,289	1,148	258	1,406	Yes
Total	8,072	6,803 – 7,768	1,616	9,223 – 9,531	Yes

1. If Pilot EIA Program does not provide intended results, then General Use I/A Assumed for implementation, estimated to remove 517 kg N/year. The watershed removal totals 1,385 kg N/year, falling less than 20 kg N/year short of the 25% removal goal for the watershed.

SECTION 4 IMPACTS

SECTION 4.1 ENVIRONMENTAL IMPACTS

Section 4.1.1 Surface and Groundwater Quality

Historical toxic contamination persists in areas like New Bedford Harbor and the former Massachusetts Military Reservation on Cape Cod. However, ongoing contributions of toxic pollutants from households and lawns worsen the issue. During the mid-20th century, factories along the Acushnet River discharged polychlorinated biphenyls (PCBs) and heavy metals into the water, creating significant risks to aquatic life and human health due to their carcinogenic properties. Despite efforts to reduce pollution, PCBs still exist in the sediment of the harbor, particularly in the upper harbor and Acushnet River where major factories operated. Similarly, in Bourne, past fuel and chemical spills, along with improper disposal practices at the Joint Base Cape Cod (formerly the Massachusetts Military Reservation), have contaminated groundwater flowing into Buzzards Bay with highly toxic substances. ⁵

Based on ongoing water quality monitoring by Buzzards Bay, Association to Preserve Cape Cod, and other non-profit monitoring agencies, Bourne is documenting nitrogen pollution through overstimulation of growth of aquatic plants and algae. For the surface and groundwater in Bourne, multiple years of studies have indicated that nitrogen pollution is causing eutrophication in multiple local ponds (leading to temporary beach closures) and death of eel grass in the coastal estuaries, reducing dissolved oxygen in the water. For human health, increased nitrogen in the groundwater can negatively affect the shared Cape Cod Aquifer, where most public drinking water supplies sources are found in Cape Cod. Nitrogen in drinking water can restrict oxygen in the bloodstream and put vulnerable populations (infants) at risk. ⁶

The installation of General Use I/A systems, in areas which comply with the Town of Bourne Board of Health regulations, can reduce nitrogen more than a traditional Title 5 septic system. Therefore, the widespread use of the nitrogen-reducing onsite system moving forward will reduce the amount of nitrogen entering the environment.

In Buttermilk Bay, where there is high density of residential homes, the Core Sewer Area will reduce the nitrogen loading into the Queen Sewell Pond and Buttermilk Bay surface water areas as well as reduce overall groundwater loading to the Cape Cod Aquifer. In June 2022, Bourne concluded its Needs Assessment, determining that the removal of approximately 8,100 kilograms of nitrogen per year (kg N/year) across their priority watersheds is necessary to meet their water quality objectives. MassDEP has identified on-site septic systems as the primary source of nitrogen contamination in

⁵"Toxic Pollution" Buzzards Bay Coalition. <https://www.savebuzzardsbay.org/current-issues/toxic-pollution/#:~:text=In%20Bourne%2C%20highly%20toxic%20chemicals,that%20flows%20to%20Buzzards%20Bay>. Accessed February 2024.

⁶"Nitrogen and Water." USGS. May 21, 2018. <https://www.usgs.gov/special-topics/water-science-school/science/nitrogen-and-water#:~:text=Excess%20nitrogen%20can%20cause%20overstimulation,block%20light%20to%20deeper%20waters> Accessed February 2024.

coastal communities. Decentralized systems can reduce nitrogen in multiple ways. These types of systems could include filtration and UV disinfection units, or a specialized denitrifying process, chemical process, disinfection unit and an operator to run the system.

Section 4.1.2 Water Supply

There are both Zone I and Zone II wellhead protection areas in the study area. The alternatives proposed can improve the groundwater quality within each watershed. Improvement in groundwater quality eventually leads to better surface water quality, as groundwater either moves from inland areas to coastal discharge areas, or toward ponds from tributary areas. The plan will reduce threats to groundwater quality associated with nitrogen and contaminants of emerging concerns within the Zones, improving the water supply to town citizens.⁷

Section 4.1.3 Air Quality

Microbes in newly installed septic systems require a pH between 6.8 and 7.6. When the pH drops below 6.8, the tank releases hydrogen sulfide, which has a smell like rotten eggs. In addition, if septic tanks are not closed and secured, there are many odorous fumes which can escape into households and create discomfort. However, with proper installation as well as maintenance, the system should not create any odor in the household.⁸

Construction vehicles can be a source of added air emissions and represent a direct short-term impact. During construction, heavy duty vehicles and equipment will generate emissions. In addition to these emissions, during excavation, there will be high dispersion of dust and soil into the air, creating particulate matter pollution in surrounding areas. This will negatively affect air quality in the town and can create unpleasant smells. To reduce these affects, the Contractor will perform dust control operations, in an approved manner, whenever a nuisance or hazard occurs or when directed by the Town or its representative, even though other work on the project may be suspended. Methods of controlling dust will meet all air pollutant standards as set forth by federal and state regulatory agencies.

Section 4.1.4 Noise Levels

On average, construction equipment such as bulldozers, excavators, and backhoes create sounds between 85 and 105 decibels. To install a new system, excavation will be necessary on roads to reach the pipework, meaning that these areas will undergo higher levels of noise. Typically, an excavator could dig approximately 720 cubic yards of dirt per day, meaning that large sections of land are completed in a day, and noise would only be increased in a specific area for a brief period. In addition, the systems themselves should not provide any additional noise component. To avoid noise pollution, The Contractors tasked with the project will make every effort to reduce noise generated during operations. The equipment will have silencers or mufflers designed to

⁷ "Ground Water in Freshwater-Saltwater Environments of the Atlantic Coast" USGS. November 23, 2016. <https://pubs.usgs.gov/circ/2003/circ1262/> Accessed February 2024.

⁸ "How to Reduce Septic Tank Odor" Bailey Brothers. August 22, 2022 [https://baileyokc.com/blog/plumbing-faq/how-to-reduce-septic-tank-odor#:~:text=Inside%20the%20septic%20tank%2C%20microbes,like%20rotten%20eggs\)%20can%20develop.](https://baileyokc.com/blog/plumbing-faq/how-to-reduce-septic-tank-odor#:~:text=Inside%20the%20septic%20tank%2C%20microbes,like%20rotten%20eggs)%20can%20develop.) Accessed February 2024.

operate at the lowest noise levels, ensuring compliance with state and federal regulations or regulations specified by the Town of Bourne.

In addition, hydraulic pumps, generators, gensets, noisy pipes, and exhaust fans are all components in the wastewater industry that create noise. However, these items are found at wastewater treatment facilities, which will strategically be placed as far away from residential areas as feasible. Some types of I/A systems use aeration to enhance the breakdown of organic matter. These systems may emit a low humming or bubbling sound due to air pumps or diffusers. Pumps and motors may also generate mechanical noises, such as humming or whirring. Typically, these units are underground, so the noise is muted due to their location. In terms of decibels, measurements were made 3.3 feet from the Aquapoint Bioclere I/A system, and five feet above the ground, at 90° intervals in four (4) directions. The average decibel level was 49.5, with a minimum of 45.5 and maximum of 52.8. The background level was 37.7 decibels. The maximum decibel of 52.8 is similar to the sound of a household refrigerator or a suburban area at night, meaning the system is barely noticeable in households once installed. ⁹

In Massachusetts there is a mandatory statewide building code that regulates both airborne noise (evaluated as Sound Transmission Class or STC) and structure-borne noise (evaluated as Impact Insulation Class or IIC) within the indoor spaces of residential structures. All new construction must abide by these ordinances to be code compliant.

Section 4.1.5 Wetlands, Floodplains, and Waterways

Wetland areas consist of open water, vegetated wetlands, and coastal landforms. Bourne has over 1,000 acres of Wetland Resource Areas, as defined by the Wetland Protection Act.

Most marshes, tidal flats, and freshwater wetlands in this ecosystem remain untouched and undeveloped, enabling them to serve their full potential as habitats, nursery, and spawning grounds, and, in the case of barrier beaches, as a means of storm damage prevention. The plan aims to position its wastewater pumping stations at locations farthest from wetland resource areas feasible, ensuring that any potential system pollution does not encroach into these vital wetland habitats. ¹⁰

Due to changes in climate, sea levels are rising, and weather patterns are changing. These are factors that contribute to severe flooding, especially in coastal areas such as Bourne, as more water is available. There are 242 properties in Bourne that have a greater than a 26% chance of severe flooding over the next 30 years. This represents 51% of all properties in Bourne. In addition to property damage, flooding can also cut off access to utilities, emergency services, transportation, and may impact the overall economic well-being of an area. Sea level rise will magnify the frequency and severity of coastal storms in Bourne. Floodwater may inflow into septic tanks or inundate groundwater disposal fields, causing solids to backup either in the soil absorption system or the

⁹"Decibel Level Comparison Chart". Yale Environmental Health and Safety.

<https://ehs.yale.edu/sites/default/files/files/decibel-level-chart.pdf> Accessed February 2024.

¹⁰"Bourne Back River and Headwater Wetlands ACEC". Mass.gov. April 1989. <https://www.mass.gov/info-details/bourne-back-river-and-headwater-wetlands-acec#:~:text=Most%20of%20the%20marshes%2C%20tidal,purposes%20of%20storm%20damage%20prevention> . Accessed February 2024.

septic tank. Ultimately, occurrences of negative public health events due to untreated wastewater will become more frequent as climate change progresses. The concern about long term impacts of onsite systems near the coastline is a consideration for Bourne as they implement their recommended plan. Maintaining adaptive management strategies can help to invest in climate resilient wastewater solutions.

Section 4.1.6 Endangered Species

Currently in the Town of Bourne there are five species considered threatened or endangered. These include the Northern, Red-bellied Cooter, the Red Knot, the Piping Plover, the Roseate Tern, as well as the Northern Long-eared Bat. All these species except for the Northern, Red-bellied Cooter and Northern Long-eared Bat live on coastal beaches, meaning that they will not be impacted during the construction process as construction will be taking place on roadways. In the case of the Northern, Red-bellied Cooter, which are found on Inland ponds and rivers, the new systems installed will improve groundwater quality which will eventually improve surface water quality, meaning that their habitats will improve in health. The systems will reduce the outflow of nitrogen into ponds and rivers, which will lead to a healthier and more prosperous ecosystem for this endangered species.¹¹ The table below shows the endangered or threatened species described above.

Table 13: Threatened or Endangered Species in Bourne

County	Species	General Status	General Location/Habitat	Town
Barnstable	Northern, Red-bellied Cooter	Endangered	Inland Ponds and Rivers	Bourne (north of the Cape Cod Canal)
	Red Knot	Threatened	Coastal Beaches and Rocky Shores, sand, and mud flats	Coastal Towns
	Piping Plover	Threatened	Coastal Beaches	All towns
	Roseate Tern	Endangered	Coastal beaches and the Atlantic Ocean	All towns
	Northern Long-eared Bat	Threatened Final 4(d) Rule	Winter- mines and caves, Summer – wide variety of forested habitats	Statewide

For the Core Sewer Area, design will include local permitting through filing a Wetland Notice of Intent and performing a project detailed review of localized threatened or endangered species. Wetland scientists or ecologists will flag resource areas during the surveying and preliminary design phase to understand if project constraints exist or if mitigation is necessary.

For I/A Onsite systems, most systems will be installed on previously disturbed residential properties. If the new I/A system stays within the existing onsite system footprint, it is extremely unlikely that any habitat will be disturbed.

¹¹Table 2 Federally Listed Endangered and Threatened Species in Massachusetts. EPA. February 5, 2016. <https://www3.epa.gov/region1/nepdes/hydrogp/2018gp/table-1-appendix-1-ma-esa.pdf> . Accessed February 2024.

Section 4.1.7 Historical and Archaeological Sites

The Town of Bourne holds multiple historical structures such as the Civil War Memorial (Soldiers and Sailors), as well as archaeological sites such as Grove Field Ossuary and Old Bourne Cemetery. Bourne Town Hall, as well as Bourne Historical Society, are also located in the town. These sites hold significance to the town's history and culture. It is unlikely that any of these sites will be disturbed by Core Sewer Area construction or General Use I/A onsite system installation. As a part of standard design and permitting, Historical and Archaeological Sites of concern will be screened through the Massachusetts Historical Commission to determine if any affected area is within the project scope. The Core Sewer Area final design will be adjusted accordingly. However, the new sewer pipeline will be placed in roadways and rights-of-way (such as private roads, easements, or cross-country routes). The intent is to avoid interaction with any historical, archaeological, or potentially archaeological areas.

For the General Use I/A onsite systems, the installation will occur on previously disturbed residential properties. Therefore, precautions based on the home status (e.g., Historically Significant Properties) will be followed as part of any specialized permitting required for installation.

Section 4.1.8 Agricultural Land

As referenced in the needs assessment, Agricultural purposes include cranberry bogs and other open farmland in the northern part of Bournedale. The largest parcel use is the Joint Base Cape Cod (JBCC) tax exempt use, which represents the major southeast portion of Town. Bourne also has 54 miles of shoreline. However, most of the work proposed will be within existing disturbed areas (i.e., public roadways, private roadways, etc.) and will be reconstructed to match existing conditions, so that these areas will not be affected.

Section 4.1.9 Environmentally Sensitive Areas

The Town of Bourne is surrounded by the 7.8-mile Cape Cod Canal and the temperate waters of Buzzards Bay. Bourne is recognized as the entry point to Cape Cod because it offers convenient proximity to New Bedford, Providence, and Boston, facilitating access to these destinations and making it a popular tourist location.

There are few areas in the Town of Bourne which are considered Areas of critical Environmental Concern. Phinney's Harbor is considered an embayment system due to its shoreline. The Back River is located at the upper inland reaches of this embayment system. Designated as an Area of Critical Environmental Concern (ACEC) by the state, the Back River establishes a framework for local and regional stewardship. This embayment system facilitates a range of recreational activities, including boating, swimming, shell fishing, and fin fishing.¹²

¹² "Phinney's Harbor." Cape Cod Commission. October 2017. https://www.capecodcommission.org/resource-library/file/?url=/dept/commission/team/Website_Resources/208/watershedreports/2017_Watershed_Report_UC_Phinneys_Harbor.pdf Accessed February 2024.

Further south, the Pocasset River ACEC encompasses a small river and estuarine system located along the eastern coastline of Buzzards Bay. Originally selected for designation by various groups including the Town of Bourne Conservation Commission, Board of Selectmen, Finance Committee, and Planning Board, it received its Area of Environmental Concern (ACEC) status in 1980 due to its remarkable natural assets.

All the Wetlands in Bourne, especially the coastal saltwater marshes, are sensitive areas. The preservation of wetland resources and the enforcement of regulations are responsibilities shared by the Bourne Conservation Commission and the Department of Natural Resources. These agencies work together to enforce federal, state, and local laws and regulations aimed at the management, protection, and improvement of wetlands. Improperly managed systems can result in pollution runoff containing harmful substances. On-site sewer systems often involve excavation and alteration of land, which can change the natural hydrology of the area. This alteration may affect the water flow patterns in and around wetlands, potentially leading to changes in water levels, drainage patterns, and sediment deposition. To avoid these potential hazards, the Town will dedicate to careful planning, management, and monitoring to minimize adverse impacts on surrounding wetlands and ensure the protection of these valuable ecosystems.¹³

SECTION 4.2 TRANSPORTATION IMPACTS

Section 4.2.1 Vehicular Traffic

Infrastructure projects have a notable short-term impact on traffic congestion due to construction activities near public and private roads. The Town plans to place its wastewater piping in public roadways, public rights-of-way, or private roadways (with necessary permissions and easements). Additionally, the Town aims to position its wastewater pumping stations near rights-of-way whenever feasible. A proactive approach will be taken to address construction-related traffic challenges.

The Town will consider completing construction during nightly working hours to avoid creating heavy traffic. The Town will also establish a well-developed public outreach approach for residents, businesses, and visitors to advise the public of anticipated traffic delays and/or detours due to construction. If detours are necessary, the next best route will be determined, and it will be clearly labeled.

Since Bourne is a tourist attraction during the summer, the tourist population during the summer will create higher traffic volumes. The Town would consider completing most construction at times when tourist visits are not as frequent.

Section 4.2.2 Pedestrian and Bicycle Transportation

As noted above, traffic will increase during installation of sewer systems due to construction blocking roadways and paths. Transportation management plans, including pedestrians and cyclists,

¹³ "Wetland Resources." Town of Bourne Local Comprehensive Plan. <https://townofbournelcp.wordpress.com/wetland-resources/> . Accessed February 2024.

are typically a standard Construction Design practice and will be most applicable to any roadway construction work in the Core Sewer Area.

If construction disturbs bike lanes, alternate bike routes will be created and labeled. While vehicle detours are planned, bike accessibility will be taken into consideration. In addition, all construction will be marked with roadway signs so that everything is clearly labeled, and accidents can be avoided, especially for bikers and pedestrians.

Decentralized I/A onsite alternative installation will take place in yards or private driveways and is not expected to disrupt any public pedestrian or cyclist transportation.

SECTION 4.3 INSTITUTIONAL IMPACTS

Section 4.3.1 Health Department

The Health Department in the Town of Bourne currently comprises four full-time staff members. Their responsibilities include enforcing federal, state, and local public health laws, rules, and regulations. The team consists of a Health Agent, Assistant Health Agent, Health Inspector and Secretary.

The Health Department conducts inspections, issue permits and licenses, provide training and resources, maintain records and databases, and facilitate biweekly Board of Health meetings. The Health Department reports to the Board of Health which consists of five members who volunteer their time to address various public health issues.

By default, the Town of Bourne operates under Title 5 regulations for septic systems. This means that the homeowner is responsible for inspecting, maintaining, and upgrading their systems. The Health Department oversees compliance with these regulations. Alternatively, the town has the option to opt-in for a new Watershed Permit. The table below outlines the key differences between Title 5 and the Watershed Permit.

Table 14: Title 5 (Default) vs. Watershed Permit (Opt-In)

	Title 5	Watershed Permit
Who is responsible?	Individuals	Town
When are upgrades required?	New Build: July 2024 Existing Systems: July 2030	Per timeline of Watershed Management Plan (e.g., CWMP Implementation Timeline)
Is there an Application Process?	No	Yes
Are there annual requirements?	No, but Local Approving Authority keeps records/performs inspections	Yes
Are there additional costs?	No	Yes*
Are there fines for non-compliance?	Yes, if applicable under Title 5	Yes

*Town would assume responsibility for any permit non-compliance, which incurs costs outside the CWMP Recommended Plan implementation costs (difficult to predict at this time).

The Health Department can enhance its operations by integrating GIS mapping, increasing staff levels, and enhancing recordkeeping. Access to accurate and up-to-date GIS information would significantly improve the efficiency of the recordkeeping system, allowing relevant data to be stored locally for each system. Additional staff would facilitate the maintenance of both GIS data and the physical onsite systems. Our recommendation is to implement an enhanced electronic recordkeeping system for managing onsite systems. This system would involve digitally uploading historical information currently available in hard copy and managing future data. Improved recordkeeping, whether electronic or not, will yield long-term benefits, especially in scenarios where ownership of the systems may change.

Section 4.3.2 Department of Public Works, Sewer Division

The Sewer Department operates as a subdivision in the Department of Public Works consisting of two full-time laborers with oversight and assistance from an office administrator, DPW Director, and Town Engineer. The Town of Bourne has a sewer division and sewer enterprise that maintains the existing sewer system. The Board of Sewer Commissioners consists of five board members and oversees rate setting, policy, and other related items to the sewer division.

The Buzzards Bay Wastewater Treatment Facility uses contracted services for its operation and maintenance. The two full-time laborers maintain and monitor five lift stations and the collection system which consists of gravity, low-pressure mains, and force mains. The office administrator maintains departmental records and permits. The DPW Director oversees the laborers and contract operations. The Town Engineer assists with technical evaluations and operational issues.

The Sewer Department Budget for FY23 and FY24 are presented in Table 14. The FY24 budget was approved for an increase of approximately \$270,000 in large part due to an increase in debt service.

Table 15: Bourne Sewer Department Budget

Item	<i>FY23 Expended</i>	<i>FY24 Approved</i>
Personal Services	\$ 171,640.28	\$ 205,940.00
Purchase of Services	\$ 780,364.83	\$ 786,526.00
Supplies	\$ 9,152.70	\$ 20,700.00
Other Charges and Expenditures	\$ 224,128.88	\$ 329,681.00
Capital Outlay	\$ 132,672.84	\$ 95,000.00
Permanent Debt Service	\$ 11,400.00	\$ 164,118.00
Total	\$ 1,329,359.53	\$1,601,965.00

Section 4.3.3 Stormwater Management Team

We recommend Stormwater Best Management Practices (BMPs) across all watersheds. Stormwater BMPs encompass a range of strategies, including street sweeping, maintenance of stormwater utilities, education and public outreach programs, thoughtful land use planning, and effective industrial/commercial reduction and control measures. The Stormwater Management Plan for 2019 discusses a number of these BMPs. The Stormwater Management Program Team, displayed in the figure below, consists of department heads from DPW, Planning, Engineering, Conservation, and Board of Health¹⁴. This plan outlines numerous ways to manage stormwater and mitigate stormwater pollution that are listed below:

- Public outreach and education
- Control of construction site discharges
- Control of stormwater from development projects
- Good housekeeping program to minimize pollution from municipal operations or properties.

¹⁴ "Stormwater Management Program (SWMP)." Town of Bourne. June 2019. https://www.townofbourne.com/sites/g/files/vyhlf7346/f/uploads/bourne_2019_stormwater_management_plan.pdf Accessed February 2024.

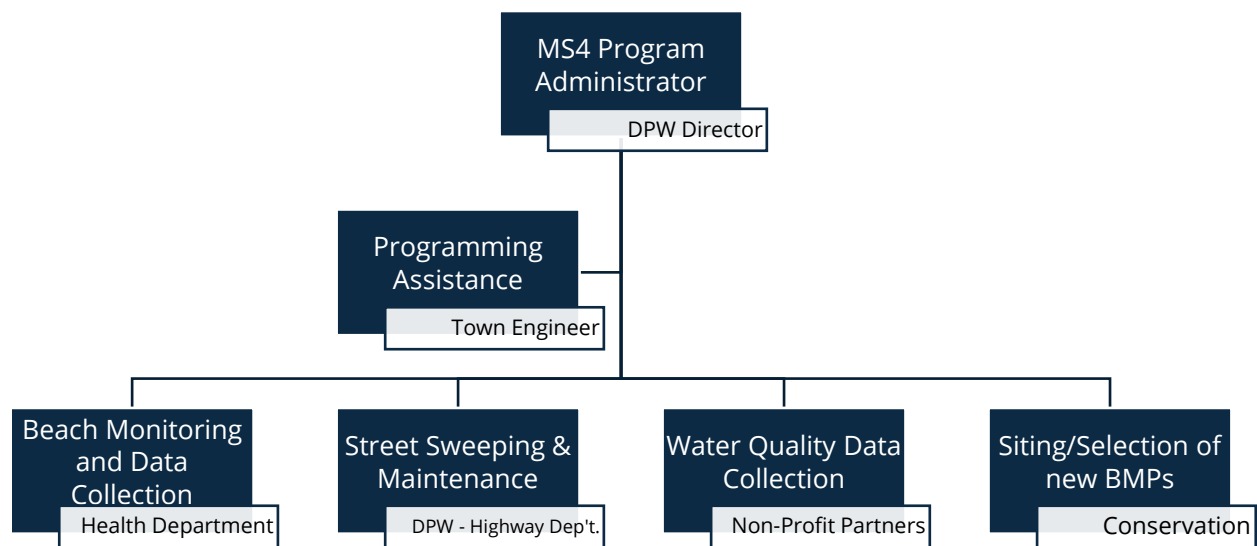


Figure 2: Town of Bourne Stormwater Management Team

Each BMP will require different resources or coordination. For example, the street sweeping will require additional coordination with the highway department at the DPW which will not require additional staff but may require a change in the current street sweeping schedule.

Section 4.3.4 Responsible Management Entity

A Responsible Management Entity (RME) is an agency or other organization tasked with managing decentralized wastewater infrastructure (i.e., septic systems, private sewage systems, individual treatment systems, or onsite sewage systems). An RME is an emerging utility management strategy that can assist in the management of widespread General Use I/A Alternatives. The RME allows oversight of every aspect of the EIA (Enhanced Innovative/Alternative) System lifecycle to ensure that these systems are restoring the watersheds.¹⁵ The RME can be a third-party agency (e.g. Barnstable County Septic Utility Program Pilot) or can be Town-based, through an existing utility or through creation of a new utility.

An RME allows for management of these systems in a comprehensive manner. This way the community can learn from newer systems as they are developed and installed. It allows the town to comply with watershed plans and environmental goals in a more customized manner.

¹⁵ "What is an RME?" Massachusetts Alternative Septic System Test Center. December 2022. <https://www.masstc.org/rme/basics/what-is-an-rme> Accessed February 2024.

How does an RME work?

The EPA has various management models for decentralized systems. There are two that outline an RME, one being where the property owner owns the system and the other where the RME owns the system. The table below outlines the main differences between the two models.

Table 16: EPA Management Models¹⁶

	Name	Owner	RME Action	Best for
Model 4	RME Operation and Maintenance Model	Property Owner	Tracks compliance with inspections and other required maintenance	Clustered systems
Model 5	RME Ownership Model	RME	Owns, operates, and manages the decentralized systems comparable to the centralized system	Clustered systems serving multiple properties under different ownership

Model 4 requires more work from the property owner which has an impact on ease of operation for the RME since the RME is tracking compliance. Model 5 gives the RME more control but requires more work upfront to establish a system.

Case Studies

The following outlines three case studies across the United States where the town implemented an RME using management models 4 or 5.

Blacksburg, VA¹⁷: This follows Model 5 with the DPW serving as the RME. In this case, there were about two hundred homes each with their own septic system but connected to the same collection system that uses internet based remote monitoring. The responsibility of the resident was to not dump fats, oils, grease, chemicals, or solids waste down the drains. If this happens, the RME is notified, and the resident must take corrective action. The users of the decentralized region pay the same water and sewer rates as those in the centralized region. Pumping occurs every seven years and costs \$150 per tank [2015 dollars].

Otter Tail Lake, Minnesota¹⁸: This RME follows Model 4 with the Otter Tail Water Management District (OTWMD) serving as the RME. The OTWMD was formed specifically to

¹⁶ "Voluntary National Guidelines for Management of Onsite and Clustered (Decentralized) Wastewater Treatment Systems." Environmental Protection Agency. March 2003. https://www.epa.gov/sites/default/files/2015-06/documents/septic_guidelines.pdf Accessed February 2024.

¹⁷ "Decentralized Wastewater Management Case Studies – Blacksburg, VA." Environmental Protection Agency. https://www.epa.gov/sites/default/files/2015-06/documents/decentralized-case-study_blacksburg-va-2.pdf Accessed February 2024.

¹⁸ "Decentralized Wastewater Management Case Studies – Otter Tail Lake, Minnesota." Environmental Protection Agency. https://www.epa.gov/sites/default/files/2015-06/documents/decentralized-case-study_otter-tail-lake-mn-2.pdf Accessed February 2024.

maintain individual and clustered systems. Like Bourne, this area has a fair number of seasonal residents. The OTWMD maintains systems for both the permanent residents which are inspected every two years and seasonal systems that are inspected every three years. The district contracts with service providers and provides a list of accepted pumpers and installers that homeowners can hire. The OTWMD staff includes one full-time and two part-time employees. The annual operating budget is \$200,00 funded by user fees of \$43 for seasonal residences and \$151 for permanent residences.

Phelps County, Missouri¹⁹: This RME follows Model 5 with the Public Water Supply District #2 (PWSD2) serving as the RME. The system consists of septic tank effluent pumps (STEP) collection system and recirculating sand filter (RSF) treatment system. Owners with malfunctioning individual systems may voluntarily connect and PWSD2 offers incentives such as connection fee waivers to get homeowners to connect. PWSD2 charges a flat rate of \$46.50 per month to fund the program and has the power to terminate potable water for not paying.

RME's in New England

Barnstable County²⁰ received a grant in September of 2022 to implement a regional RME over a 5-year period. In this case Massachusetts Alternative Septic System Test Center (MASSTC) would function as the RME. MASSTC is a well-established testing and research facility for innovative/alternative technologies. More information will become available as the process continues to move along.

Charlestown, RI has an On-Site Wastewater Management Program which is an RME following the Operation and Maintenance Model (Model 4). All of Charlestown relies on septic systems for sewage disposal.²¹ This model means that the ownership and the responsibility of the operation and maintenance of the system still lies with the property owner. The Town provides information on service providers, when inspections need to occur, general information about the systems, and access to the septic history to the residents on the town website. The approved providers upload information about the inspection to the town's database. This allows the town to keep a comprehensive log of what systems are being inspected and if the property owners are being compliant.

Advantages and Disadvantages for an RME in Bourne

¹⁹ "Decentralized Wastewater Management Case Studies – Phelps County, Missouri." Environmental Protection Agency. https://www.epa.gov/sites/default/files/2015-06/documents/decentralized-case-study_phelps-county-mo-2.pdf Accessed February 2024.

²⁰ "Barnstable County Receives EPA Grant to Develop a Low-Cost Wastewater Utility for Advanced Onsite Septic Systems." Barnstable County Department of Health and Environment. September 2022. <https://www.capecod.gov/2022/09/26/barnstable-county-receives-epa-grant-to-develop-a-low-cost-wastewater-utility-for-advanced-onsite-septic-systems/> Accessed February 2024.

²¹ "Town of Charlestown – On-Site Wastewater Management Program." Town of Charlestown Rhode Island. <https://charlestownri.gov/index.asp?SEC=57BE787A-1F23-406A-906B-4FBC5BCACF34&DE=96357C4D-96F6-49F6-8FA4-021E0B30C8FF> Accessed February 2024.

An RME will be required with Bourne's decision to move ahead with I/A systems as a major part of the Recommended Plan. While guidance documents exist presenting different models of RMEs, currently the only operational RMEs are in other states. The grant funded Barnstable County pilot RME may result in an option for a regional RME the Town of Bourne could be a part of for a fee. Otherwise, the Town would have to create a local RME. A regional RME would consolidate the oversight, inspections, and reporting while a local RME would require additional staff and efforts from the Town to implement and manage. The RME in Barnstable County is an opportunity for the town to operate under a RME without having the additional load of maintaining it.

The Ownership Model would be beneficial due to the number of seasonal residents in Bourne. This would reduce the amount of responsibility by the resident and coordination by the RME especially in the off-season where it would be difficult.

SECTION 5 COST ESTIMATE

SECTION 5.1 TRADITIONAL SOLUTIONS

Section 5.1.1 Decentralized General Use I/A Onsite Systems

General Use I/A onsite system costs were used as the basis for the decentralized traditional solution. As of March 2022, there are five approved vendors on the I/A technology list which meet the 19 mg/L nitrogen effluent removal requirement. The number of general use approved technology vendors is expected to increase over time as more vendors can pilot and achieve provisional status. Therefore, the cost basis for this recommended plan is an average of the five available technologies, which may change over future revisions of this plan.

Capital Costs

Table 16 presents the prices for a Nitrogen Reducing filter from four different source companies (Norweco, Septi-Tech, Aquapoint, Orenco, and Bio-Microbics). This nitrogen reducing filter will be applied as a Typical Residential Installation for a 3-bedroom home in the town of Bourne. Prices for all include the unit itself and do not include tax, delivery fees, any installation fees or materials, and any design or permitting fees as required by the Town of Bourne Health department. Prices were given as of February 2024. The information sheets and budgetary basis information from each vendor are included in **Appendix B**.

Table 17: General Use I/A Budgetary Capital Costs

Company	Model	Inclusions/Exclusions	Unit Price ¹
Aquapoint	Bioclere Model 16/12ss	Pricing includes delivery and tax. Pricing does not include tanks, electrical work, external connections or PVC piping, SAS, etc.	\$12,350
Bio-Microbics	MicroFAST® 0.5 – 9.0 HighStrengthFAST® 1.0 – 9.0 NitriFAST® 0.5 - 9.0	Pricing does not include tanks, electrical work, external connections or PVC piping, SAS, etc.	\$6,100
Septi-Tech	STAAR 0.5 Denite (M400N)	Pricing includes STAAR components, delivery to the site, setup into tanks, connections and PVC within treatment tanks, and system startup. Pricing does not include tanks, electrical work, external connections or PVC piping, SAS, etc.	\$10,200
Norweco	Singulair 960 DN models 600, 750, 1000, and 1500; Singulair 960 DN Green model 600	Pricing includes delivery and setup. Pricing does not include any electrical work.	\$8,962
Orenco	Advantex AX20, AX20-RT, AX25-RT, AX100 <10,000 GPD	Pricing includes delivery, setup, electrical work, and external connections.	\$48,600

1. Massachusetts Sales Tax (6.25%) added to unit if not explicitly included by the vendor.

The systems do not include any design, permitting, or site work (i.e., site clearing, excavation, materials). A few include some electrical connections and installation, but no comprehensive installation (including pipe connections or inspecting existing drainfields). For the purposes of this plan, the design, permitting, construction, and the unit itself were included in an estimated capital cost. As the vendor unit prices vary, the average price was used. The contingency was carried at 10% of the subtotal cost, to account for any varying existing conditions or unforeseen challenges with each individual installation. Therefore, the range could be between \$38,000 and \$42,500 for an individual installation.

Table 18: General Use I/A Individual System OPCC – New Installation

GU I/A Individual System	OPCC (March 2024)
Average GUIA Unit	\$ 15,850.00
Design & Permitting	\$ 3,170.00
Construction (Electrical and Sitework) ¹	\$ 19,020.00
Permits/Fees ²	\$ 525.00
Contingency (10%)	\$ 3,860.00
Total	\$ 42,425.00

1. Landscaping and/or asphalt pavement is not included in base estimate.

2. Includes current Bourne Permit fees for General Permit, I/A Technology, and one Percolation Test

Operation and Maintenance Costs

For general use I/A systems, there is a power component as compared to Title 5 septic systems, which do not require power. The estimated power usage is modeled for each general use I/A system below, which is assumed to be paid by the property owner directly. The Operation, Maintenance, and Management costs are in addition to the estimated energy usage costs.

Estimated Energy Usage

Based on manufacturer cost sheets, the following power usage is estimated per system, Estimated annual electricity cost based on 12 -hour operation, 365 days a year, with a \$0.28 kW per hour electricity rate.²² The overall cycling may occur in less frequent intervals, but each system is manufactured differently.

²² "Average Energy Prices, Boston-Cambridge-Newton – October 2023." Northeast Information Office, Bureau of Labor Statistics. Web. https://www.bls.gov/regions/northeast/news-release/averageenergyprices_boston.htm

Table 19: General Use I/A Estimated Annual Energy Costs

Manufacturer/Model	Daily Usage	Annual Estimated Average Cost
Orenco Systems	2.4 kW/day	\$24.09
Aquapoint-Bioclere	4.25 kW/day	\$42.66
Bio-Microbics	3.96 kW/day	\$39.75
Norweco	6.24 kW/day	\$81.20
Septi-Tech	8.09 kW/day	\$62.63
Average		\$50.07

The energy costs are typically paid for by the homeowner, as it is added on to a typical residential meter.

Operation, Monitoring, and Maintenance:

Based on the 2010 Comparison of Costs for Wastewater Management Systems, the average annual cost to operate a General Use I/A onsite system was \$1,375 (April 2014, ENR 9750). In today's dollars, the cost is approximately \$1,910 (March 2024, ENR 13532.01). The baseline costs did not include municipal procurement or oversight of operations, which adds approximately 25% or \$475 per year for the GUIA costs. The monthly expense is approximately \$200 per household for Municipal Oversight and Maintenance related to the GUIA systems.

Table 20: I/A Operation, Monitoring, and Maintenance Cost Estimate

Average Annual O&M Cost	2014 Cape Cod Cost per year ²³	2024 Cost per year*	Total Cost with Municipal Procurement and Oversight (+25%)
General Use I/A	\$ 1,375.00	\$ 1,910.00	\$ 2,390.00

*Did not assume RME or Septic Utility

This amount is comparable to other national examples of decentralized operation and maintenance systems. For example, Chesapeake Bay's average operation and maintenance cost for decentralized systems is about \$2,140 per year (2018 cost \$1,744, updated to today's dollars).²⁴ As listed in Section 4.3.4 above, the use of the Responsible Management Entity also has variable costs depending on the level of ownership that Bourne chooses to employ. For example, the Otter Trail Lake RME in Minnesota offers two types of RME service plans: Passive and Active.

- The passive maintenance plan pays an administrative fee each year for being within the district boundaries, but the homeowner oversees any cost that is associated with the septic

²³ "Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod," Barnstable County Wastewater Cost Task Force. April 2010. (Updated by AECOM, 2014).

²⁴ Chesapeake Assessment Scenario Tool. "Cost Effectiveness of BMPs." Chesapeake Bay Program Office. Phase 6 – 7.11.1. Web. <https://cast.chesapeakebay.net/Documentation/CostProfiles>

system. The district will provide record keeping and troubleshooting help, but any cost is the responsibility of the homeowner.

- The active maintenance plan is where the system is taken care of by the district. The user fee covers the maintenance and upkeep of the septic system from the inlet of the septic tank through the drainfield (With the exception of freeze ups in the winter months and inappropriate use by the homeowner; those costs are incurred by the homeowner).

The range for these costs may cover the additional staff within the Health Department to advance the Town's nitrogen removal programming or may be added through the creation of a Septic Utility Program, like a Sewer Enterprise. The rates collected and assessed may be like a Stormwater Utility (where flat fees are assessed per size of home and therefore size of I/A system) or usage. The amount carried in Table 19 below assumes some element of municipal oversight, whether a County RME system is used or Local RME (i.e., Town RME).

Total Cost

The total cost for each individual GU I/A onsite system is calculated by adding O&M costs to the capital cost over the lifecycle of the technology. Assuming that the General Use I/A system is operated and maintained in accordance with manufacturer requirements, the assumed useful life is 20 years. Assuming a 5% interest rate for repayment of capital costs, the total annual cost is \$5,800 for each individual general use IA system.

$$\begin{aligned} \text{Individual Annual Cost} &= (\text{Capital Cost} \times \text{CRF}) + \text{O\&M Cost} \\ \text{Individual Annual Cost} &= (\$42,425 \times 0.08) + (\$2,390 + \$50) \\ \text{Individual Annual Cost} &= \$5,834 \end{aligned}$$

Townwide, if the Town were to implement General Use I/A systems across all watersheds at the same time, the Total Annual Cost would be as follows, by Tier.

Tier 1 – Natural Resource NSA Watersheds (TMDL Watersheds)

$$\begin{aligned} \text{Total Annual Cost} &= (\text{Capital Cost} \times \text{CRF}) + \text{O\&M Cost} \\ \text{Total Annual Cost} &= (\$60M \times 0.08) + (\$3.4M) \\ \text{Total Annual Cost} &= \$8.2M \end{aligned}$$

Tier 2 – Nitrogen Impaired Watersheds

$$\begin{aligned} \text{Total Annual Cost} &= (\text{Capital Cost} \times \text{CRF}) + \text{O\&M Cost} \\ \text{Total Annual Cost} &= (\$105M \times 0.08) + (\$5.9M) \\ \text{Total Annual Cost} &= \$14.3M \end{aligned}$$

Adding these two costs together, the Total Annual Cost for all General Use I/A Systems in this Plan is \$22.5M per year.

Section 5.1.2 Core Sewer Area – Buttermilk Bay

As stated in the Alternatives Analysis, the Core Sewer Area identified for the CWMP is in Buttermilk Bay. The existing wastewater development

Capital Costs

The costs to upgrade the sewer system in Buttermilk Bay to a low-pressure sewer system are outlined in Table 21 below based on a quote for E/One, a worldwide manufacturer of complex metal parts and industrial products pioneering low-pressure, gravity-independent, contour-following sewage collection systems.

The following cost estimates are for the Core Sewer Area – Alternative 1, and Buttermilk Bay – Alternative 2 which encompasses Alternative 1 plus remaining parcels at the southwestern end of Buzzards Bay village. Core Sewer Area – Alternative 1 adds approximately 6 miles of low-pressure sewer to the collection system with a discharge point at the Buzzards Bay WWTF. Buttermilk Bay Alternative 2 adds a total of 12 miles of low-pressure sewer to the collection system, also with a discharge point at the Buzzards Bay WWTF.

Table 21: Low Pressure Sewer System Costs, March 2024 OPCC

Item	Core Sewer Area – Alternative 1 (~6 mi.)	Buttermilk Bay – Alternative 2 (12 mi.)
Low Pressure Sewer System ¹ .	\$10,950,000	\$21,900,000
Design, Permitting, Bidding	\$1,100,000	\$2,200,000
Construction ² .	\$1,100,000	\$1,900,000
Contingency (20%)	\$2,200,000	\$4,400,000
Total	\$15,350,000	\$30,400,000

1. Based on the average of two vendors: E-One and Keen Pumps, who provided hydraulic designs of the entire Buttermilk Bay Core Sewer Area (including Sewer Alternative 1 and the remainder of the southern Buttermilk Bay shoreline). The cost for just Sewer Alternative 1 – Core Sewer Area is about half of the total estimated cost. Assumes discharge at Buzzards Bay WWTF in Bourne.

2. Construction estimated as 125% of construction materials cost.

As mentioned in Section 3.1.1., Buzzards Bay WWTF will need to be upgraded to accommodate either of the two Buttermilk Bay core sewer expansion areas. The facility

Operation and Maintenance Costs

The Town of Bourne maintains its own existing collection system serving the Downtown Buzzards Bay area. The Department of Public Works oversees the Sewer Division, funded by the Sewer Enterprise fund.

The operation and maintenance costs include Personnel Expenses, Services (including energy, chemicals, and equipment), Supplies, Capital Assessments for Wareham IMA, Capital Outlay, and Debt Service (including Principal and Interest). The cost per gallon is about \$0.04 with the average sewer bill around \$150 per month.

Table 22: Current Operation and Maintenance Costs

Item	FY23 Expended	FY24 Approved
Personal Services	\$ 171,640.28	\$ 205,940.00
Purchase of Services	\$ 780,364.83	\$ 786,526.00
Supplies	\$ 9,152.70	\$ 20,700.00
Other Charges and Expenditures	\$ 224,128.88	\$ 329,681.00
Capital Outlay	\$ 132,672.84	\$ 95,000.00
Permanent Debt Service	\$ 11,400.00	\$ 164,118.00
Total	\$ 1,329,359.53	\$ 1,601,965.00
<i>Cost Per mile (8 miles)</i>	<i>\$167,000</i>	<i>\$200,250</i>
<i>Cost Per user (655 users)</i>	<i>\$2,100</i>	<i>\$2,500</i>

Based on the estimated mileage for the additional sewer areas, the following estimates for additional operation and maintenance are provided in the Table below. The Operation and Maintenance costs assume that the Town will continue to use Contract Operations for the Buzzards Bay WWTF (which are approximately 10% of the overall Sewer Department budget) and utilize the same solids disposal costs. It was assumed that the Buzzards Bay WWTF investigation, design, permitting, bidding, and construction would take place before adding either Sewer Alternative to the collection system. Therefore, Alternative 1 and Alternative 2 would not be actualized until Plan Year 7 (2031) at the earliest. Existing O&M budgets were escalated using an annual 5% inflation increase between 2025 and 2030. Next, the estimated O&M costs were estimated by multiplying the increase in annual wastewater flow treated by the planned cost per gallon (\$0.06 in 2030). As mentioned in Section 3.1.1, Buttermilk Bay – Alternative 2 includes the Core Sewer Area – Alternative 1 plus additional unsewered parcels along the southwestern end of Buzzards Bay village, closest to Cohasset Narrows.

Table 23: Sewer Alternative Estimated O&M Costs

Sewer Area	Additional Mileage	Additional Users	Estimated Annual O&M Cost	
			Total	Per User
Core Sewer Area – Alternative 1	6 miles	330	\$3,452,000	\$3,504
Buttermilk Bay Alternative 2	12 miles	858	\$5,532,500	\$3,657

Total Cost

The total cost for each Alternative 1 or Alternative 2 sewer connection is calculated by adding O&M costs to the capital cost over the lifecycle of the technology. Assuming that the low-pressure sewer is operated and maintained in accordance with manufacturer requirements, the assumed useful life of the low-pressure sewer system is 40 years. Most typical wastewater treatment facilities have a

useful life of 20 years, due to electrical upgrades and component lifecycles. Assuming a 5% interest rate for repayment of capital costs, the Total Annualized Cost for Sewer Alternative 1 is \$6.1M and Sewer Alternative 2 is \$10.5M.

Core Sewer Area - Sewer Alternative 1

Addition of 330 parcels through low-pressure sewer system to Buzzards Bay WWTF and assumed capital upgrades for capacity at the treatment plant. The Total Annualized Cost is \$2.915M and the estimated Total Annualized Cost per user is \$9,642, assuming 985 total sewer users.

$$\begin{aligned} \text{Total Annual Cost} &= (\text{Capital Cost}_{LPS} \times CRF_{LPS}) + (\text{Capital Cost}_{WWTF} \times CRF_{WWTF}) + O\&M \text{ Cost} \\ \text{Total Annual Cost} &= (\$15.3M \times 0.06) + (\$21.8M \times 0.08) + (\$3.4M) \\ \text{Total Annual Cost} &= \$6,099,460 \end{aligned}$$

Buttermilk Bay - Sewer Alternative 2

Addition of 858 parcels total through low-pressure sewer system to Buzzards Bay WWTF and assumed capital upgrades for capacity at the treatment plant. The Total Annualized Cost is \$10.46M and the estimated Total Annualized Cost per user is \$16,830, assuming 1,513 total sewer users.

$$\begin{aligned} \text{Total Annual Cost} &= (\text{Capital Cost}_{LPS} \times CRF_{LPS}) + (\text{Capital Cost}_{WWTF} \times CRF_{WWTF}) + O\&M \text{ Cost} \\ \text{Total Annual Cost} &= (\$30.4M \times 0.06) + (\$39.3M \times 0.08) + (\$5.5M) \\ \text{Total Annual Cost} &= \$10,461,710 \end{aligned}$$

Section 5.1.3 Traditional Cost Summary

The following table summarizes the Total Annual Cost and the Total Annual Cost per individual for the three alternatives identified. The Pilot EIA alternative costs not included in this summary as Pilot and Provisional Approved I/A onsite systems are considered non-traditional technologies.

Table 24: Traditional Solution Cost Summary

Alternative	Total Annual Cost (\$M)	Individual Total Annual Costs ¹	Estimated Nitrogen Removal (kg-N/yr.)	Approximate Cost per Kg N removed
General Use I/A Onsite System	\$22.5M	\$5,800	6,800 – 7,800	\$2,900- \$3,300
Sewer Alternative 1	\$6.1M	\$9,642	1,160	\$5,260
Sewer Alternative 2	\$10.46M	\$16,830	3,000	\$3,490

1. For General Use I/A systems, the individual cost is the annual cost per parcel. For the sewer alternatives, the individual cost is the annual cost per sewer user (which may also be per parcel, depending on property type).

SECTION 5.2 NON-TRADITIONAL SOLUTIONS

Section 5.2.1 Pilot EIA Program

For consideration in place of the Buttermilk Bay Core Sewer Area - Sewer Alternative 1, the following costs were estimated for a potential Pilot Enhanced I/A program among the 330 parcels in the Queen Sewell Pond vicinity of the Buttermilk Bay Watershed. No vendor capital costs were obtained and an estimated 20% increase on the General Use I/A systems was assumed.

Operation and Maintenance Costs

Similar to general use I/A systems, there is a power component for most EIA system as compared to Title 5 septic systems, which do not require power. The EIA systems may also contain specialty components, such as media or chemicals, which may require more oversight on a month to month basis. The following table estimates the annual individual system Operation and Maintenance costs for an Enhanced I/A System.

Table 25: EIA Operation, Monitoring, and Maintenance Cost Estimate

Average Annual O&M Cost	2014 Cape Cod Cost per year²⁵	2024 Cost per year¹.	Total Cost with Municipal Procurement and Oversight (+25%)
Enhanced I/A (Pilot or Provisional)	\$ 3,850.00	\$ 5,350.00	\$ 6,690.00

1. Did not assume RME or Septic Utility

Total Cost

The capital costs for each individual EIA system was estimated to cost about 20% more than a General Use I/A system, as the technologies have not yet been widely adopted. Assuming that the system is maintained in accordance with manufacturer requirements, the EIA system useful life is also estimated at 20 years. Based on the following Operation, Monitoring and Maintenance estimate for EIA systems, and a 5% interest rate for repayment costs, the total annual cost is \$10,800 for each individual Pilot EIA system, about \$5,000 more than the General Use I/A.

$$\begin{aligned} \text{Individual Annual Cost} &= (\text{Capital Cost} \times \text{CRF}) + \text{O\&M Cost} \\ \text{Individual Annual Cost} &= (\$50,910 \times 0.08) + (\$6,690) \\ \text{Individual Annual Cost} &= \$10,763 \end{aligned}$$

If the Town were to implement the Pilot EIA alternative all at once, the estimated total annual cost is \$3.5M for the 330 parcels in the Buttermilk Bay Core Sewer Area – Alternative 1 region.

$$\begin{aligned} \text{Total Annual Cost} &= (\text{Capital Cost} \times \text{CRF}) + \text{O\&M Cost} \\ \text{Total Annual Cost} &= (\$16.8M \times 0.08) + (\$2.2M) \\ \text{Total Annual Cost} &= \$3.5M \end{aligned}$$

²⁵ "Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod," Barnstable County Wastewater Cost Task Force. April 2010. (Updated by AECOM, 2014).

Section 5.2.2 Stormwater BMP

Typical expenditures include Capital and Operation and Maintenance Costs. For Bourne, the Engineering, Conservation, Public Works, and Health departments share the Stormwater duties, for public safety and right of way activities. The following outlines typical costs for stormwater activities.

Table 26: Typical Stormwater Costs

Cost Type	Capital	Operation and Maintenance
Fixed	Equipment	Staff Memberships (e.g., Buzzards Bay Stormwater Coalition, Massachusetts Maritime Agreement for MS4 Services)
Variable	Projects Consultant Assistance	Supplies Energy (Fuel) Materials Consumable Supplies (e.g., laboratory supplies)

Capital Costs

The Town of Bourne has the following expenditures planned for Stormwater related best management practices, including proactive maintenance, replacement of critical equipment, upgrades to existing outfalls and improvements related to nutrient removal. The Engineering and Department of Public Works have \$3.29M forecasted for stormwater related capital improvements over the next five years, for an average of \$658,000 per year.

Table 27: Bourne Capital Planned Spending - Stormwater

Item	Watershed	FY25	FY26	FY27	FY28	FY29
Electric Ave. Boat Ramp	Buttermilk Bay	\$99,000				
Queen Sewell Green Infrastructure	Buttermilk Bay		\$150,000			
Sagamore Beach Boat Ramp	Cape Cod Bay		\$150,000			
Circuit Ave. Roadway	Pocasset Harbor		\$500,000			
Wings Neck Roadway	Pocasset Harbor/Buzzards Bay		\$500,000			
Eel Pond Rd. Outfall	Phinney's Harbor			\$150,000		
Shore Rd. Park Outfall	Pocasset River			\$340,000		
Massasoit Ave. or Circuit Ave. Outfall	Pocasset Harbor			\$25,000	\$150,000	
Old Head of the Bay Outfall	Buttermilk Bay				\$25,000	\$150,000
Drainage Repairs (DPW)	Townwide		\$250,000			
Replace Street Sweeper (DPW)	Townwide					\$800,000
Subtotal		\$99,000	\$1,550,000	\$515,000	\$175,000	\$950,000

The implementation plan for the installation of structural BMPs is prioritized based on nitrogen loading. We recommend pursuing the proposed BMPs in the in the following order, highest nitrogen loading area first.

- Old Head of Bay Rd at Head of the Bay Rd,
- Barlows Landing Beach,
- Beach Access Rd off Squeteague Harbor Rd,
- End of Massasoit Ave, and
- Circuit Ave at Outfall 86

Operation and Maintenance Costs

The Cape Cod Costs for Wastewater Management strategies estimated the following costs per curb mile of roadway within the watershed. Based on standard street sweeping practices, care of roadway best management practices, and public education, the costs were able to be summarized per roadway curb mile.

Table 28: Annual O&M Cost for Stormwater, per Curb Mile

Annual O&M Cost	2014 Cost (per curb mi)	2024 Cost (per curb mi)
Low	\$ 3,740.00	\$ 5,200.00
High	\$ 9,020.00	\$ 12,520.00
Average	\$ 6,380.00	\$ 8,860.00

However, the overall number of town-owned roadways versus privately-owned roadways in the nitrogen sensitive areas made this cost difficult to accomplish using the standard curb mile calculations. Therefore, the Total Annual Cost was determined using the price per kg of nitrogen removed below.

Total Annual Cost

According to the Cape Cod 208 Plan Update in 2017, the removal cost per kg-N was \$695 (over the average life cycle of 20 years), which is \$900 per kg-N in today's (2024) dollars. The non-structural strategies include street sweeping, maintenance of stormwater utilities, education and public outreach, land use planning and impervious cover reduction/control. For Bourne, this means updating Town Stormwater Bylaws, enforcing regulations and policies, and supporting appropriate annual funding to meet the removal goal of 20% of controllable nitrogen load through stormwater runoff. The following table shows the approximate funding necessary to support the removal of nitrogen through Stormwater Best Management Practices, based on the Cape Cod 208 Plan Update for removal of nitrogen.

Table 29: Stormwater Removal Costs per Kg Nitrogen

Watershed	Bourne Load Removal	Stormwater Removal Maximum (20% of Controllable load)	Estimated Annual Cost (2024)
Megansett-Squeteague Harbor ¹ .	564	113	\$ 101,700
Phinneys Harbor ¹ .	1,706	341	\$ 306,900
Buttermilk Bay ² .	1,402	280	\$ 252,000
Pocasset Harbor ² .	3,120	624	\$ 561,600
Pocasset River ² .	1,289	258	\$ 232,200
Total	8,072	1,616	\$1,454,400

1. As required by TMDL.

2. Based on 25% removal of estimated total controllable load, subject to approval by MassDEP.

Section 5.2.3 Non-Traditional Cost Summary

The following table summarizes the Total Annual Cost and the Total Annual Cost per individual for the two non-traditional alternatives identified. The Pilot EIA alternative costs are approximate as no specific vendor information was referenced at this time. The costs can be refined if the Town chooses to move forward with this alternative.

Table 30: Non-Traditional Solution Cost Summary

Alternative	Total Annual Cost (\$M)	Individual Total Annual Costs ¹	Estimated Nitrogen Removal (kg-N/yr.)	Approximate Cost per Kg N removed
Pilot EIA Onsite System	\$3.5M	\$10,800	803	\$4,359
Stormwater BMP	\$1.45M	N/A	1,616	\$897

1. Stormwater BMP individual total annual costs are not applicable as Bourne does not have a stormwater utility where funds are collected townwide for the purposes of stormwater management.

SECTION 5.3 PLAN COST SUMMARY

The following table summarizes the traditional and non-traditional solution cost summaries into one comparison table in order of highest total annual cost to lowest total annual cost. The approximate cost per kilogram (kg) of nitrogen (N) removed helps to understand the value of the environmental cost benefit when selecting the appropriate technologies as part of the final recommended plan.

Table 31: Draft Recommended Plan Cost Summary

Alternative	Total Annual Cost (\$M)	Individual Total Annual Costs	Estimated Nitrogen Removal (kg-N/yr.)	Approximate Cost per Kg N removed
General Use I/A Onsite System	\$22.5M	\$5,800 ¹	6,800 – 7,800	\$2,900- \$3,300
Buttermilk Bay Sewer Alternative 2	\$10.46M	\$16,830	3,000	\$3,490
Core Sewer Area - Alternative 1	\$6.1M	\$9,642	1,160	\$5,260
Pilot EIA Onsite System	\$3.5M	\$10,800	803	\$4,359
Stormwater BMP	\$1.45M	N/A ²	1,616	\$897

1. For General Use I/A systems, the individual cost is the annual cost per parcel. For the sewer alternatives, the individual cost is the annual cost per sewer user (which may also be per parcel, depending on property type).

2. Stormwater BMP individual total annual costs are not applicable as Bourne does not have a stormwater utility where funds are collected townwide for the purposes of stormwater management.

The highest individual total annual cost is Sewer Alternative 2 and the lowest individual total annual cost is the General Use I/A systems. However, both the highest and lowest individual total annual cost alternatives have similar costs per kg of nitrogen removed (between \$3,000 and \$3,500 per kg N removed). The lowest cost per kg of nitrogen removed is the stormwater best management practices alternative, which is less than \$1,000 per kg. It is important to note that the maximum nitrogen credit allowed, per MassDEP, is no more than 20% of the controllable load per watershed. Therefore, while the stormwater BMP solution may be the most cost effective, it cannot be expanded beyond its current estimated nitrogen removal allowance.

SECTION 6 IMPLEMENTATION PLAN

SECTION 6.1 WATERSHED PERMIT APPLICATION

Bourne is strongly encouraged to apply for a watershed permit for both of their TMDL watersheds: Megansett-Squeteague Harbor and Phinney's Harbor. The town can complete a Notice of Intent Letter and then has two years to submit a full application. The watershed permit must be able to achieve at least 75% of the necessary nitrogen load reduction over the 20-year permit period. To apply for the Watershed Permit, a Watershed Management Plan, needs to be signed and stamped by a Massachusetts Registered Professional Engineer, for the watershed or sub-watershed which includes maps, description of current and future nitrogen loading, as well as approved plans for removal of such controllable nitrogen loading. The following steps outline some initial analysis of the two watersheds which the Town of Bourne should prioritize Watershed Permitting for, as they are the two watersheds with Total Maximum Daily Loads which are classified as Natural Resource Nitrogen Sensitive Areas.

Section 6.1.1 Megansett-Squeteague Harbor

Megansett-Squeteague Harbor's loading is the smallest load removal of all the Bourne nitrogen impaired watersheds. After confirming the regulation de minimus load calculation methodology, it was determined that Megansett-Squeteague is ineligible for this exemption, as the controllable nitrogen load to remove is 7% for Bourne, greater than the 3% qualifier for de minimus.

$$564 \text{ kg N per year (removal required)} \div 7,611 \text{ kg N per year (controllable wastewater load)} = 7\%$$

Therefore, the Town of Bourne would need to pursue a Watershed Implementation Plan for the watershed. The Town of Bourne has been meeting with the Town of Falmouth to discuss potential for collaboration on a joint watershed permit for the shared Megansett-Squeteague watershed. Compliant with 314 CMR 21.03.2.c., an inter-municipal agreement confirming each permittee's percentage share of the aggregate pollutant reduction responsibility needs to be included in the application. A framework for administration including the implementation of the Watershed management plan, including funding and monitoring, needs to be included in the document.

Section 6.1.2 Phinney's Harbor

The Town of Bourne shares Phinney's Harbor with Joint Base Cape Cod upland and a small portion of Sandwich. Therefore, for the controllable nitrogen loading, Bourne has 100% of the loading within its jurisdiction. Other than potential beneficial land return from Joint Base Cape Cod, Bourne is solely responsible for wastewater nitrogen load removal from Phinney's Harbor watershed.

The loading is also considered much higher than the eligible 3% de minimus classification, requiring a watershed permit to show that within 20 years, 75% of the total controllable load can be removed.

SECTION 6.2 SCHEDULE

As requested by the Select Board, and for initial discussion of the draft recommended plan, two distinct timeframes for implementation were considered:

- Title 5 Regulation (default) timeline for Natural Resource Nitrogen Sensitive Area implementation and
- Watershed Permit (opt-in) timeline for Natural Resource Nitrogen Sensitive Area Implementation

To strike a balance between short-term needs and long-term goals, the General Use I/A implementation is staggered for non-designated watersheds. In other words, Tier 1 watersheds, or Designated Natural Resource Nitrogen Sensitive watersheds (Megansett-Squeteague Harbor and Phinney's Harbor) are prioritized for implementation first. Tier 2 watersheds, remaining nitrogen impaired watersheds without TMDLs (Buttermilk Bay, Pocasset Harbor and Pocasset River) are implemented second. Detailed implementation schedules, including the approximate annual capital cost, are included in Appendix D for Title 5 implementation and Appendix E for the Watershed Permit implementation.

SECTION 6.3 FINANCING

- This section will be updated after the implementation schedules are reviewed.
- The goal is to choose possible funding strategies around:
 - Whether the Town decides to pursue a Watershed Permit (time implications) and
 - Whether the Town decides to take ownership of decentralized systems (cost implications)

SECTION 6.4 ADAPTIVE MANAGEMENT

The CWMP is intended to be a living document, to be reviewed, revisited, and updated as phases are completed, and key performance indicators (KPIs) are recorded. Bourne intends to adaptively manage its CWMP by revisiting future phases based on the successful performance of past installations, or to pivot to an alternative technology if the original performance estimated is not met.

Adaptive Management allows Bourne to revisit its Recommended Plan and adjust based on improvements to technology, changes in existing conditions or community plans, or to adapt to climate change and other phases. Timing, phasing, costs will evolve over the planning period and the goal of adaptive management is to hold commitment to improving water quality while adjusting the technology means and numbers as data is collected. For example, at the time of this report, there are only five technologies which are General Use Innovative/Alternative onsite systems as approved by MassDEP. The hope is that more technologies that are in development will become eligible for General Use approval and be able to be used more widely by residents in Bourne.

Section 6.4.1 Data Monitoring

Bourne has two TMDL watersheds which each have multiple parameters which were monitored during the MEP process and can be duplicated for monitoring improvements in water quality, habitat, and other environmental indicators. There are also multiple nitrogen impaired watersheds that, while a linked-embayment model was not produced for, the regional and local water quality monitoring non-profit network allows for consistent data collection. Data sources for outside collaboration and monitoring are listed below:

Table 32: Stakeholder Data Monitoring Sources

Regional	Local
Buzzards Bay Coalition Buzzards Bay National Estuary Program Cape Cod Commission	Bourne Health Department Beach Monitoring Conservation Commission Studies Bourne Conservation Trust

Section 6.4.2 Quality Management Plan

The quality management plan defines the goals of the monitoring plan, the selected water quality parameters, the methods of monitoring to be employed, the sampling frequency, locations, timing, duration, and a quality assurance plan. Quality Assurance is the plan for specific monitoring of quality-control elements to be implemented to ensure data collected for Key Performance Indicators will be of known and documented quality to meet the CWMP needs.

For future adaptive management considerations, including reporting for Watershed Permit progress applications, laboratory certifications for outside testing will be included in the Quality Management Plan as well as any standards provided by the Massachusetts Maritime Academy, for samples tested and recorded as part of the Stormwater BMP monitoring agreement, and the Buzzards Bay Coalition, as part of the ongoing water quality monitoring testing taking place in each Buzzards Bay embayment.

Section 6.4.3 Reporting

In consultation with the Watershed Permit reporting requirements, the following headings will be contained in the five-year report, submitted to MassDEP, Cape Cod Commission, and available on the CWMP Implementation website.

- Progress towards General Use I/A onsite installations
- Financial Status of Projects including:
 - Funding sources
- Updated future phase schedule
- Continued inspection of existing I/A systems
- Proactive recruitment of voluntary General Use I/A conversion properties
- Installation of Stormwater BMPs
- Sharing of progress towards Stormwater BMP Installations
- Policy Changes or Implementation
- Updates to Build Out projections.
- Updates to relevant Planning documents

- Updates on coordination with joint communities
- Status of any updates with Joint Base Cape Cod
- Status of any updates with Massachusetts Maritime Academy
- Status of collaboration with co-permittee Wareham

Should the Town continue to pursue a Watershed Permit, the following will be included in their Annual Report to MassDEP, in accordance with 314 CMR 21.00 - Massachusetts Watershed Permit Regulations:

- Baseline Nitrogen Load
- Updated Nitrogen Load
- Updating aggregate nitrogen loading area (for example, land released from Joint Base Cape Cod that may assist with upland aggregate nitrogen loading).

The Town will also be required to submit a five-year report to MassDEP, including the following:

- a description, including dates, of the installation of any treatment and control systems and facilities, or approaches taken, during the reporting period;
- a summary of results of any monitoring information that has been collected and analyzed during the reporting period;
- a performance evaluation of the treatment and control systems and facilities, and approaches taken, during the reporting period, including identification of any non-compliance, performance shortcomings, or challenges along with recommended corrective actions and optimization activities, as necessary;
- a discussion of the activities planned, and the associated critical path for the next five-year reporting cycle, consistent with the implementation schedule;
- a self-assessment review of compliance with the terms and conditions of this permit during the reporting period; and
- a progress report which describes the progress made in achieving the Necessary Nitrogen Load Reductions and water quality and habitat quality restoration goals required to achieve the designated uses for the waterbody, including an evaluation of the results of the permittee's water quality management program to date, any proposed adjustments and modifications to the strategies and practices under the approved Watershed Management Plan, pertinent sampling and monitoring results, including sentinel station monitoring results (if applicable), as well as other data pertinent to the technologies installed and approaches taken under the approved Watershed Management Plan as of the date of the report, any proposed nitrogen reduction credits for Alternative Control Approaches and Technologies, any changes requested to the approved implementation schedule, and any other information requested by the Department.

As part of any Watershed Permit, there may be additional requirements which the Town may need to include, subject to MassDEP revisions (the items listed above are the standard provisions listed in the Watershed Permit regulations).

SECTION 7 PUBLIC PARTICIPATION

Public Participation was initiated at the start of the project and was consistently executed throughout all phases of the CWMP. Bourne actively sought opportunities for public education, outreach, and participation throughout the project. The Town has a page on the Town's website specifically for the CWMP project, where information is regularly uploaded and shared with the public. This website information includes meeting and workshop agendas and minutes, presentations, deliverables, background documents, specific public information content related to the CWMP, and recordings of public meetings and hearings, and regular updates. Announcements related to public participation opportunities are posted on the town's CWMP website page (<https://www.townofbourne.com/comprehensive-wastewater-management-plan-cwmp>).

SECTION 7.1 PHASES 1 AND 2 SUMMARY

The following meetings were completed as part of the Needs Assessment and Alternatives Analysis. Meeting information, including handouts and any recorded minutes or agendas, can be found in the appendices of the Phase 1 Needs Assessment report or the Phase 2 Alternatives Analysis report, as published on the Town of Bourne CWMP website.

Table 33: Updated Stakeholder Meeting Schedule

Scope of Work Task	<i>Town wide Meeting Date</i>
Phase I - Needs Assessment (Year 1)	
a. Wastewater Conditions	May 2021
b. Wastewater Needs and Problem Identification	December 2021
Phase II - Identification and Screening of Alternatives (Year 2)	
a. Proposed Criteria	April 2022 (WAC)
b. Refine criteria and matrix	April 2022 (WAC)
c. Present Refinement	July 2022 (WAC)

SECTION 7.2 PHASE 3 (THIS PLAN)

Toward the end of Phase IV, when the comprehensive management strategy is drafted with the recommended plan, the Town plans to host three public hearings. The Recommended Plan and report will be presented. One public hearing will be with the Town and two with the Cape Cod Commission, to meet the requirements of the CWMP process. The Town will also prepare a summary report on the public participation activities of Phases I, II and III for inclusion in the final CWMP and Environmental Impact Report (FEIR).

Table 34: Phase 3 Public Participation Meeting Schedule

Scope of Work Task	<i>Town wide Meeting Date</i>
Phase III - Formulation of Plan (Year 2/3)	
a. Cost Allocation Discussion	One* (TBD)
b. Review the evaluation results and the plan	One (TBD)
c. Public Hearing	One (TBD)
Phase IV - MEPA & CCC DRI Reviews (Year 3)	One** (TBD)

*Presented with Board of Sewer Commissioners, a public meeting.

**Considered Public Hearings, in accordance with CWMP process requirements. Two meetings will be held with the Cape Cod Commission.

APPENDIX A:
FULL PAGE WATERSHED RECOMMENDED PLAN FIGURES

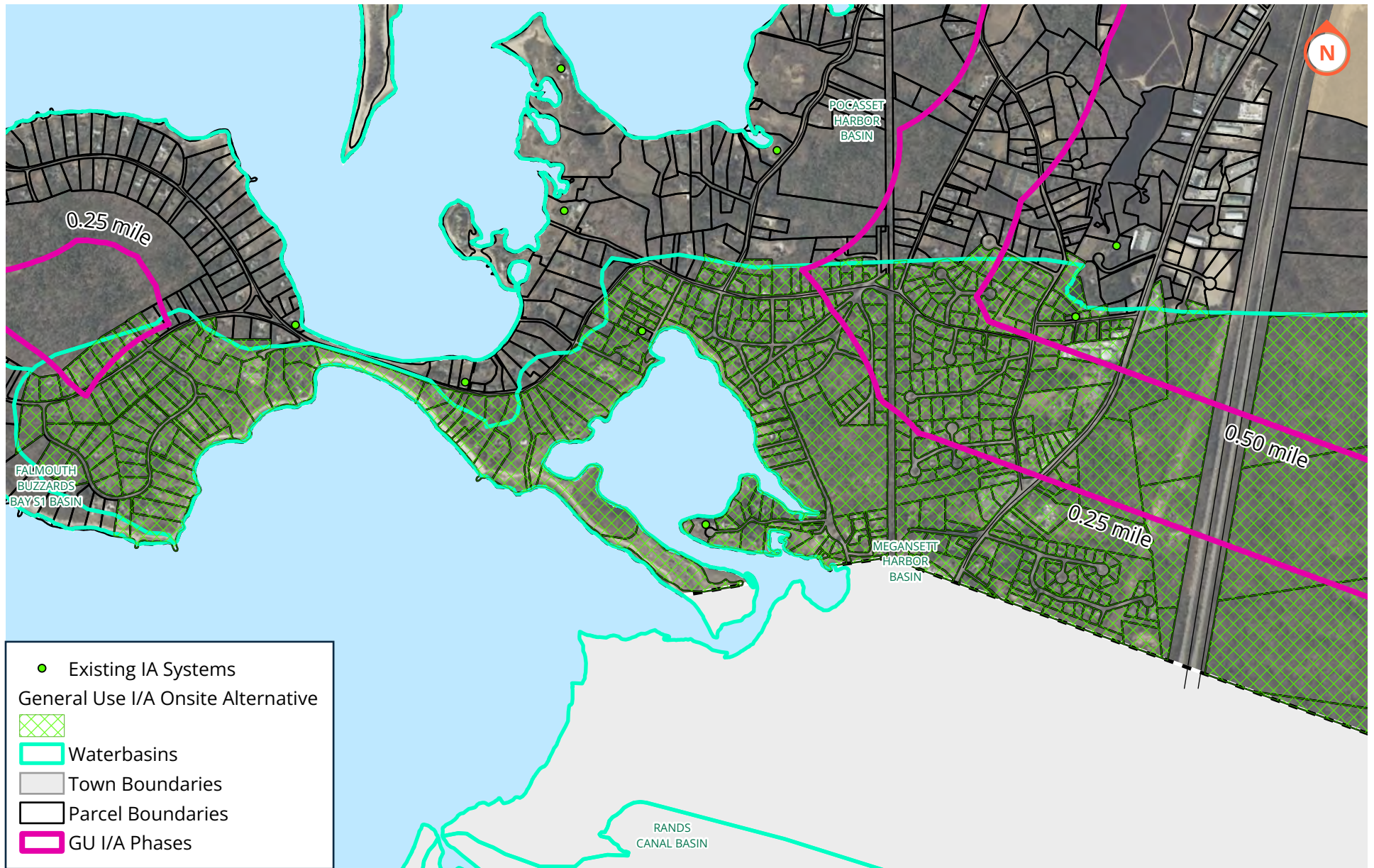


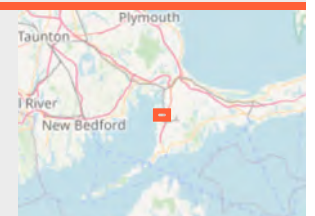
Figure 1
Megansett Squeteague Harbor

Bourne, MA

3/26/2024



ENVIRONMENTAL
PARTNERS
— An Apex Company —



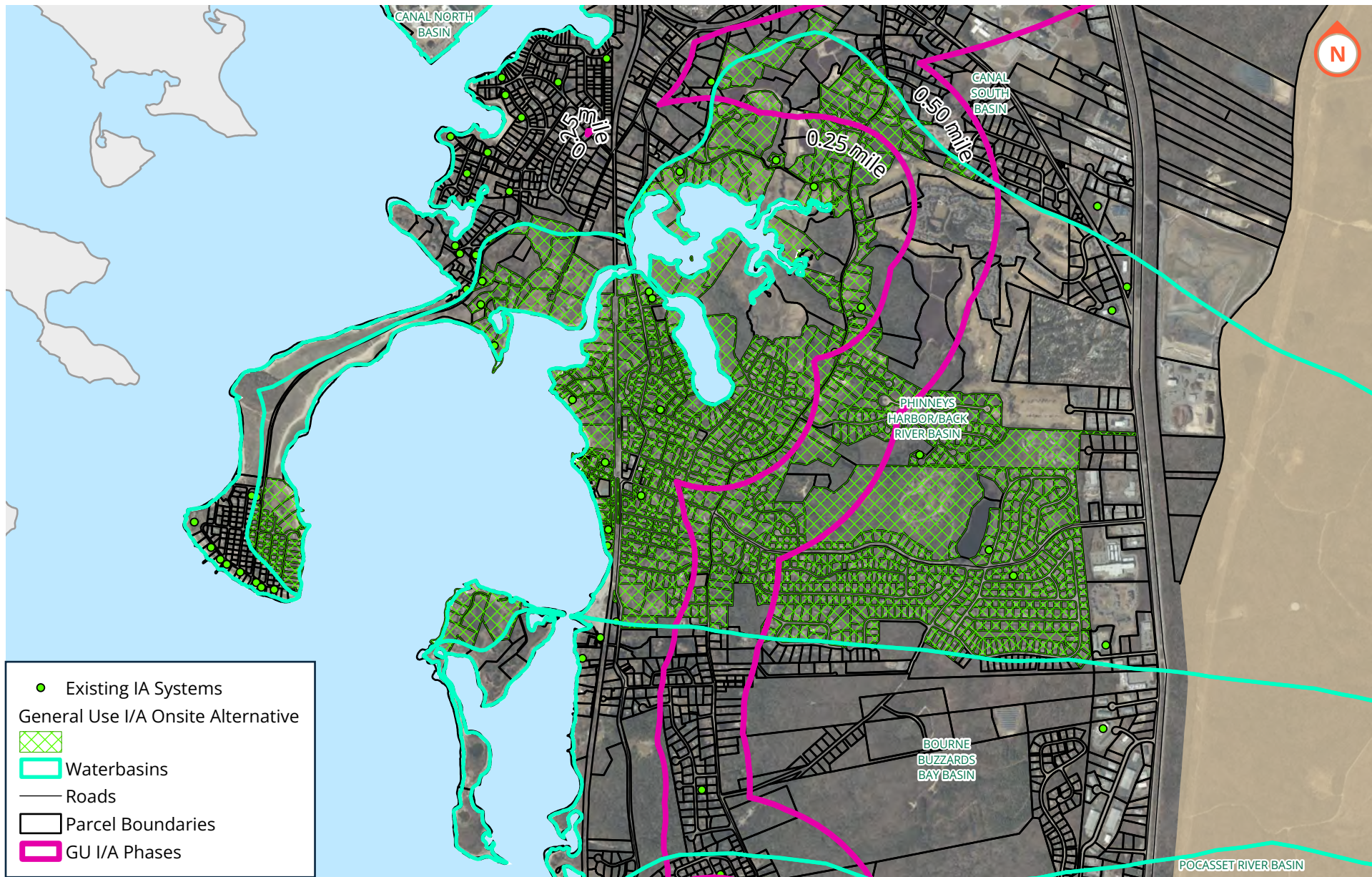
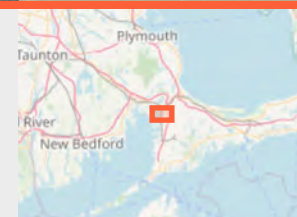


Figure 2
Phinney's Harbor
Bourne, MA

3/4/2024



ENVIRONMENTAL
PARTNERS
— An Apex Company —



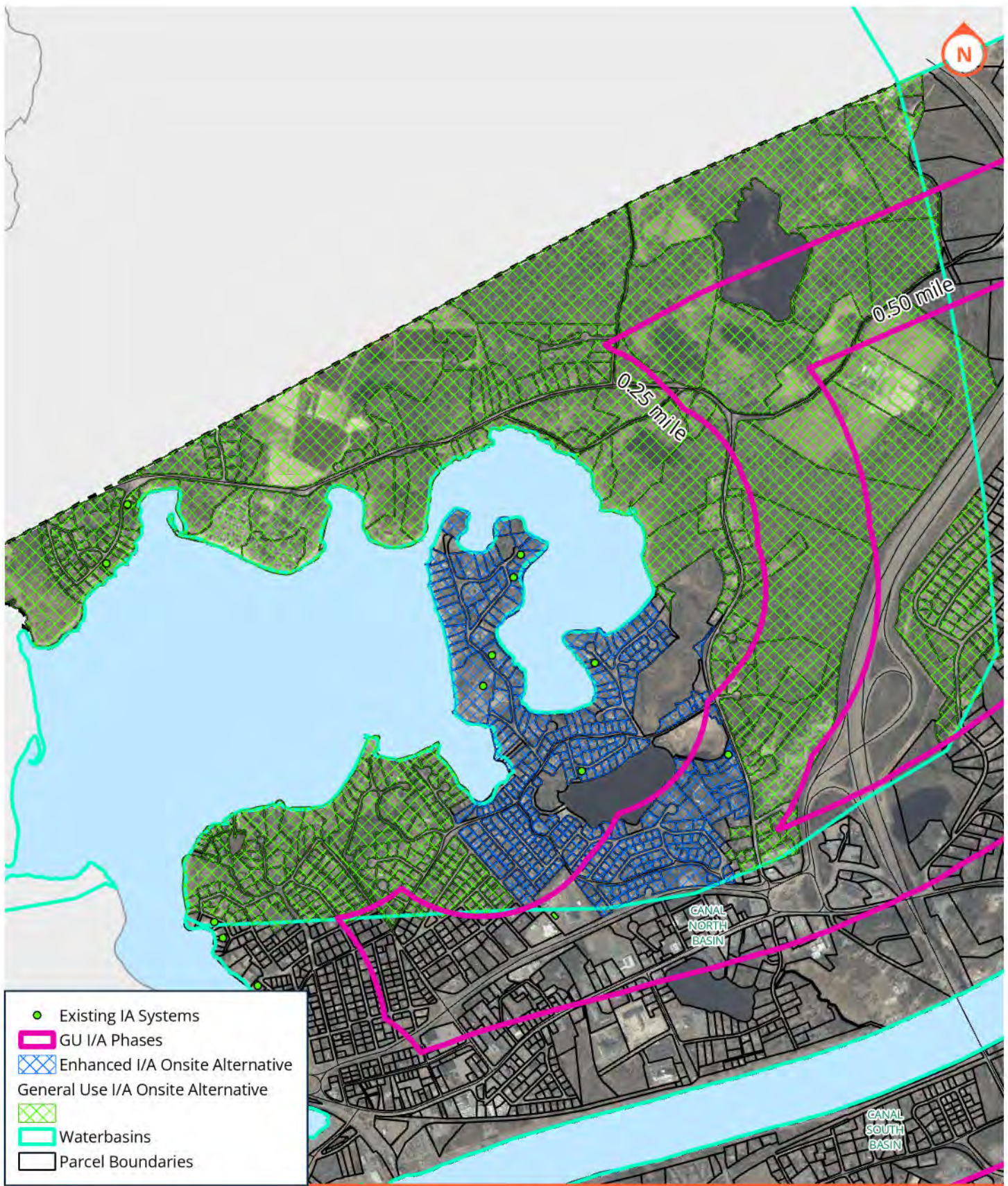


Figure 3
Buttermilk Bay
Bourne, MA
3/26/2024

**ENVIRONMENTAL
PARTNERS**
An Apex Company

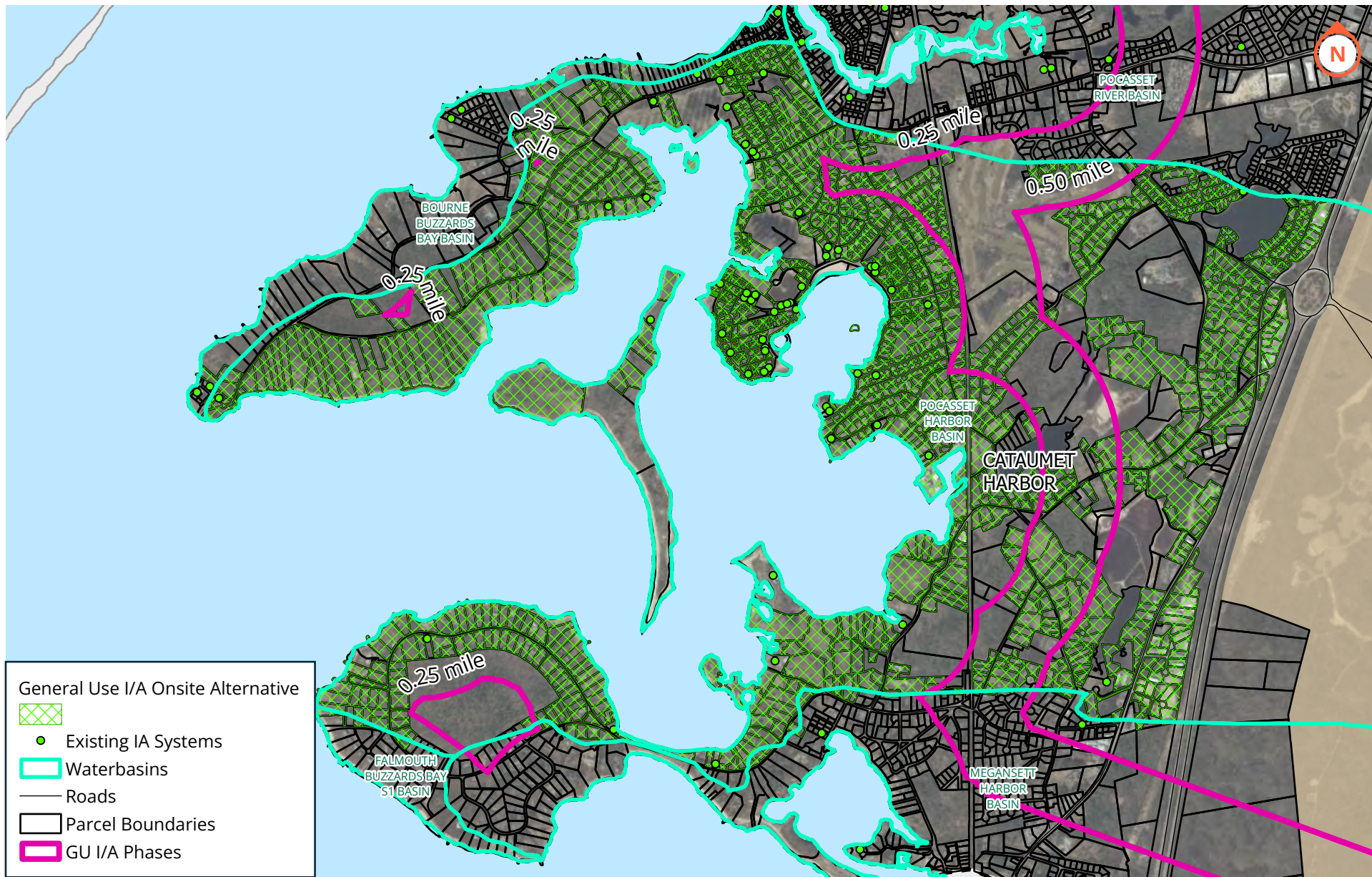
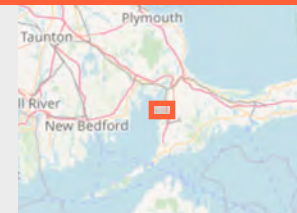
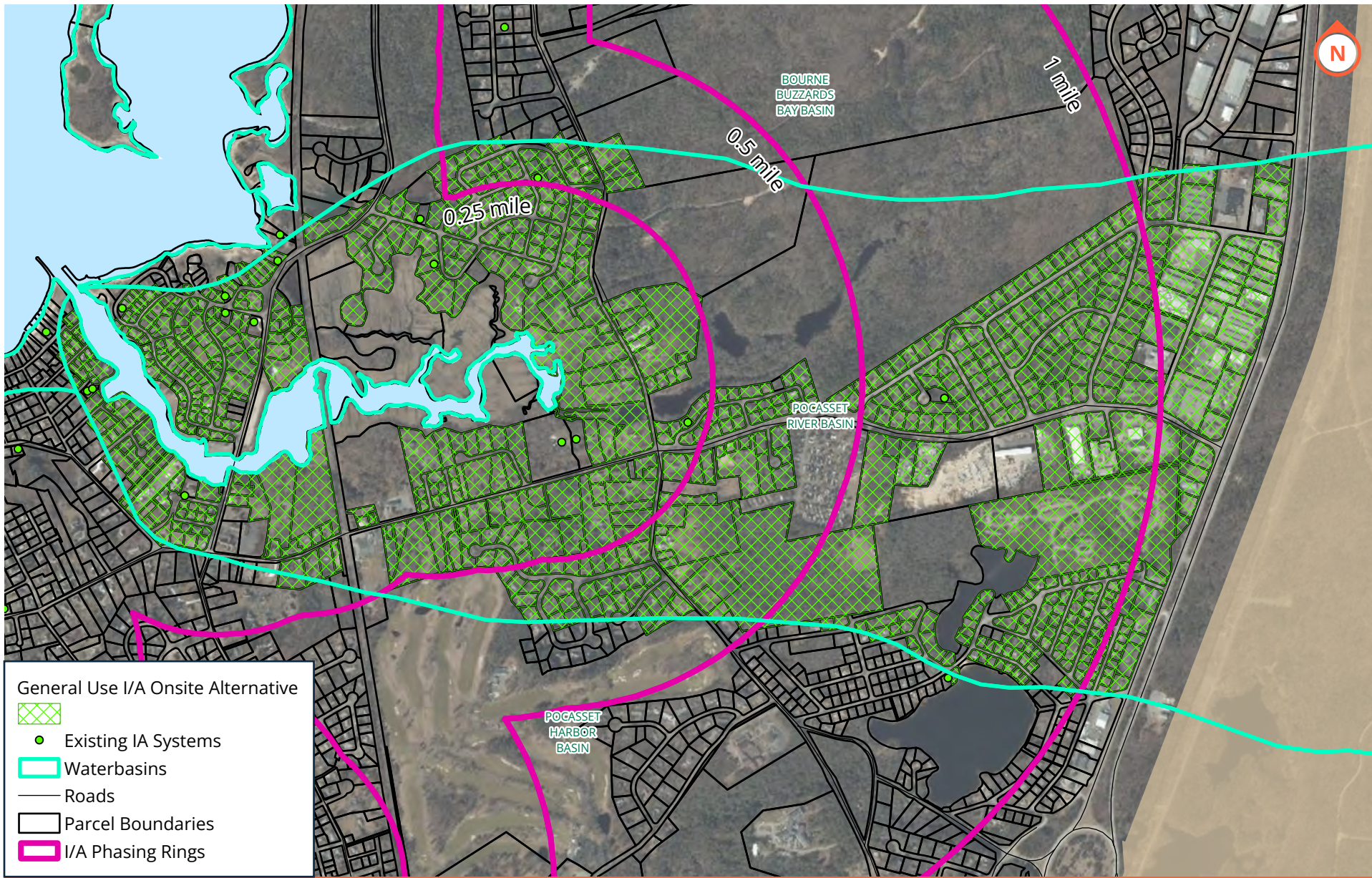


Figure 4
Pocasset Harbor
Bourne, MA

3/4/2024

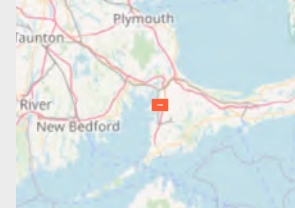
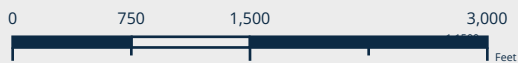


ENVIRONMENTAL
PARTNERS
— An Apex Company —



ENVIRONMENTAL
PARTNERS
 — An Apex Company —

Figure 5
 Pocasset River
 Bourne, MA
 2/22/2024



APPENDIX B:

GENERAL USE I/A VENDOR INFORMATION



Features & Benefits

- Treats flows from 200 to 100,000 gpd
- Cost effective treatment with efficient installation and operation
- Treats high strength wastewater
- Internal flow stabilization treats intermittent flows
- Fully automated pump system
- Self adjusting process control
- Small footprint / Compact design
- Gravity flow system
- Quiet operation
- Sealed and insulated for seasonal conditions
- Durable UV resistant fiberglass construction
- Minimal energy usage
- Remote monitoring control options

BIOCLERE™

Wastewater Treatment Systems

The Bioclere Advantage

Bioclere is a modified trickling filter over a clarifier. It is designed to treat wastewater with varying organic and nutrient concentrations as well as intermittent flows. Bioclere's natural fixed film treatment process is stable, simple to maintain and inexpensive to operate.

Bioclere reduces biochemical oxygen demand (BOD5) and total suspended solids (TSS) to levels that meet or exceed NSF and EPA standards. As water trickles through the biofilter, organic material is consumed by a

population of microorganisms that form on the surface of the media. Sloughed solids from the biofilter filter are returned to the primary tank as secondary sludge and treated water is displaced to the next treatment component or the disposal area.

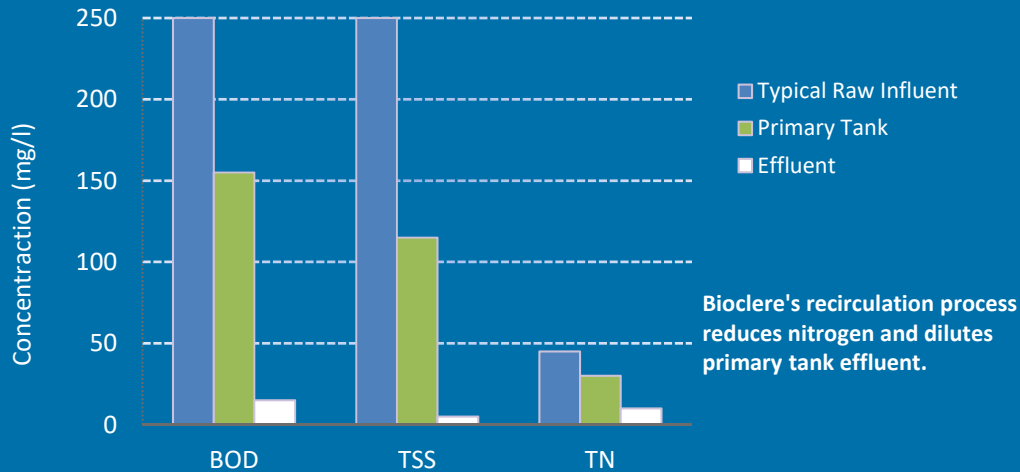
Bioclere is a modular technology. Units can be installed in parallel to accommodate large flows or in series to achieve high levels of treatment. The systems are sealed and insulated to minimize the impact of seasonal temperature variations on the treatment process.

Nitrogen Reduction

Bioclere systems can be designed to consistently convert and reduce nitrogen. Total nitrogen is reduced substantially and cost effectively by recirculating nitrified water from the Bioclere back to the primary settling tank. Large Bioclere systems may incorporate a second stage nitrifying Bioclere and a tertiary anoxic reactor to achieve < 10 mg/l total nitrogen.

Applications include

Residential, commercial, institutional, light industrial and municipal wastewater treatment.



Bioclere's recirculation process reduces nitrogen and dilutes primary tank effluent.

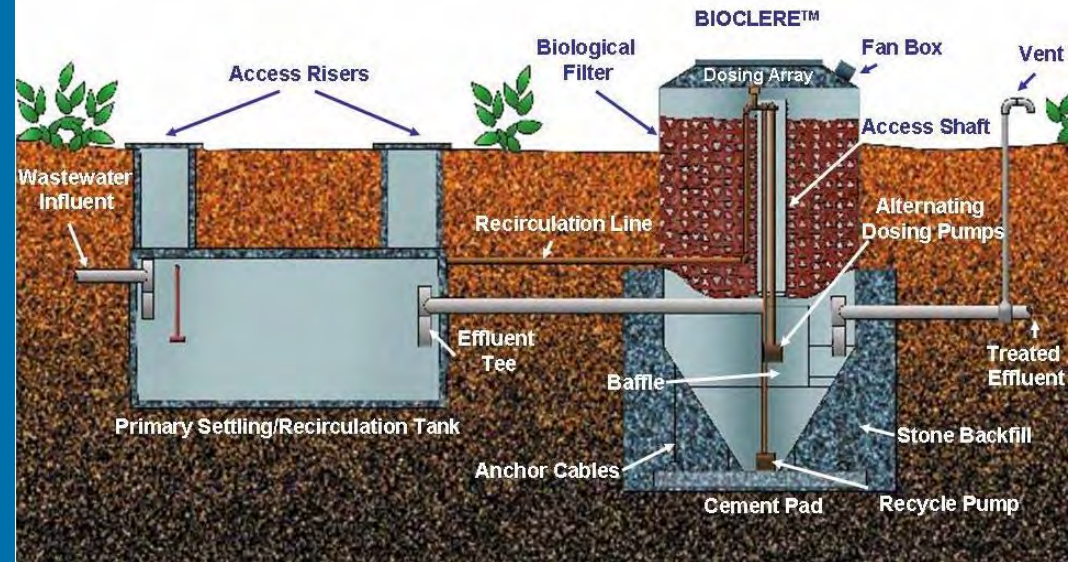


Bioclere 16/12-350 is ANSI/NSF Standard 40 certified by the National Sanitation Foundation (NSF). The above performance results (BOD & TSS) are based on a six month accumulative average from NSF's certification testing.



U.S. Environmental Protection Agency's (EPA) technology verification program. Total nitrogen results can be viewed at www.EPA.GOV/ETV. Above TN results are based on achievable standards.

Standard Single Bioclere™ Installation:



BIOCLERE

Residential Wastewater Treatment Systems

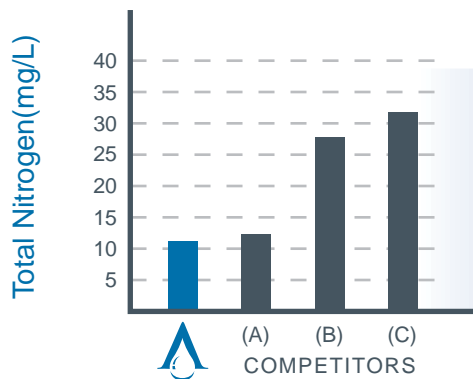


Bioclere: The highest performing denitrification system at the lowest cost

THE PROOF IS IN THE DATA

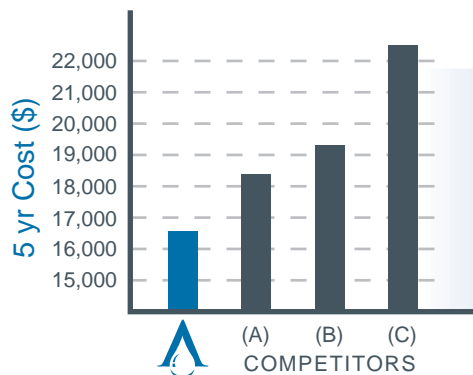
The Pinelands Study

The most rigorous comprehensive third party evaluation of residential wastewater treatment systems to date.



Performance Comparison

Objective: Total Nitrogen <14mg/L



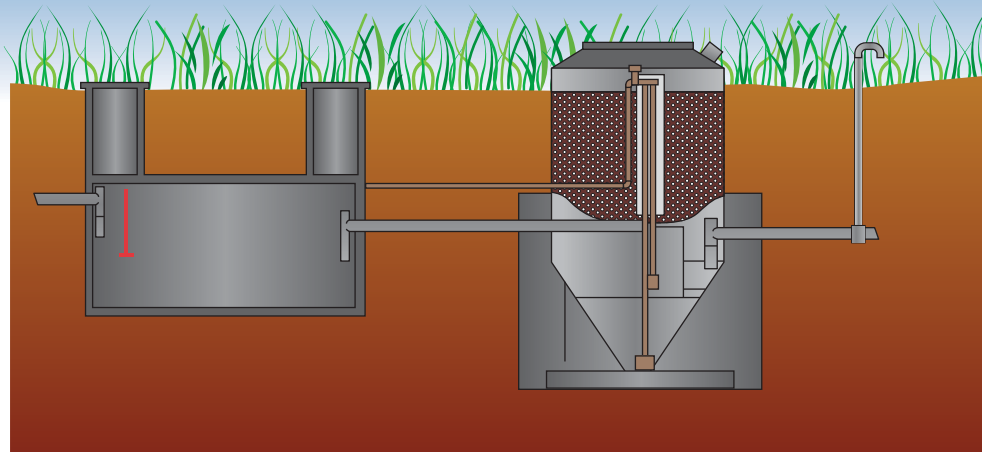
Cost Comparison

5 year Total Cost Evaluation

Source: New Jersey Pinelands Commission Annual Report, August 2010

If you have to buy a residential wastewater treatment system, Bioclere is the only solution that delivers reliable wastewater treatment at an affordable price.

BIOCLERE
Residential Wastewater Treatment Systems



BIOCLERE ADVANTAGES

Quiet and Discrete

The vertical orientation of the Bioclere allows for the the smallest footprint among residential wastewater treatment systems. Combined with the fact that Bioclere is quiet and emits no odors. This saves time and money on installation.

Lowest Maintenance Costs

The unique design and process of the Bioclere requires only one moving part. This means that while other systems may require significant routine or unscheduled maintenance costs, Bioclere will continue to be a good investment over time.

Energy Efficient

A residential Bioclere system requires approximately 103 kwh/mo - this is an energy savings of up to 80% versus competing systems. This amounts to substantial savings over the life of the system.

Resilient Fixed Film Process

Bioclere's biological process allows it to produce compliant effluent under the varying wastewater demands of a residential home. This process is also effective across seasonal and temperature variations.

Simple to Operate & Maintain

Due to its unique design, Bioclere requires very little maintenance. Installation is quick and seamless.

Multi Family Systems

Bioclere can be scaled to serve two or more homes at substantial cost savings.

Name:
Address:
Phone:
Fax:
email:

APPENDIX B

Norweco

NORWECO

Singulair 960 DN, model 600, 750, 1000, and 1500. Singulair 960 DN Green, model 600

Secondary Treatment Unit (STU) and Nitrogen reduction Enhanced Three compartment tank with a pretreatment chamber, aerobic chamber, and settling/filtration chamber with BioKinetic filter unit. TNT models remove nitrogen using timed aerobic and anaerobic periods in the second chamber. Installed between building sewer and SAS

Nitrogen reduction BOD <30 mg/L; TSS <30 mg/L; pH 6-9 For flow <2,000 GPD. Subject to Nitrogen Loading 660 GPD/acre w/TN <19mg/l. 550 GPD/acre w/ TN <25 mg/l Approval: January 3, 2019

Budget Quotes:

For the system to be delivered and set: \$8,962 (including tax). The company would install internal components but would not complete any electrical work.

APPENDIX C

Septi-Tech

Hi Mila,

Below please find the pricing you requested for the SeptiTech STAAR treatment systems. I've listed the model number, with the corresponding gallons per day, below. And attached are system drawings.

STAAR 0.5 Denite (M400N) – 1-4 bedrooms – up to 500 gpd : \$9,550.00 plus MA tax

STAAR 0.75 Denite (M550N) – 5-6 bedrooms – up to 750 gpd: \$10,865.00 plus MA tax

STAAR 1.0 Denite (M750N) – 7-9 bedrooms – up to 1,000 gpd: \$14,150.00 plus MA tax

STAAR 1.2 Denite (M1200N) – 10-11 bedrooms – up to 1,200 gpd: \$19,200.00 plus MA tax

STAAR 1.5 Denite (M1500N) – 12-14 bedrooms – up to 1,500 gpd: \$22,750.00 plus MA tax

STAAR 3.0 Denite (M2500N) – up to 3,000 gpd: \$36,600.00 plus MA tax

STAAR 4.5 Denite (M3000N) – up to 4,500 gpd: \$64,750.00 plus MA tax

Pricing includes STAAR components, delivery to the site, setup into tanks, connections and PVC within treatment tanks, and system startup.

Pricing does not include tanks, electrical work, external connections or PVC piping, SAS, etc.

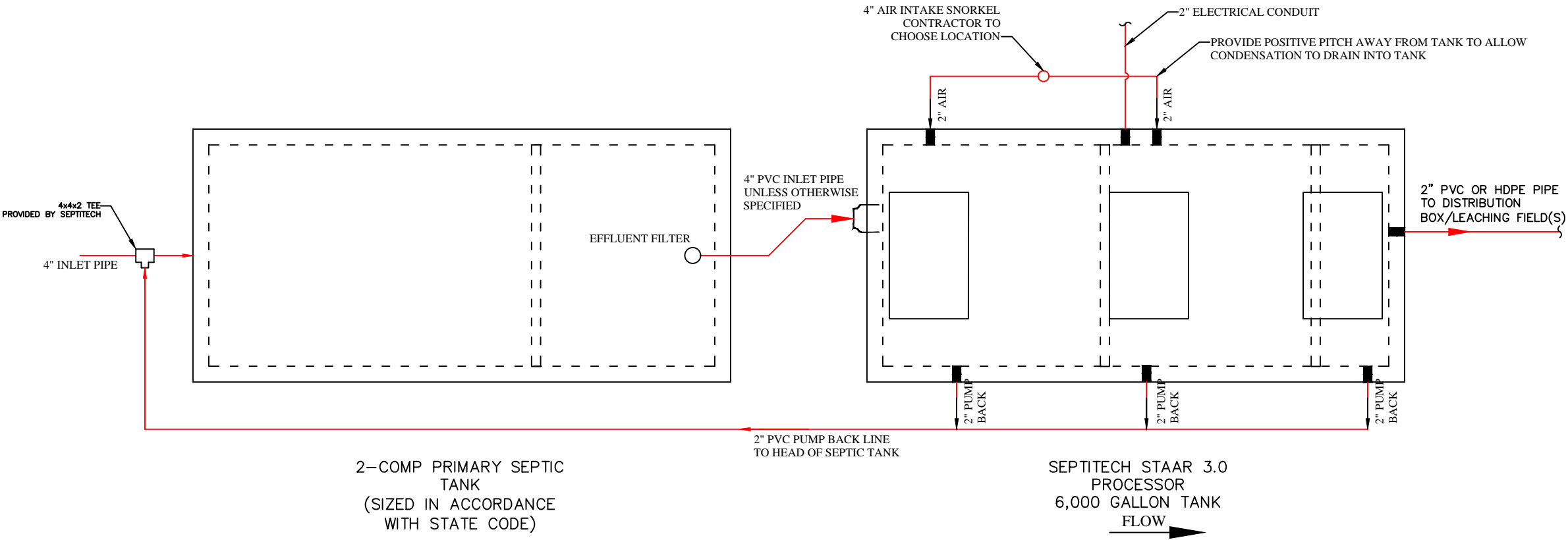
BioMicrobics/SeptiTech requests approval of treatment tanks prior to system being ordered.

Please let me know if you have any questions or would like additional information.

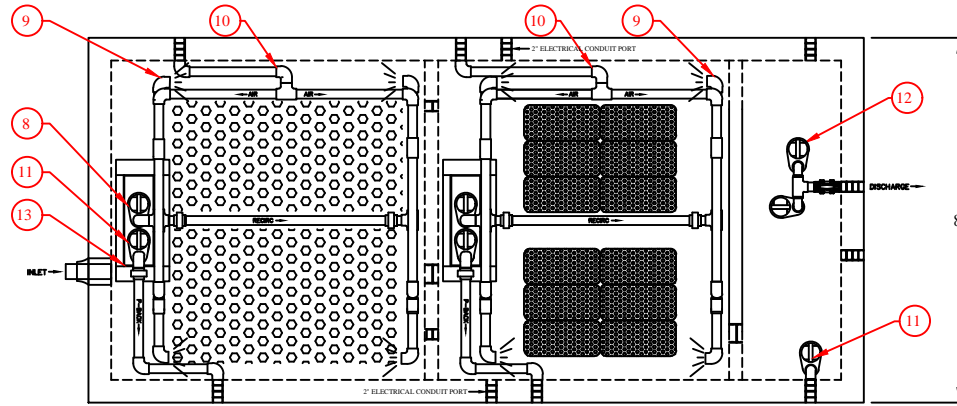
Thanks,
Lauren

GENERAL NOTES

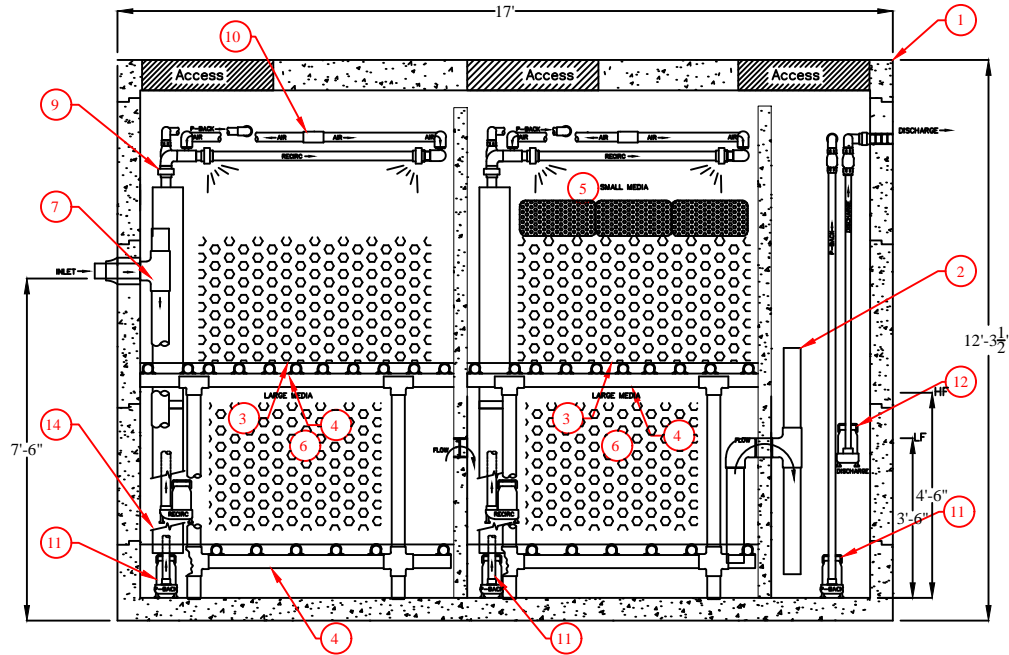
- Tank(s) shall not be installed at a depth any greater than 24-inches. Tank installations requiring a depth greater than 24-inches shall do so with prior approval by SeptiTech only. Any risers required to bring the aluminum hatches to grade are the responsibility of the contractor.
 - Tank(s) shall be installed with a minimum of 12-inches of compacted crushed stone bedding. Select fill shall be used for backfilling around tanks. Native material may be used if approved by the design engineer.
 - Water Testing: Contractor is responsible for water testing the concrete tank(s) once the tank(s) installation has been completed and allowed to set overnight. Water testing shall be conducted in accordance with ASTM C1227.9.2. Installing contractor shall be responsible for providing clean water for the testing, filling the tanks, and pumping the tanks dry once testing is completed.
 - Exterior Piping: Contractor is responsible for supplying and installing all exterior piping per SeptiTech installation drawings.
 - Air Intake Piping: Air intake snorkel shall be installed within 100 feet of the processor tank. Air intake piping shall be installed such that a positive pitch is provided back towards the processor tank such that any condenstaion build up is free to drain.
 - Pipe Insulation: Contractor is responsible for insulating all piping exterior to the SeptiTech processor including the discharge line from the processor to the disposal field.
 - Tank Insulation: After concrete tanks have been installed and water testing is completed, contractor shall insulate the top and sides of the processor tank below frost depth (4-feet minimum) down the sides of the tank with 2" rigid foam (blue) board insulation and then complete backfilling. Contractor is also responsible for installing insulation over the top of the forcemain from the SeptiTech system to the disposal field if not buried below frost level in order to prevent freezing.
 - Electrical: All electrical work is the responsibility of the contractor's licensed electrician and is not provided by SeptiTech. System Controller should be installed in a heated building where an ambient temperature range of 60 to 90 degrees F is maintained. If the control panel must be located outside, please notify SeptiTech, Inc. so a heater may be installed within the enclosure.
- SeptiTech processors can also be built to 3-phase power requirements. If 3-phase is required, please notify SeptiTech at the time of contract signing.
- Internet: Contractor is responsible for installing a internet line to the processor control panel for the Telemetry. Any work performed on the system without the installation of the internet line shall be at the expense of the owner.



SeptiTech [®] a subsidiary of Bio-Microbics, Inc.	DES.BY: JSC
	DR.BY: JSC
	CK.BY: DRR
PROJECT NO.:	
STAAR 3.0 PROCESSOR INSTALLATION PLAN	
DATE: 03/16/07	DWG. NO.:
SCALE: 1/4"=1'-0"	REV.: 1



TOP VIEW



ELEVATION VIEW

FLOW

14	2	#####	Pump Back Chute Assembly
13	2	#####	Pump Chute Assembly
12	1	#####	Dual Discharge Pump Assembly
11	3	#####	Pump Back Pump
10	2	#####	Blaster Air Header Assembly
9	2	#####	Blaster Assembly
8	2	#####	Recirc Pump
7	1	#####	Inlet Piping Assembly
6	2	#####	Large Media
5	2	#####	Small Media
4	4	#####	Support Structure
3	2	#####	Screening Assembly
2	1	#####	Interior Piping Assembly
1	1	#####	6000 Gal. Concrete Tank
ITEM	QTY.	PART NO.	DESCRIPTION

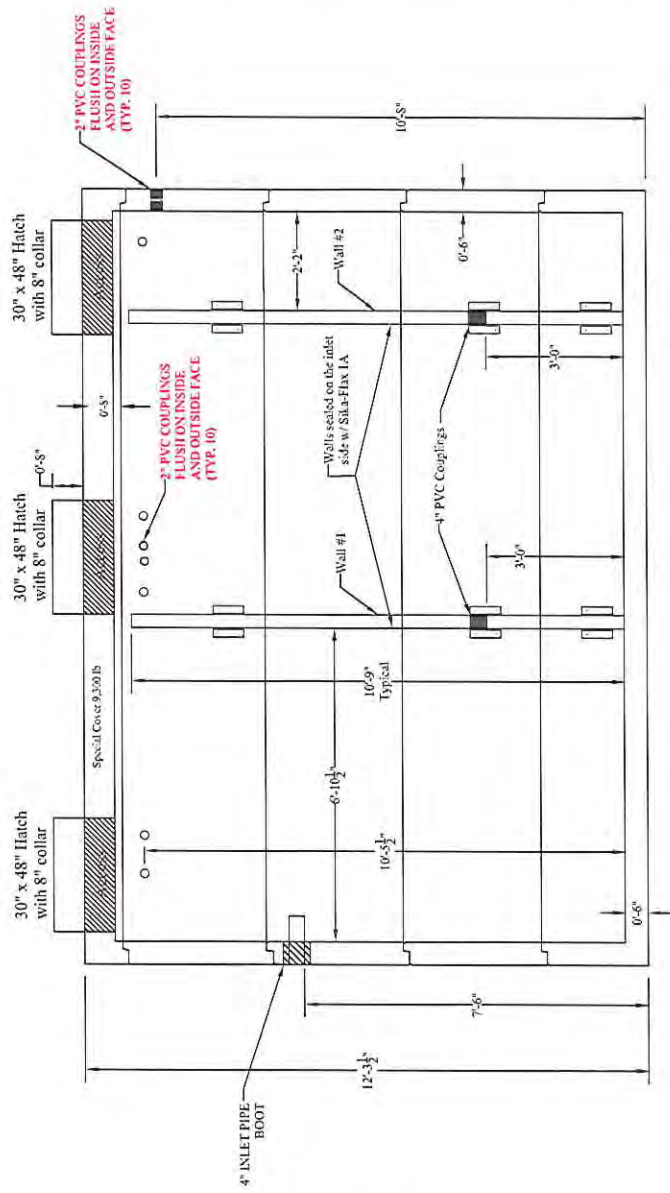
SeptiTech®
a subsidiary of Bio-Microbics, Inc.

DES.BY: DRR
DR.BY: JSC
CK.BY: WDR

PROJECT NO.:

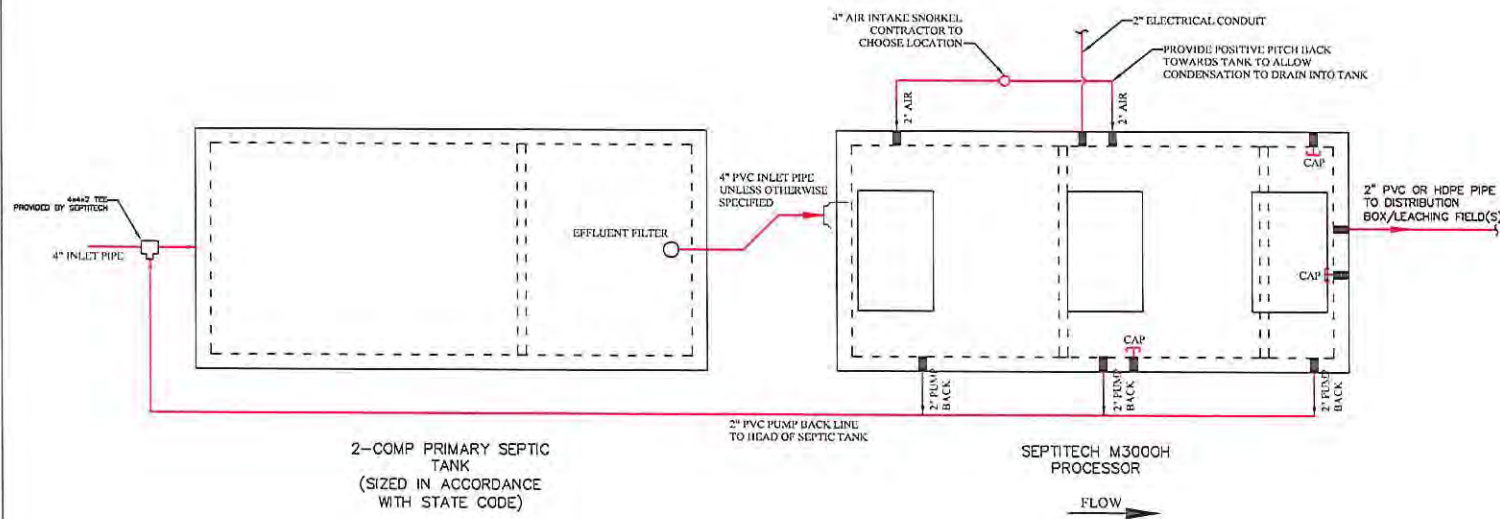
STAAR 3.0
TOTAL TANK LAYOUT

DATE:	03/04/02	DWG. NO.:
SCALE:	1/4"=1'-0"	REV.: 1

[illegible]


M3000 PROCESSOR TANK
8,000 GALLON CONCRETE

SCALE: 3/8"=1'-0"	REV.:
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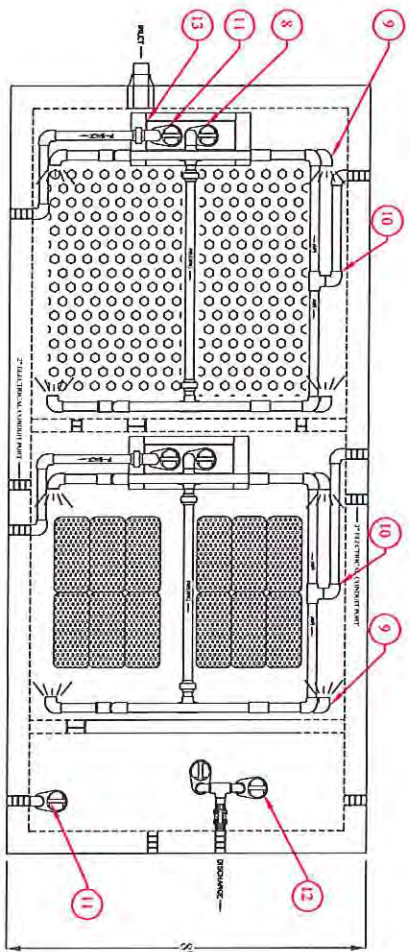
GENERAL NOTES

- Tank(s) shall not be installed at a depth any greater than 24-inches. Tank installations requiring a depth greater than 24-inches shall do so with prior approval by SeptiTech only. Any risers required to bring the aluminum hatches to grade are the responsibility of the contractor.
 - Tank(s) shall be installed with a minimum of 12-inches of compacted crushed stone bedding. Select fill shall be used for backfilling around tanks. Native material may be used if approved by the design engineer.
 - Water Testing: Contractor is responsible for water testing the concrete tank(s) once the tank(s) installation has been completed and allowed to set overnight. Water testing shall be conducted in accordance with ASTM C1227.9.2. Installing contractor shall be responsible for providing clean water for the testing, filling the tanks, and pumping the tanks dry once testing is completed.
 - Exterior Piping: Contractor is responsible for supplying and installing all exterior piping per SeptiTech installation drawings.
 - Air Intake Piping: Air intake snorkel shall be installed within 100 feet of the processor tank. Air intake piping shall be installed such that a positive pitch is provided back towards the processor tank such that any condensation build up is free to drain.
 - Pipe Insulation: Contractor is responsible for insulating all piping exterior to the SeptiTech processor including the discharge line from the processor to the disposal field.
 - Tank Insulation: After concrete tanks have been installed and water testing is completed, contractor shall insulate the top and sides of the processor tank below frost depth (4-feet minimum) down the sides of the tank with 2" rigid foam (blue) board insulation and then complete backfilling. Contractor is also responsible for installing insulation over the top of the forcemain from the SeptiTech system to the disposal field if not buried below frost level in order to prevent freezing.
 - Electrical: All electrical work is the responsibility of the contractor's licensed electrician and is not provided by SeptiTech. System Controller should be installed in a heated building where an ambient temperature range of 60 to 90 degrees F is maintained. If the control panel must be located outside, please notify SeptiTech, Inc. so a heater may be installed within the enclosure.
- SeptiTech processors can also be built to 3-phase power requirements. If 3-phase is required, please notify SeptiTech at the time of contract signing.
- Phone Line: Contractor is responsible for installing a dedicated analog phone line to the processor control panel for the autodialer/modem. Phone line must be installed and working in order to have any work performed under warranty. Any work performed on the system without the installation of the phone line shall be at the expense of the owner.

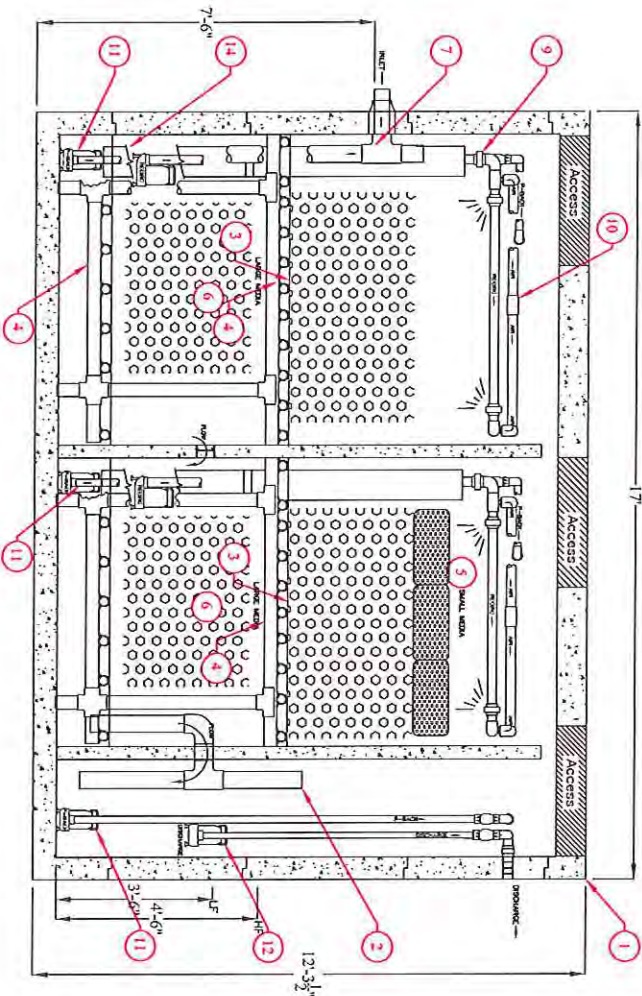
	DES.BY: JSC
	DR.BY: JSC
	CK.BY: DRR
PROJECT NO.:	
M3000 PROCESSOR INSTALLATION PLAN	
DATE: 03/16/07	DWG. NO.:
SCALE: 1/4"=1'-0"	REV: 1

REVISIONS

DATE	DESCRIPTION	INIT
03/07/06	REWORKED SPRAY NOZZLES, ADDED BLASTERS	JSC
03/08/07	ADDED 1" PUMP HOIST CHAINWORK, REWORKED LAMINATE	JSC



TOP VIEW



ELEVATION VIEW

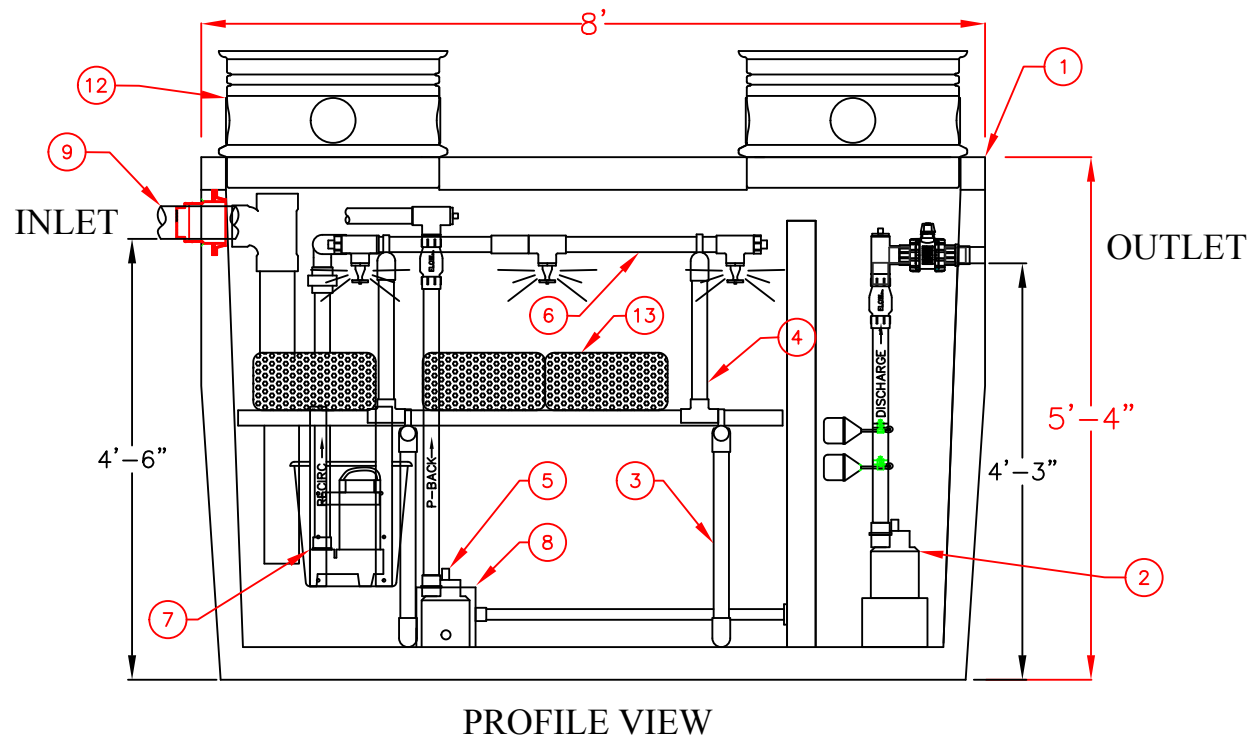
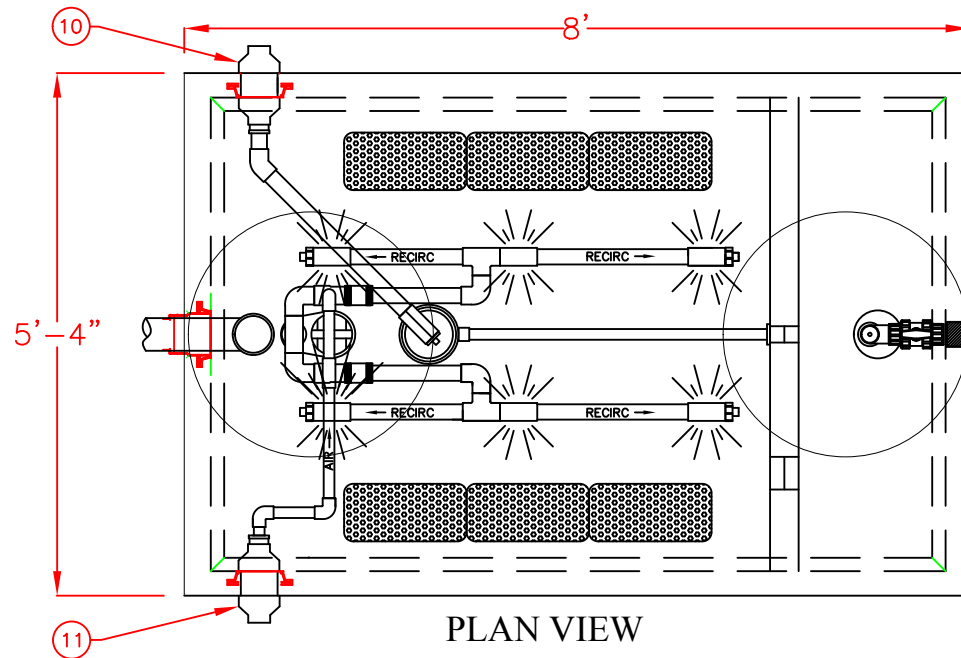
ITEM	QTY	PART NO.	DESCRIPTION
14	2	00000	Pump Tank Closure Assembly
13	2	00000	Pump Closure Assembly
12	1	00000	Blow Down Valve Assembly
11	3	00000	Pump Tank Pump
10	2	00000	Water Air Heater Assembly
9	2	00000	Water Assembly
8	2	00000	Kerosene Pump
7	1	00000	Water Pump Assembly
6	2	00000	Large Media
5	2	00000	Small Media
4	4	00000	Support Structure
3	2	00000	Nozzling Assembly
2	1	00000	Interior Pump Assembly
1	1	00000	Blow Out Connect Tank



DES. BY: DMR
 DR. BY: JSC
 OK. BY: MOR

PROJECT NO.:
 M3000(H)
 TOTAL TANK LAYOUT

DATE: 03/04/02 DWG. NO.:
 SCALE: 3/8"=1'-0" REV.: 1



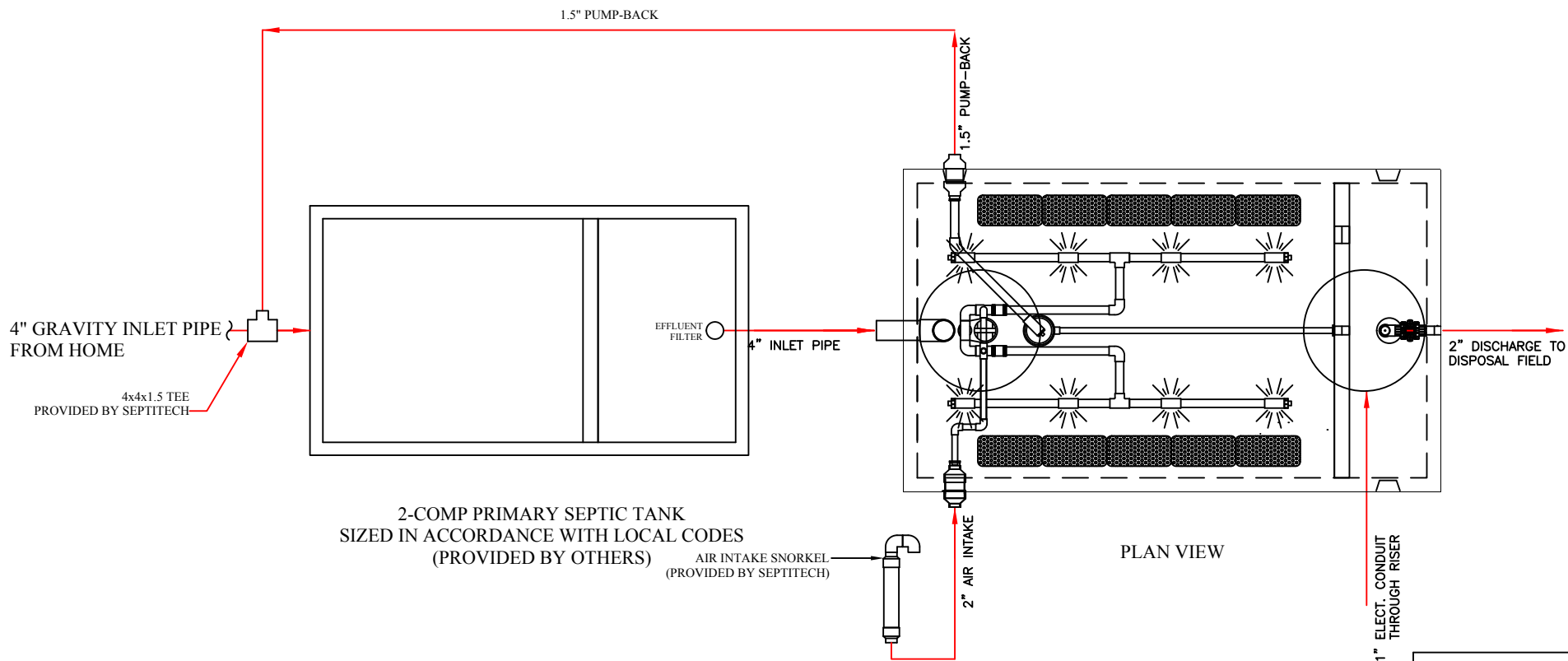
NOTE: CONCRETE TANK CAPACITIES REMAIN THE SAME. HOWEVER, TANK DIMENSIONS MAY VARY BY STATE.


13	6	Media Bags (Large) 15 CUFT
12	2	FRALO Plastic Riser and Lid
11	1	Air Intake Assembly
10	2	Wall Insert Assembly
9	1	Inlet Pipe
8	1	Pump Back Stand
7	1	Recirculation Pump, Tsurumi 50PU2.15S
6	1	Spray Header Assembly
5	1	Pump Back Pump Assembly, Goulds LSP03
4	1	Spray Header Support Structure
3	1	Support Structure
2	1	Discharge Pump Assembly, Goulds LSP03
1	1	1000 Gal. Concrete Tank
ITEM	QTY.	DESCRIPTION

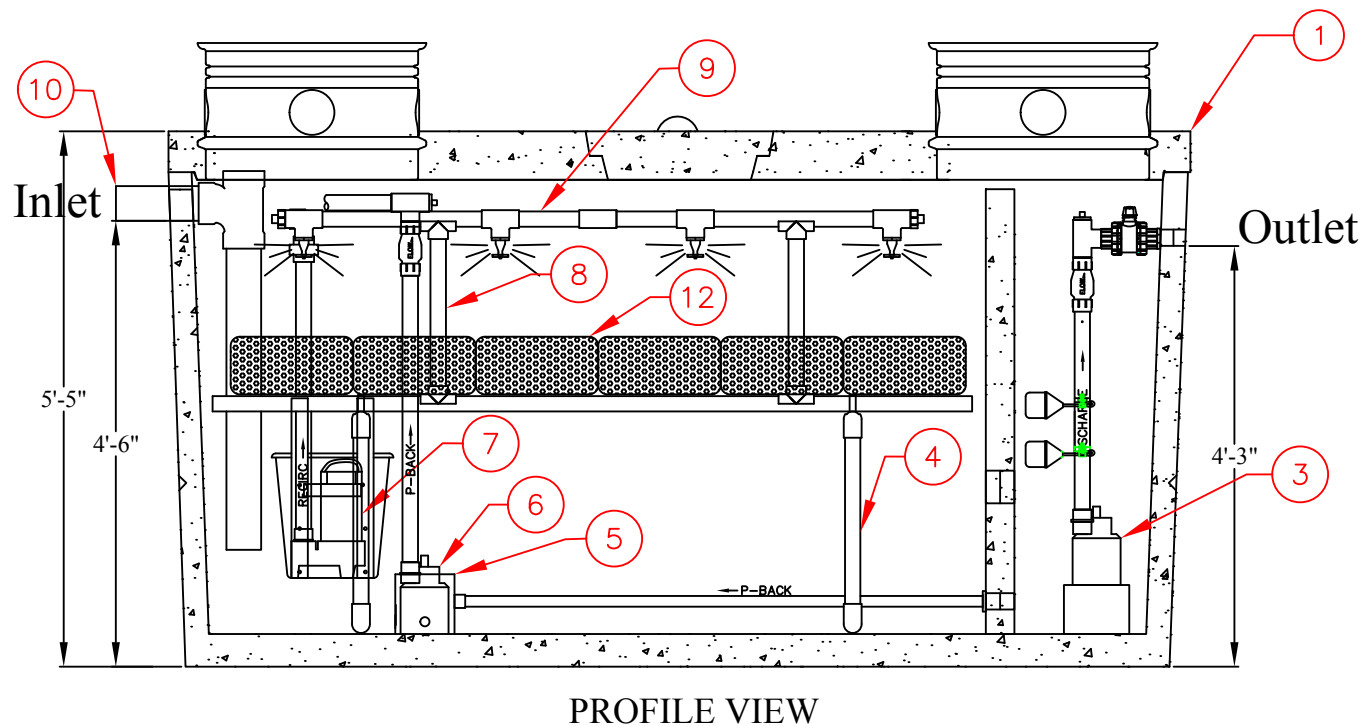
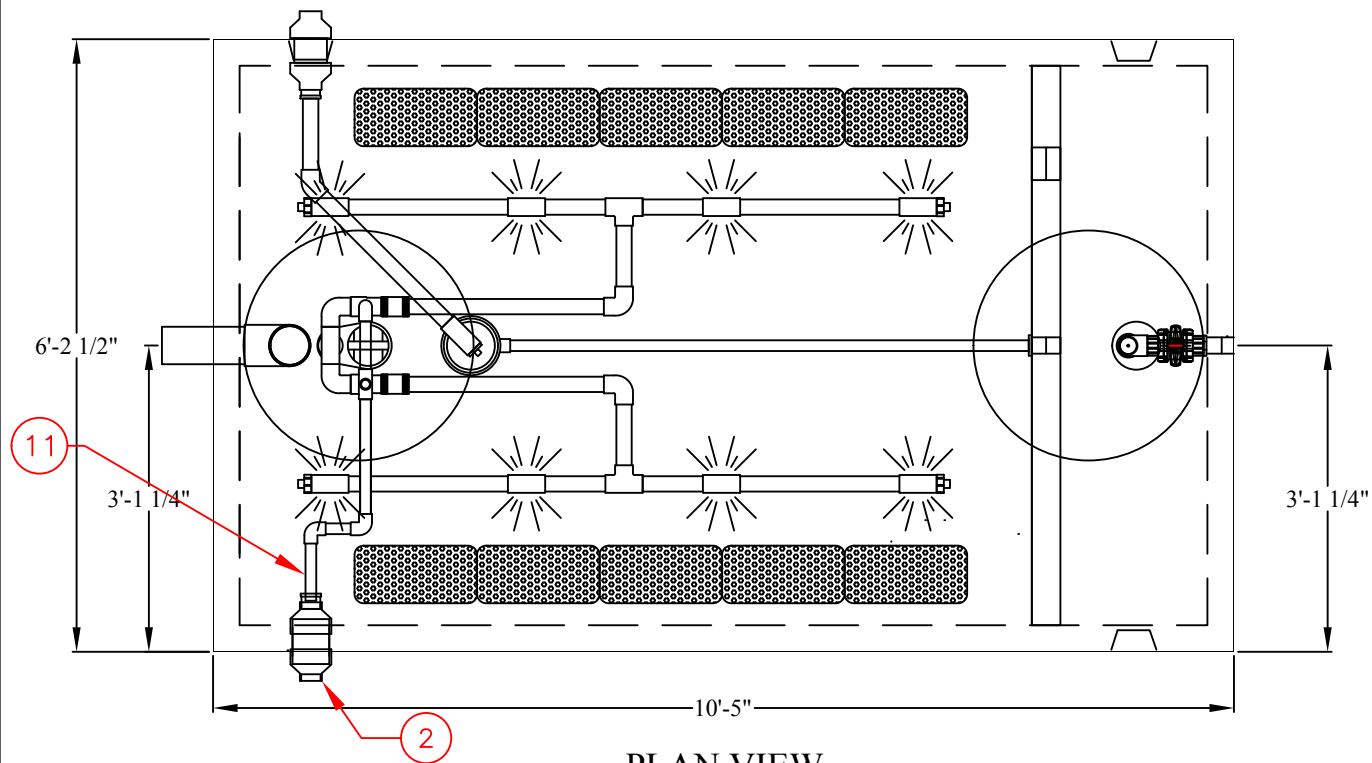
DES.BY: JSC
DR.BY: JSC
CK.BY: DR

PROJECT NO.:
STAAR(TM) 0.5 CONCRETE
TANK LAYOUT (Model M400N)

DATE:	07/2008	DWG. NO.:
SCALE:	1/2"=1'-0"	REV.:



 a subsidiary of Bio-Microbics, Inc.		DES.BY: JSC
		DR.BY: JSC
		CK.BY: JSC
PROJECT NO.:		
STAAR(TM) 0.75 CONCRETE INSTALLATION SCHEMATIC		
DATE:	07/2008	DWG. NO.:
SCALE:	1/2" = 1'-0"	REV.:



NOTE: CONCRETE TANK CAPACITIES REMAIN THE SAME. HOWEVER, TANK DIMENSIONS MAY VARY BY STATE.

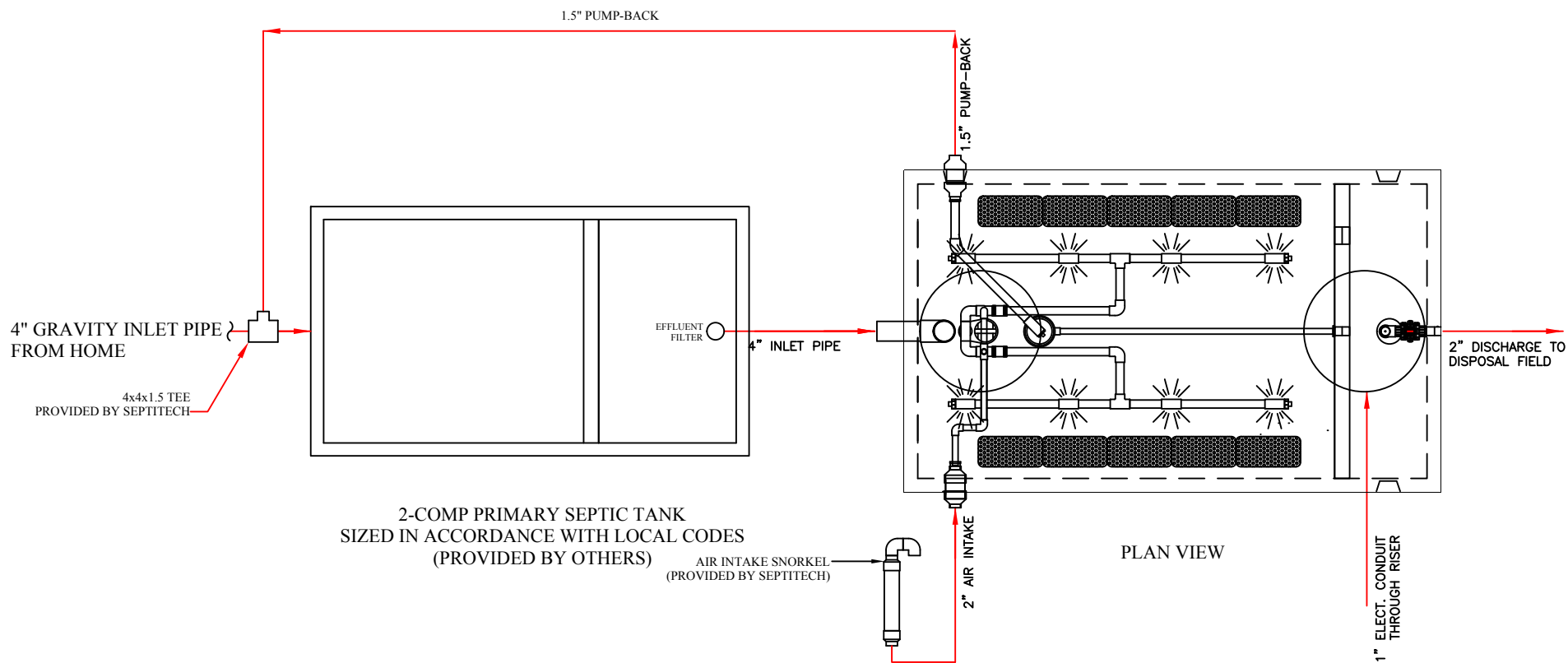
12	10	Media Bags (Large) 29 CUFT
11	1	Air Header Assembly
10	1	Inlet Piping Assembly
9	1	Spray Header Assembly
8	1	Spray Header Support Structure
7	1	Recirculation Pump, Tsurumi 50PU2.4S
6	1	Pump Back Assembly, Goulds LSP03
5	1	Pump Back Stand Assembly
4	1	Support Structure
3	1	Discharge Pump Assembly, Goulds LSP03
2	3	Wall Insert Assembly
1	1	1500 Gal. Tank


ITEM	QTY.	DESCRIPTION
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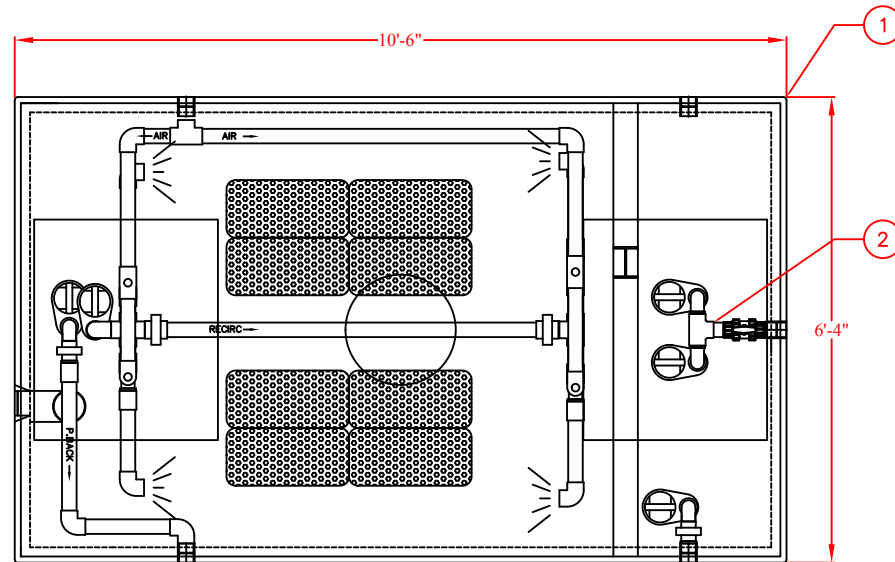
		DES.BY: JSC
		DR.BY: JSC
		CK.BY: DR

PROJECT NO.:	
STAAR(TM) 1.0 CONCRETE TOTAL TANK LAYOUT	

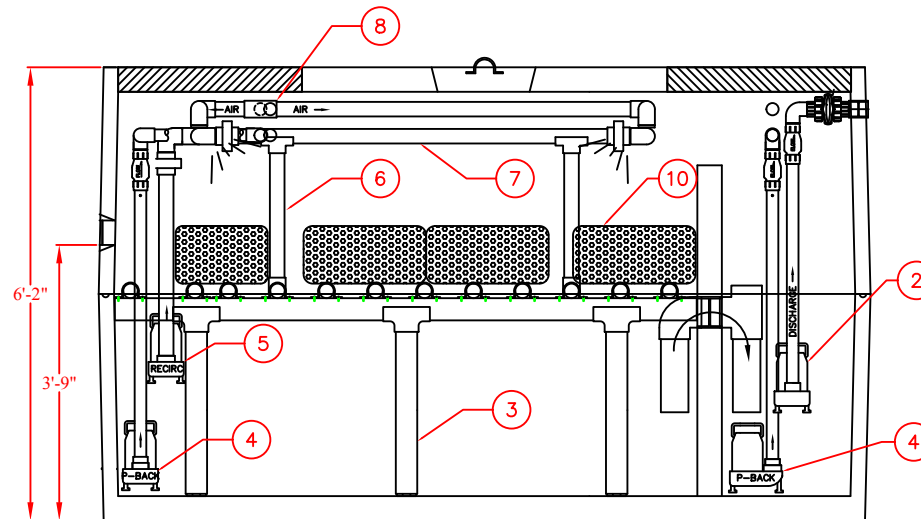
DATE: 07/2008	DWG. NO.:
SCALE: 1/2"=1'-0"	REV.:



 <small>a subsidiary of Bio-Microbics, Inc.</small>	DES.BY: JSC
	DR.BY: JSC
	CK.BY: DR
PROJECT NO.:	
STAAR(TM) 1.0 CONCRETE INSTALLATION SCHEMATIC	
DATE: 07/2008	DWG. NO.:
SCALE: 1/2" = 1'-0"	REV.:



NOTE: CONCRETE TANK CAPACITIES REMAIN THE SAME. HOWEVER, TANK DIMENSIONS MAY VARY BY STATE.



9	12	Media Bags (Large) 32 CUFT
8	1	Air Header Assembly
7	1	Spray Header Assembly
6	1	Spray Header Support Structure
5	1	Recirculation Pump, Tsurumi 50PN2.75S
4	2	Pump Back Assem, Tsurumi 50PU2.15S
3	1	Support Structure
2	1	Discharge Pump Assem, Tsurumi 50PU2.15S
1	1	2000 Gal. Tank
ITEM	QTY.	DESCRIPTION

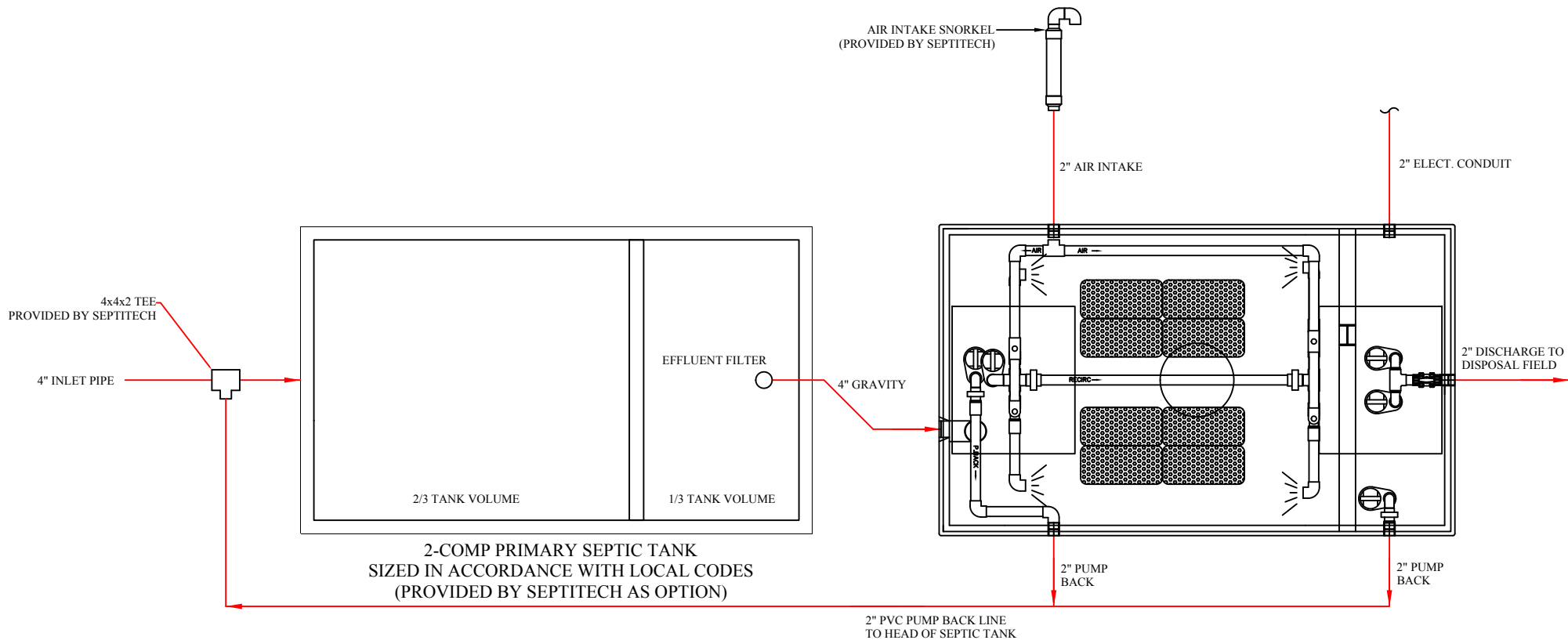
SeptiTech® DES.BY: JSC
a subsidiary of Bio-Microbics, Inc. DR.BY: JSC
CK.BY:

PROJECT NO.:

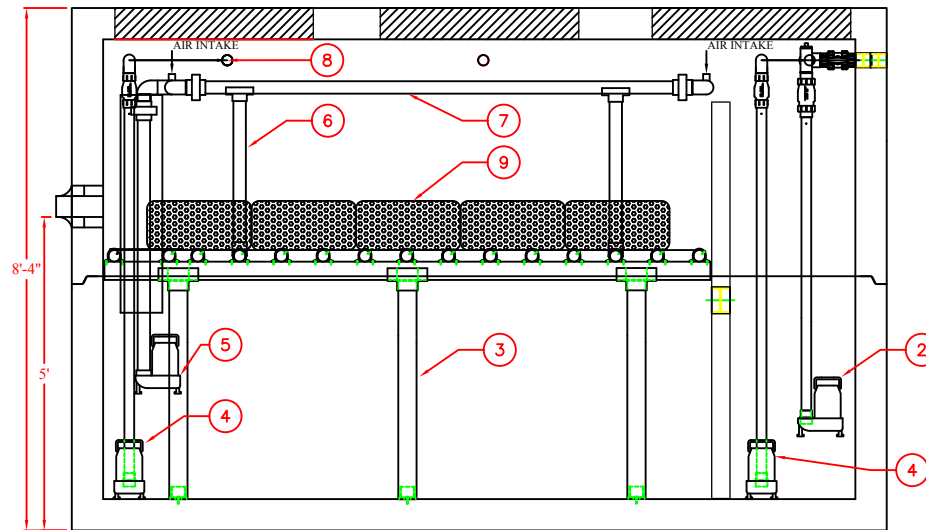
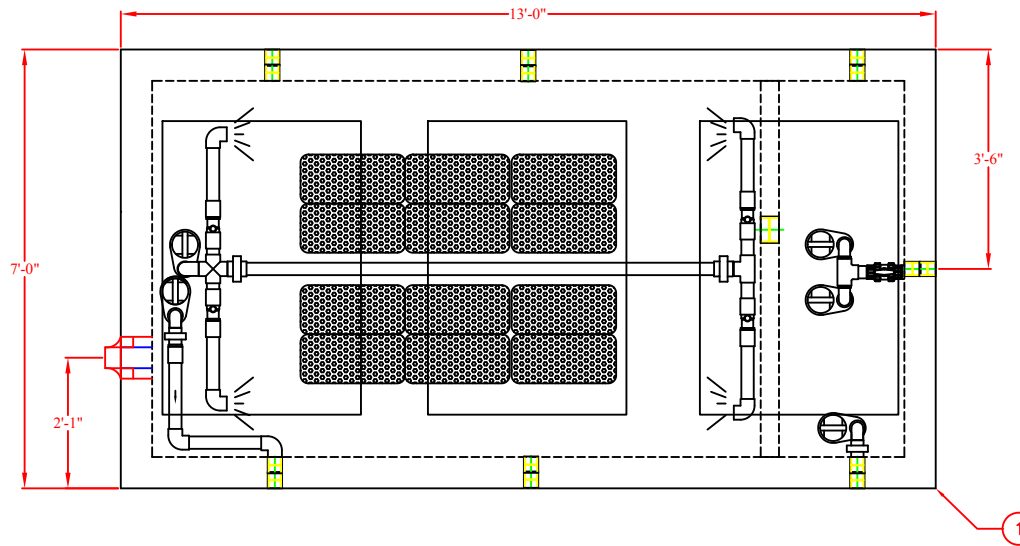
STAAR(TM) 1.2 CONCRETE
TOTAL TANK LAYOUT

DATE: 07/2008 DWG. NO.:

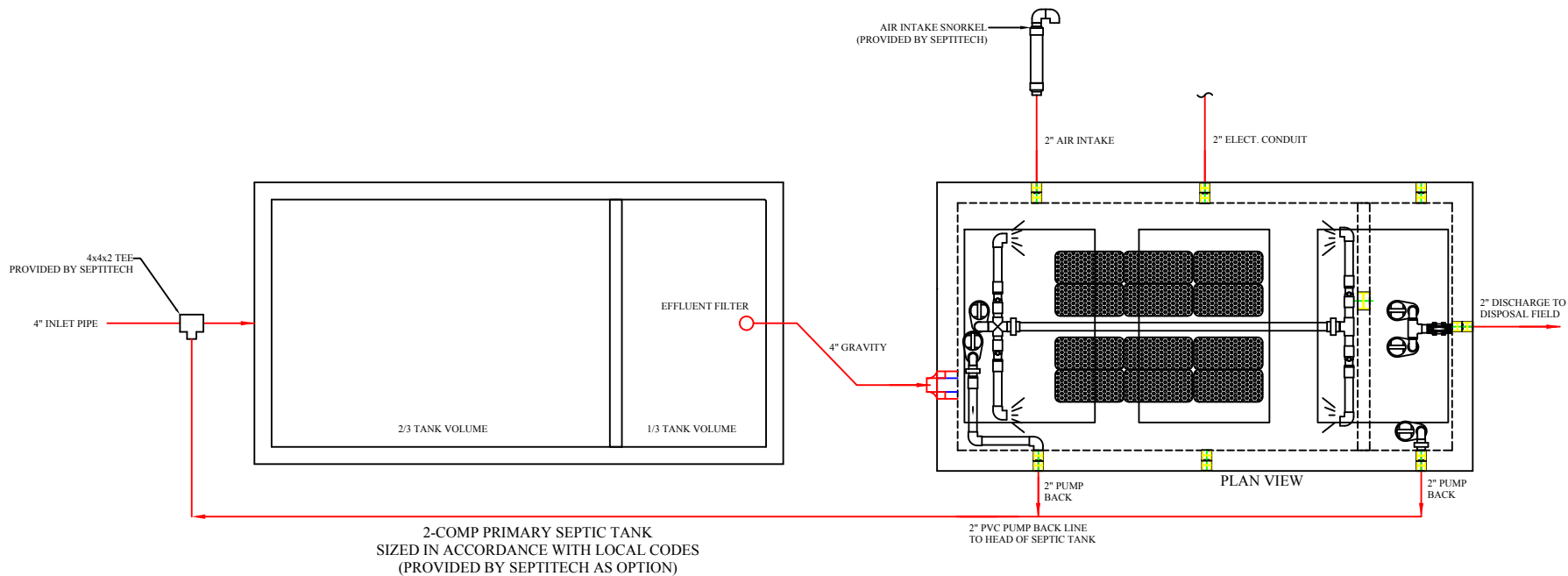
SCALE: 3/8"=1'-0" REV.:




SeptiTech <small>a subsidiary of Bio-Microbics, Inc.</small>	DES.BY: JSC
	DR.BY: JSC
	CK.BY: JSC
STAAR(TM) 1.2 CONCRETE INSTALLATION SCHEMATIC	
DATE: 07/2008	DWG. NO.:
SCALE: 1/2" = 1'-0"	REV: 0



9	15	Media Bags (Large) 40 CUFT
8	1	Air Header Assembly
7	1	Spray Header Assembly
6	1	Spray Header Support Structure
5	1	Recirculation Pump, Tsurumi 50PN2.75S
4	2	Pump Back Assem, Tsurumi 50PU2.15S
3	1	Support Structure
2	1	Discharge Pump Assem, Tsurumi 50PU2.15S
1	1	4000 Gal. Tank
ITEM QTY. DESCRIPTION		
		DES.BY: JSC
		DR.BY: JSC
		CK.BY: JSC
PROJECT NO.:		
STAAR(TM) 1.5 CONCRETE		
TOTAL TANK LAYOUT		
DATE:	07/2008	DWG. NO.:
SCALE:	1/2" = 1'-0"	REV.:



 <small>a subsidiary of Bio-Microbics, Inc.</small>	DES.BY: JSC
	DR.BY: JSC
	CK.BY: JSC
PROJECT NO.:	
STAAR(TM) 1.5 CONCRETE INSTALLATION SCHEMATIC	
DATE: 07/2008	DWG. NO.:
SCALE: 3/8" = 1'-0"	REV.: 0

APPENDIX D

Orenco

EIA Capital Cost (\$) per Home

Sources: MASSTC, Water Industry and Provisional Permit Vendors

BHW - December 19, 2023

EIA costs are currently borne entirely by the homeowner. This analysis works to identify all the costs that would go into an installation.

Retrofit - Many installations can take advantage of components already installed at the home. At the Shubael Pond project, 60% of homes could still use the septic tank and/or the leach field, sometimes with modification. This had a material effect on total project costs and is basis for weighted average calculation.

For a 2-4 bedroom home we look at ranges and make a final assumption.

	<u>Full Installation</u>	<u>Retrofit</u>
Design (1)	5,000-7,000	5,000-7,000
Permitting (2)	400-600	400-600
N Removing Equipment (3)	20,000-35,000	20,000-35,000
Installation (4)	17,000-20,000	7,000-15,000
RME Mgt Fee (5)	500-700	500-700
Total Capital Cost (6)	42,900-63,300	32,900-58,300

Weighted Average (7) - Low 36,900, High 60,300. Average \$48,600. Assume \$50,000.

Notes

- (1) Soil evaluation included. Design costs should be subject to learning curve pricing as project goes into production mode.
- (2) Permitting costs should be consistent from town to town.
- (3) Remote sensors are expected to be limited at this point to indications of whether or not a blower or pump is operating and are assumed to be in the equipment cost.
- (4) Installation includes other components like piping, wiring and Title 5 level equipment. Includes pulling and/or decommissioning old tanks/cesspools. Includes water meter to monitor water use.
- (5) Assumes purchase and installation will be managed by RME, rather than the owner.
- (6) Main variable is balance between Equipment and Installation. When combined, vendor totals were reasonably comparable.
- (7) $(42.9k-63.3k) @ 40\% + (32.9k-58.3k @ 60\%) = \text{Range } \$36.9k-60.3k. \text{ Average } \$48.6.$

APPENDIX E

Bio-Microbics

BIOMICROBICS

Model: FAST Treatment Systems with Nitrogen Reduction MicroFAST® 0.5, 0.75, 0.9, 1.5, 3.0, 4.5, 9.0 ; HighStrengthFAST® 1.0, 1.5, 3.0, 4.5, 9.0; NitriFAST® 0.5, 0.75, 1.0, 1.5, 3.0, 4.5, 9.0

Nitrogen Reducing Aerobic Treatment system. Nitrogen reducing 25 mg/l for 550 gpda; 19 mg/l for 660 gpda Residential < 2000 gpd Approval: 12/29/10, revised 3/20/15

Budget Quotes:

\$5,710 (tax NOT included)

Additional installation Guidance:

Instead of a 1500-gallon septic tank, this is a 1500-gallon FAST tank. The tank is different due to its configuration, it is configured so that it can accept a fast system to be installed inside of it.

There are two models which are the same price.

H-20: this system goes inside the tank.

H-10: this system requires a rectangular cut out at the top of the tank where the unit can be installed and supported with a flange. Requires venting and air lines. A blower would be hooked up to the air line and would require power.

APPENDIX C:

LOW PRESSURE CORE SEWER AREA VENDOR INFORMATION



Environment One Corporation

Pressure Sewer Preliminary

Cost and Design Analysis

For

Bourne, MA Low Pressure Sewer Design

Prepared For:
EPG

MA

Tel:

Fax:

Prepared By: M. Crowley

February 14, 2024

Bourne, MA Low Pressure Sewer Design

Prepared by : M. Crowley

On: February 14, 2024

Notes :

Elevations estimated using Google Earth. Station and valve quantities approximate. Analysis based upon drawings and data provided. Station recommendations are preliminary. GPD values impact retention times only, not line sizing or hydraulics. GP laterals to be 1.25".

Analysis valid only with pipe type listed. General recommendations for valve placement are: clean out valves at intervals of approximately 1,000 ft and at branch ends and junctions; isolation valves at branch junctions; and air release valves at peaks of 25 ft or more and/or at intervals of 2,000 to 2,500 ft. Lateral kits comprised of a ball and check valve are required to be installed between the pump discharge and street main on all installations. Laterals should be located as close to the public right of way as possible.

Quantities of grinder pumps, pipe, and valves are indicated on the cost page. The model of grinder pump(s) indicated is based upon the initial information provided to us but may not be the most appropriate for the specific location or requirements of the project. Costs of these items and their installation are best obtained from sources in your region.

We recommend you contact your local distributor of Environment One products for additional recommendations.

07.01.2020 - Initial analysis.

02.13.2024 - Rev1.

<<<< END OF NOTES >>>>

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
M. Crowley

Bourne, MA Low Pressure Sewer Design

February 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE										Friction loss calculations were based on a Constant for inside roughness "C" of: 150							
1.00	2.00	9	9	200	11.00	3	33.00	2.00	3.57	510.00	2.52	12.85	81.73	41.00	16.00	25.00	106.73
2.00	3.00	9	18	200	11.00	4	44.00	3.00	2.19	718.00	0.65	4.67	68.88	41.00	23.00	18.00	86.88
3.00	6.00	8	26	200	11.00	5	55.00	3.00	2.74	1,093.00	0.98	10.74	64.21	41.00	23.00	18.00	82.21
4.00	6.00	4	4	200	11.00	3	33.00	2.00	3.57	291.00	2.52	7.33	60.80	41.00	23.00	18.00	78.80
5.00	6.00	4	4	200	11.00	3	33.00	2.00	3.57	676.00	2.52	17.03	70.50	41.00	25.00	16.00	86.50
6.00	8.00	8	42	200	11.00	6	66.00	3.00	3.29	960.00	1.38	13.22	53.47	41.00	14.00	27.00	80.47
7.00	8.00	7	7	200	11.00	3	33.00	2.00	3.57	1,155.00	2.52	29.10	69.35	41.00	8.00	33.00	102.35
8.00	20.00	0	49	200	11.00	6	66.00	3.00	3.29	161.00	1.38	2.22	40.25	41.00	12.00	29.00	69.25
9.00	11.00	3	3	200	11.00	2	22.00	2.00	2.38	128.00	1.19	1.52	65.60	41.00	15.00	26.00	91.60
10.00	11.00	3	3	200	11.00	2	22.00	2.00	2.38	229.00	1.19	2.72	66.80	41.00	8.00	33.00	99.80
11.00	13.00	3	9	200	11.00	3	33.00	2.00	3.57	287.00	2.52	7.23	64.08	41.00	17.00	24.00	88.08
12.00	13.00	3	3	200	11.00	2	22.00	2.00	2.38	198.00	1.19	2.35	59.20	41.00	17.00	24.00	83.20
13.00	15.00	9	21	200	11.00	5	55.00	3.00	2.74	528.00	0.98	5.19	56.85	41.00	9.00	32.00	88.85
14.00	15.00	3	3	200	11.00	2	22.00	2.00	2.38	212.00	1.19	2.52	54.18	41.00	14.00	27.00	81.18
15.00	17.00	1	25	200	11.00	5	55.00	3.00	2.74	192.00	0.98	1.89	51.66	41.00	16.00	25.00	76.66
16.00	17.00	8	8	200	11.00	3	33.00	2.00	3.57	517.00	2.52	13.03	62.80	41.00	12.00	29.00	91.80
17.00	19.00	6	39	200	11.00	6	66.00	3.00	3.29	396.00	1.38	5.45	49.77	41.00	13.00	28.00	77.77
18.00	19.00	5	5	200	11.00	3	33.00	2.00	3.57	388.00	2.52	9.78	54.10	41.00	12.00	29.00	83.10
19.00	20.00	1	45	200	11.00	6	66.00	3.00	3.29	457.00	1.38	6.29	44.32	41.00	13.00	28.00	72.32
20.00	23.00	17	111	200	11.00	8	88.00	4.00	2.65	982.00	0.69	6.79	38.03	41.00	13.00	28.00	66.03
21.00	22.00	9	9	200	11.00	3	33.00	2.00	3.57	545.00	2.52	13.73	48.55	41.00	21.00	20.00	68.55
22.00	23.00	9	18	200	11.00	4	44.00	3.00	2.19	551.00	0.65	3.58	34.82	41.00	27.00	14.00	48.82
23.00	34.00	7	136	200	11.00	9	99.00	4.00	2.98	440.00	0.86	3.78	31.24	32.00	25.00	7.00	38.24
24.00	27.00	8	8	200	11.00	3	33.00	2.00	3.57	647.00	2.52	16.30	87.78	32.00	8.00	24.00	111.78
25.00	26.00	9	9	200	11.00	3	33.00	2.00	3.57	366.00	2.52	9.22	84.64	32.00	23.00	9.00	93.64
26.00	27.00	5	14	200	11.00	4	44.00	3.00	2.19	606.00	0.65	3.94	75.42	32.00	23.00	9.00	84.42
27.00	29.00	6	28	200	11.00	5	55.00	3.00	2.74	647.00	0.98	6.36	71.48	32.00	32.00	0.00	71.48
28.00	29.00	9	9	200	11.00	3	33.00	2.00	3.57	837.00	2.52	21.09	86.21	32.00	28.00	4.00	90.21
29.00	31.00	14	51	200	11.00	7	77.00	3.00	3.83	1,473.00	1.83	26.99	65.12	32.00	12.00	20.00	85.12
30.00	31.00	3	3	200	11.00	2	22.00	2.00	2.38	393.00	1.19	4.67	42.80	32.00	26.00	6.00	48.80
31.00	33.00	6	60	200	11.00	7	77.00	3.00	3.83	378.00	1.83	6.93	38.13	32.00	28.00	4.00	42.13
32.00	33.00	3	3	200	11.00	2	22.00	2.00	2.38	382.00	1.19	4.54	35.74	32.00	24.00	8.00	43.74
33.00	34.00	1	64	200	11.00	7	77.00	3.00	3.83	204.00	1.83	3.74	31.20	32.00	25.00	7.00	38.20
34.00	58.00	12	212	200	11.00	11	121.00	4.00	3.65	618.00	1.25	7.70	27.46	32.00	26.00	6.00	33.46
35.00	36.00	9	9	200	11.00	3	33.00	2.00	3.57	1,064.00	2.52	26.81	54.49	31.00	18.00	13.00	67.49

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
M. Crowley

Bourne, MA Low Pressure Sewer Design

February 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE										Friction loss calculations were based on a Constant for inside roughness "C" of: 150							
36.00	37.00	9	18	200	11.00	4	44.00	3.00	2.19	706.00	0.65	4.59	27.68	31.00	18.00	13.00	40.68
37.00	40.00	6	24	200	11.00	5	55.00	3.00	2.74	420.00	0.98	4.13	23.09	31.00	17.00	14.00	37.09
38.00	39.00	9	9	200	11.00	3	33.00	2.00	3.57	359.00	2.52	9.04	30.21	31.00	10.00	21.00	51.21
39.00	40.00	4	13	200	11.00	4	44.00	3.00	2.19	340.00	0.65	2.21	21.17	31.00	18.00	13.00	34.17
40.00	42.00	3	40	200	11.00	6	66.00	3.00	3.29	229.00	1.38	3.15	18.96	31.00	23.00	8.00	26.96
41.00	42.00	9	9	200	11.00	3	33.00	2.00	3.57	962.00	2.52	24.24	40.05	31.00	30.00	1.00	41.05
42.00	44.00	0	49	200	11.00	6	66.00	3.00	3.29	105.00	1.38	1.45	15.81	31.00	20.00	11.00	26.81
43.00	44.00	9	9	200	11.00	3	33.00	2.00	3.57	478.00	2.52	12.04	26.40	31.00	20.00	11.00	37.40
44.00	46.00	2	60	200	11.00	7	77.00	3.00	3.83	296.00	1.83	5.42	14.36	31.00	15.00	16.00	30.36
45.00	46.00	7	7	200	11.00	3	33.00	2.00	3.57	315.00	2.52	7.94	16.88	31.00	15.00	16.00	32.88
46.00	140.00	1	68	200	11.00	7	77.00	3.00	3.83	232.00	1.83	4.25	8.94	31.00	15.00	16.00	24.94
47.00	48.00	9	9	200	11.00	3	33.00	2.00	3.57	542.00	2.52	13.66	40.30	47.00	38.00	9.00	49.30
48.00	50.00	6	15	200	11.00	4	44.00	3.00	2.19	490.00	0.65	3.18	26.64	31.00	16.00	15.00	41.64
49.00	50.00	3	3	200	11.00	2	22.00	2.00	2.38	312.00	1.19	3.71	27.17	31.00	15.00	16.00	43.17
50.00	51.00	9	27	200	11.00	5	55.00	3.00	2.74	546.00	0.98	5.36	23.46	31.00	12.00	19.00	42.46
51.00	53.00	7	34	200	11.00	6	66.00	3.00	3.29	610.00	1.38	8.40	18.10	31.00	11.00	20.00	38.10
52.00	53.00	2	2	200	11.00	2	22.00	2.00	2.38	81.00	1.19	0.96	10.66	31.00	9.00	22.00	32.66
53.00	140.00	7	43	200	11.00	6	66.00	3.00	3.29	364.00	1.38	5.01	9.70	31.00	10.00	21.00	30.70
54.00	140.00	5	23	200	11.00	5	55.00	3.00	2.74	262.00	0.98	2.57	7.26	31.00	24.00	7.00	14.26
55.00	54.00	6	6	200	11.00	3	33.00	2.00	3.57	399.00	2.52	10.05	17.31	31.00	8.00	23.00	40.31
56.00	54.00	9	12	200	11.00	4	44.00	3.00	2.19	651.00	0.65	4.23	11.49	31.00	22.00	9.00	20.49
57.00	56.00	3	3	200	11.00	2	22.00	2.00	2.38	211.00	1.19	2.51	14.00	31.00	10.00	21.00	35.00
58.00	60.00	3	215	200	11.00	12	132.00	4.00	3.98	208.00	1.46	3.05	19.76	31.00	27.00	4.00	23.76
59.00	141.00	9	236	200	11.00	12	132.00	4.00	3.98	357.00	1.46	5.23	7.71	31.00	31.00	0.00	7.71
60.00	59.00	12	227	200	11.00	12	132.00	4.00	3.98	615.00	1.46	9.00	16.71	31.00	29.00	2.00	18.71
61.00	64.00	3	3	200	11.00	2	22.00	2.00	2.38	253.00	1.19	3.01	11.10	31.00	27.00	4.00	15.10
62.00	142.00	9	488	200	11.00	20	220.00	6.00	3.06	446.00	0.57	2.56	4.09	31.00	30.00	1.00	5.09
63.00	62.00	9	479	200	11.00	20	220.00	6.00	3.06	422.00	0.57	2.42	6.51	31.00	30.00	1.00	7.51
64.00	63.00	5	470	200	11.00	19	209.00	6.00	2.90	303.00	0.52	1.58	8.09	31.00	27.00	4.00	12.09
65.00	64.00	2	462	200	11.00	19	209.00	6.00	2.90	236.00	0.52	1.23	9.32	31.00	23.00	8.00	17.32
66.00	67.00	9	9	200	11.00	3	33.00	2.00	3.57	338.00	2.52	8.52	21.50	31.00	13.00	18.00	39.50
67.00	65.00	9	18	200	11.00	4	44.00	3.00	2.19	563.00	0.65	3.66	12.98	31.00	23.00	8.00	20.98
68.00	65.00	0	442	200	11.00	18	198.00	6.00	2.75	101.00	0.47	0.48	9.80	31.00	23.00	8.00	17.80
69.00	70.00	9	9	200	11.00	3	33.00	2.00	3.57	677.00	2.52	17.06	37.29	31.00	19.00	12.00	49.29
70.00	70.10	3	12	200	11.00	4	44.00	3.00	2.19	164.00	0.65	1.07	20.23	31.00	26.00	5.00	25.23

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
M. Crowley

Bourne, MA Low Pressure Sewer Design

February 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE										Friction loss calculations were based on a Constant for inside roughness "C" of: 150							
70.10	71.00	6	67	200	11.00	7	77.00	3.00	3.83	390.00	1.83	7.14	19.16	31.00	25.00	6.00	25.16
71.00	68.00	4	93	200	11.00	8	88.00	4.00	2.65	321.00	0.69	2.22	12.02	31.00	24.00	7.00	19.02
72.00	68.00	2	349	200	11.00	16	176.00	6.00	2.45	229.00	0.38	0.87	10.67	31.00	23.00	8.00	18.67
73.00	74.00	4	4	200	11.00	3	33.00	2.00	3.57	1,053.00	2.52	26.53	58.36	47.00	44.00	3.00	61.36
74.00	72.00	4	8	200	11.00	3	33.00	2.00	3.57	840.00	2.52	21.16	31.83	31.00	22.00	9.00	40.83
75.00	72.00	7	339	200	11.00	15	165.00	6.00	2.29	445.00	0.34	1.50	12.17	31.00	21.00	10.00	22.17
76.00	75.00	9	9	200	11.00	3	33.00	2.00	3.57	764.00	2.52	19.25	31.42	31.00	20.00	11.00	42.42
77.00	75.00	7	323	200	11.00	15	165.00	6.00	2.29	452.00	0.34	1.52	13.69	31.00	20.00	11.00	24.69
78.00	77.00	4	4	200	11.00	3	33.00	2.00	3.57	419.00	2.52	10.56	24.25	31.00	20.00	11.00	35.25
79.00	77.00	6	312	200	11.00	15	165.00	6.00	2.29	403.00	0.34	1.36	15.05	31.00	18.00	13.00	28.05
80.00	81.00	9	9	200	11.00	3	33.00	2.00	3.57	501.00	2.52	12.62	36.92	33.00	17.00	16.00	52.92
81.00	82.20	5	14	200	11.00	4	44.00	3.00	2.19	211.00	0.65	1.37	24.30	33.00	33.00	0.00	24.30
82.00	82.10	9	9	200	11.00	3	33.00	2.00	3.57	411.00	2.52	10.35	37.25	34.00	34.00	0.00	37.25
82.10	82.20	4	35	200	11.00	6	66.00	3.00	3.29	288.00	1.38	3.97	26.90	32.00	32.00	0.00	26.90
82.20	70.10	0	49	200	11.00	6	66.00	3.00	3.29	274.00	1.38	3.77	22.93	31.00	30.00	1.00	23.93
83.00	82.10	6	22	200	11.00	5	55.00	3.00	2.74	477.00	0.98	4.69	31.59	32.00	28.00	4.00	35.59
84.00	85.00	9	9	200	11.00	3	33.00	2.00	3.57	600.00	2.52	15.12	48.26	32.00	18.00	14.00	62.26
85.00	83.00	5	14	200	11.00	4	44.00	3.00	2.19	239.00	0.65	1.55	33.14	32.00	26.00	6.00	39.14
86.00	83.00	2	2	200	11.00	2	22.00	2.00	2.38	136.00	1.19	1.62	33.21	32.00	25.00	7.00	40.21
87.00	71.00	9	22	200	11.00	5	55.00	3.00	2.74	677.00	0.98	6.65	18.67	31.00	27.00	4.00	22.67
88.00	87.00	8	13	200	11.00	4	44.00	3.00	2.19	617.00	0.65	4.01	22.68	31.00	25.00	6.00	28.68
89.00	88.00	5	5	200	11.00	3	33.00	2.00	3.57	174.00	2.52	4.38	27.06	31.00	16.00	15.00	42.06
90.00	91.00	9	9	200	11.00	3	33.00	2.00	3.57	608.00	2.52	15.32	35.66	31.00	19.00	12.00	47.66
91.00	94.00	3	12	200	11.00	4	44.00	3.00	2.19	280.00	0.65	1.82	20.34	31.00	17.00	14.00	34.34
92.00	93.00	9	9	200	11.00	3	33.00	2.00	3.57	579.00	2.52	14.59	36.89	31.00	16.00	15.00	51.89
93.00	94.00	9	18	200	11.00	4	44.00	3.00	2.19	582.00	0.65	3.78	22.30	31.00	16.00	15.00	37.30
94.00	79.00	2	32	200	11.00	6	66.00	3.00	3.29	252.00	1.38	3.47	18.52	31.00	17.00	14.00	32.52
95.00	79.00	3	274	200	11.00	13	143.00	6.00	1.99	263.00	0.26	0.68	15.73	31.00	16.00	15.00	30.73
96.00	97.00	9	9	200	11.00	3	33.00	2.00	3.57	555.00	2.52	13.98	35.90	31.00	13.00	18.00	53.90
97.00	98.00	9	18	200	11.00	4	44.00	3.00	2.19	407.00	0.65	2.64	21.92	31.00	13.00	18.00	39.92
98.00	95.00	5	23	200	11.00	5	55.00	3.00	2.74	361.00	0.98	3.55	19.28	31.00	14.00	17.00	36.28
99.00	95.00	2	248	200	11.00	13	143.00	6.00	1.99	293.00	0.26	0.76	16.49	31.00	17.00	14.00	30.49
100.00	101.00	9	9	200	11.00	3	33.00	2.00	3.57	417.00	2.52	10.51	34.23	31.00	11.00	20.00	54.23
101.00	102.00	9	18	200	11.00	4	44.00	3.00	2.19	431.00	0.65	2.80	23.72	31.00	15.00	16.00	39.72
102.00	99.00	5	23	200	11.00	5	55.00	3.00	2.74	451.00	0.98	4.43	20.92	31.00	17.00	14.00	34.92

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
M. Crowley

Bourne, MA Low Pressure Sewer Design

February 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Friction loss calculations were based on a Constant for inside roughness "C" of: 150										
103.00	99.00	3	223	200	11.00	12	132.00	4.00	3.98	280.00	1.46	4.10	20.59	31.00	21.00	10.00	30.59
104.00	105.00	9	9	200	11.00	3	33.00	2.00	3.57	496.00	2.52	12.50	39.08	32.00	18.00	14.00	53.08
105.00	106.00	9	18	200	11.00	4	44.00	3.00	2.19	429.00	0.65	2.79	26.58	32.00	23.00	9.00	35.58
106.00	103.00	5	23	200	11.00	5	55.00	3.00	2.74	326.00	0.98	3.20	23.79	32.00	30.00	2.00	25.79
107.00	103.00	3	197	200	11.00	11	121.00	4.00	3.65	278.00	1.25	3.46	24.05	32.00	32.00	0.00	24.05
108.00	109.00	9	9	200	11.00	3	33.00	2.00	3.57	58.00	2.52	1.46	31.33	36.00	30.00	6.00	37.33
109.00	110.00	9	18	200	11.00	4	44.00	3.00	2.19	321.00	0.65	2.09	29.87	35.00	35.00	0.00	29.87
110.00	107.00	5	23	200	11.00	5	55.00	3.00	2.74	380.00	0.98	3.73	27.78	33.00	33.00	0.00	27.78
111.00	112.00	9	9	200	11.00	3	33.00	2.00	3.57	771.00	2.52	19.42	62.64	40.00	21.00	19.00	81.64
112.00	117.00	9	18	200	11.00	4	44.00	3.00	2.19	893.00	0.65	5.80	43.22	32.00	23.00	9.00	52.22
113.00	115.00	5	5	200	11.00	3	33.00	2.00	3.57	214.00	2.52	5.39	50.90	32.00	24.00	8.00	58.90
114.00	115.00	3	3	200	11.00	2	22.00	2.00	2.38	445.00	1.19	5.29	50.80	32.00	31.00	1.00	51.80
115.00	116.00	9	17	200	11.00	4	44.00	3.00	2.19	765.00	0.65	4.97	45.51	32.00	23.00	9.00	54.51
116.00	117.00	4	21	200	11.00	5	55.00	3.00	2.74	318.00	0.98	3.12	40.54	32.00	23.00	9.00	49.54
117.00	121.00	7	46	200	11.00	6	66.00	3.00	3.29	483.00	1.38	6.65	37.42	32.00	22.00	10.00	47.42
118.00	119.00	9	9	200	11.00	3	33.00	2.00	3.57	406.00	2.52	10.23	49.62	34.00	21.00	13.00	62.62
119.00	120.00	9	18	200	11.00	4	44.00	3.00	2.19	810.00	0.65	5.26	39.39	34.00	15.00	19.00	58.39
120.00	121.00	6	24	200	11.00	5	55.00	3.00	2.74	342.00	0.98	3.36	34.13	32.00	20.00	12.00	46.13
121.00	107.00	0	70	200	11.00	7	77.00	3.00	3.83	367.00	1.83	6.72	30.77	32.00	22.00	10.00	40.77
122.00	107.00	3	101	200	11.00	8	88.00	4.00	2.65	364.00	0.69	2.52	26.57	32.00	24.00	8.00	34.57
123.00	125.00	7	7	200	11.00	3	33.00	2.00	3.57	354.00	2.52	8.92	68.22	32.00	13.00	19.00	87.22
124.00	125.00	6	6	200	11.00	3	33.00	2.00	3.57	212.00	2.52	5.34	64.64	32.00	16.00	16.00	80.64
125.00	128.00	6	19	200	11.00	5	55.00	3.00	2.74	942.00	0.98	9.25	59.30	32.00	24.00	8.00	67.30
126.00	127.00	9	9	200	11.00	3	33.00	2.00	3.57	597.00	2.52	15.04	69.16	32.00	16.00	16.00	85.16
127.00	128.00	7	16	200	11.00	4	44.00	3.00	2.19	626.00	0.65	4.07	54.12	32.00	16.00	16.00	70.12
128.00	130.00	3	38	200	11.00	6	66.00	3.00	3.29	307.00	1.38	4.23	50.05	32.00	18.00	14.00	64.05
129.00	130.00	8	8	200	11.00	3	33.00	2.00	3.57	525.00	2.52	13.23	59.05	32.00	10.00	22.00	81.05
130.00	132.00	6	52	200	11.00	7	77.00	3.00	3.83	401.00	1.83	7.35	45.82	32.00	13.00	19.00	64.82
131.00	132.00	7	7	200	11.00	3	33.00	2.00	3.57	454.00	2.52	11.44	49.91	32.00	13.00	19.00	68.91
132.00	134.00	4	63	200	11.00	7	77.00	3.00	3.83	307.00	1.83	5.62	38.47	32.00	13.00	19.00	57.47
133.00	134.00	4	4	200	11.00	3	33.00	2.00	3.57	314.00	2.52	7.91	40.76	32.00	13.00	19.00	59.76
134.00	122.00	2	69	200	11.00	7	77.00	3.00	3.83	343.00	1.83	6.28	32.85	32.00	18.00	14.00	46.85
135.00	122.00	2	29	200	11.00	5	55.00	3.00	2.74	161.00	0.98	1.58	28.15	32.00	24.00	8.00	36.15
136.00	137.00	9	9	200	11.00	3	33.00	2.00	3.57	935.00	2.52	23.56	56.69	32.00	17.00	15.00	71.69
137.00	135.00	10	27	200	11.00	5	55.00	3.00	2.74	507.00	0.98	4.98	33.13	32.00	30.00	2.00	35.13

PRELIMINARY PRESSURE SEWER - PIPE SIZING AND BRANCH ANALYSIS

Prepared By:
M. Crowley

Bourne, MA Low Pressure Sewer Design

February 14, 2024

Zone Number	Connects to Zone	Number of Pumps in Zone	Accum Pumps in Zone	Gals/day per Pump	Max Flow Per Pump (gpm)	Max Sim Ops	Max Flow (GPM)	Pipe Size (inches)	Max Velocity (FPS)	Length of Main this Zone	Friction Loss Factor (ft/100 ft)	Friction Loss This Zone	Accum Friction Loss (feet)	Max Main Elevation	Minimum Pump Elevation	Static Head (feet)	Total Dynamic Head (ft)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Friction loss calculations were based on a Constant for inside roughness "C" of: 150										
138.00	137.00	2	2	200	11.00	2	22.00	2.00	2.38	312.00	1.19	3.71	36.84	32.00	30.00	2.00	38.84
139.00	137.00	6	6	200	11.00	3	33.00	2.00	3.57	833.00	2.52	20.99	54.12	32.00	28.00	4.00	58.12
140.00	141.00	0	134	200	11.00	9	99.00	4.00	2.98	257.00	0.86	2.21	4.69	31.00	24.00	7.00	11.69
141.00	142.00	0	370	200	11.00	16	176.00	6.00	2.45	250.00	0.38	0.95	2.48	31.00	30.00	1.00	3.48
142.00	142.00	0	858	200	11.00	31	341.00	8.00	2.80	428.00	0.36	1.53	1.53	16.00	16.00	0.00	1.53

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Bourne, MA Low Pressure Sewer Design

Prepared By:
M. Crowley

February 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Gals per Day per Dwelling		200	
1.00	2.00	9	2.00	15.40	510.00	78.55	1,800	22.91	1.05	6.95
2.00	3.00	18	3.00	33.47	718.00	240.29	3,600	14.98	1.60	5.90
3.00	6.00	26	3.00	33.47	1,093.00	365.79	5,200	14.22	1.69	4.30
4.00	6.00	4	2.00	15.40	291.00	44.82	800	17.85	1.34	3.95
5.00	6.00	4	2.00	15.40	676.00	104.12	800	7.68	3.12	5.73
6.00	8.00	42	3.00	33.47	960.00	321.28	8,400	26.15	0.92	2.61
7.00	8.00	7	2.00	15.40	1,155.00	177.90	1,400	7.87	3.05	4.74
8.00	20.00	49	3.00	33.47	161.00	53.88	9,800	181.88	0.13	1.69
9.00	11.00	3	2.00	15.40	128.00	19.72	600	30.43	0.79	5.07
10.00	11.00	3	2.00	15.40	229.00	35.27	600	17.01	1.41	5.69
11.00	13.00	9	2.00	15.40	287.00	44.21	1,800	40.72	0.59	4.28
12.00	13.00	3	2.00	15.40	198.00	30.50	600	19.67	1.22	4.91
13.00	15.00	21	3.00	33.47	528.00	176.70	4,200	23.77	1.01	3.69
14.00	15.00	3	2.00	15.40	212.00	32.65	600	18.37	1.31	3.99
15.00	17.00	25	3.00	33.47	192.00	64.26	5,000	77.81	0.31	2.68
16.00	17.00	8	2.00	15.40	517.00	79.63	1,600	20.09	1.19	3.57
17.00	19.00	39	3.00	33.47	396.00	132.53	7,800	58.86	0.41	2.37
18.00	19.00	5	2.00	15.40	388.00	59.76	1,000	16.73	1.43	3.40
19.00	20.00	45	3.00	33.47	457.00	152.94	9,000	58.85	0.41	1.97
20.00	23.00	111	4.00	55.31	982.00	543.18	22,200	40.87	0.59	1.56
21.00	22.00	9	2.00	15.40	545.00	83.95	1,800	21.44	1.12	3.32
22.00	23.00	18	3.00	33.47	551.00	184.40	3,600	19.52	1.23	2.20
23.00	34.00	136	4.00	55.31	440.00	243.38	27,200	111.76	0.21	0.97
24.00	27.00	8	2.00	15.40	647.00	99.66	1,600	16.06	1.49	4.72
25.00	26.00	9	2.00	15.40	366.00	56.37	1,800	31.93	0.75	5.72
26.00	27.00	14	3.00	33.47	606.00	202.81	2,800	13.81	1.74	4.96
27.00	29.00	28	3.00	33.47	647.00	216.53	5,600	25.86	0.93	3.23
28.00	29.00	9	2.00	15.40	837.00	128.92	1,800	13.96	1.72	4.02
29.00	31.00	51	3.00	33.47	1,473.00	492.96	10,200	20.69	1.16	2.30
30.00	31.00	3	2.00	15.40	393.00	60.53	600	9.91	2.42	3.56
31.00	33.00	60	3.00	33.47	378.00	126.50	12,000	94.86	0.25	1.14
32.00	33.00	3	2.00	15.40	382.00	58.84	600	10.20	2.35	3.24
33.00	34.00	64	3.00	33.47	204.00	68.27	12,800	187.49	0.13	0.88
34.00	58.00	212	4.00	55.31	618.00	341.84	42,400	124.04	0.19	0.76
35.00	36.00	9	2.00	15.40	1,064.00	163.89	1,800	10.98	2.19	5.46

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Bourne, MA Low Pressure Sewer Design

Prepared By:
M. Crowley

February 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Gals per Day per Dwelling		200	
36.00	37.00	18	3.00	33.47	706.00	236.27	3,600	15.24	1.58	3.28
37.00	40.00	24	3.00	33.47	420.00	140.56	4,800	34.15	0.70	1.70
38.00	39.00	9	2.00	15.40	359.00	55.30	1,800	32.55	0.74	2.78
39.00	40.00	13	3.00	33.47	340.00	113.79	2,600	22.85	1.05	2.05
40.00	42.00	40	3.00	33.47	229.00	76.64	8,000	104.39	0.23	1.00
41.00	42.00	9	2.00	15.40	962.00	148.18	1,800	12.15	1.98	2.74
42.00	44.00	49	3.00	33.47	105.00	35.14	9,800	278.89	0.09	0.77
43.00	44.00	9	2.00	15.40	478.00	73.63	1,800	24.45	0.98	1.66
44.00	46.00	60	3.00	33.47	296.00	99.06	12,000	121.14	0.20	0.68
45.00	46.00	7	2.00	15.40	315.00	48.52	1,400	28.85	0.83	1.31
46.00	140.00	68	3.00	33.47	232.00	77.64	13,600	175.16	0.14	0.48
47.00	48.00	9	2.00	15.40	542.00	83.48	1,800	21.56	1.11	4.64
48.00	50.00	15	3.00	33.47	490.00	163.99	3,000	18.29	1.31	3.53
49.00	50.00	3	2.00	15.40	312.00	48.06	600	12.49	1.92	4.14
50.00	51.00	27	3.00	33.47	546.00	182.73	5,400	29.55	0.81	2.22
51.00	53.00	34	3.00	33.47	610.00	204.15	6,800	33.31	0.72	1.41
52.00	53.00	2	2.00	15.40	81.00	12.48	400	32.06	0.75	1.43
53.00	140.00	43	3.00	33.47	364.00	121.82	8,600	70.60	0.34	0.69
54.00	140.00	23	3.00	33.47	262.00	87.68	4,600	52.46	0.46	0.80
55.00	54.00	6	2.00	15.40	399.00	61.46	1,200	19.53	1.23	2.03
56.00	54.00	12	3.00	33.47	651.00	217.87	2,400	11.02	2.18	2.98
57.00	56.00	3	2.00	15.40	211.00	32.50	600	18.46	1.30	4.28
58.00	60.00	215	4.00	55.31	208.00	115.05	43,000	373.75	0.06	0.56
59.00	141.00	236	4.00	55.31	357.00	197.47	47,200	239.03	0.10	0.32
60.00	59.00	227	4.00	55.31	615.00	340.18	45,400	133.46	0.18	0.50
61.00	64.00	3	2.00	15.40	253.00	38.97	600	15.40	1.56	2.03
62.00	142.00	488	6.00	119.90	446.00	534.75	97,600	182.52	0.13	0.25
63.00	62.00	479	6.00	119.90	422.00	505.97	95,800	189.34	0.13	0.38
64.00	63.00	470	6.00	119.90	303.00	363.29	94,000	258.74	0.09	0.47
65.00	64.00	462	6.00	119.90	236.00	282.96	92,400	326.55	0.07	0.55
66.00	67.00	9	2.00	15.40	338.00	52.06	1,800	34.57	0.69	2.50
67.00	65.00	18	3.00	33.47	563.00	188.42	3,600	19.11	1.26	1.80
68.00	65.00	442	6.00	119.90	101.00	121.10	88,400	729.99	0.03	0.58
69.00	70.00	9	2.00	15.40	677.00	104.28	1,800	17.26	1.39	2.98
70.00	70.10	12	3.00	33.47	164.00	54.89	2,400	43.73	0.55	1.59

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Bourne, MA Low Pressure Sewer Design

Prepared By:
M. Crowley

February 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Gals per Day per Dwelling		200	
70.10	71.00	67	3.00	33.47	390.00	130.52	13,400	102.67	0.23	1.04
71.00	68.00	93	4.00	55.31	321.00	177.56	18,600	104.76	0.23	0.81
72.00	68.00	349	6.00	119.90	229.00	274.57	69,800	254.22	0.09	0.67
73.00	74.00	4	2.00	15.40	1,053.00	162.19	800	4.93	4.87	7.48
74.00	72.00	8	2.00	15.40	840.00	129.38	1,600	12.37	1.94	2.61
75.00	72.00	339	6.00	119.90	445.00	533.55	67,800	127.07	0.19	0.86
76.00	75.00	9	2.00	15.40	764.00	117.68	1,800	15.30	1.57	2.43
77.00	75.00	323	6.00	119.90	452.00	541.94	64,600	119.20	0.20	1.06
78.00	77.00	4	2.00	15.40	419.00	64.54	800	12.40	1.94	3.00
79.00	77.00	312	6.00	119.90	403.00	483.19	62,400	129.14	0.19	1.25
80.00	81.00	9	2.00	15.40	501.00	77.17	1,800	23.33	1.03	2.90
81.00	82.20	14	3.00	33.47	211.00	70.61	2,800	39.65	0.61	1.87
82.00	82.10	9	2.00	15.40	411.00	63.31	1,800	28.43	0.84	2.44
82.10	82.20	35	3.00	33.47	288.00	96.38	7,000	72.63	0.33	1.60
82.20	70.10	49	3.00	33.47	274.00	91.70	9,800	106.87	0.22	1.27
83.00	82.10	22	3.00	33.47	477.00	159.64	4,400	27.56	0.87	2.47
84.00	85.00	9	2.00	15.40	600.00	92.42	1,800	19.48	1.23	4.39
85.00	83.00	14	3.00	33.47	239.00	79.98	2,800	35.01	0.69	3.15
86.00	83.00	2	2.00	15.40	136.00	20.95	400	19.10	1.26	3.72
87.00	71.00	22	3.00	33.47	677.00	226.57	4,400	19.42	1.24	2.04
88.00	87.00	13	3.00	33.47	617.00	206.49	2,600	12.59	1.91	3.95
89.00	88.00	5	2.00	15.40	174.00	26.80	1,000	37.31	0.64	4.59
90.00	91.00	9	2.00	15.40	608.00	93.65	1,800	19.22	1.25	3.75
91.00	94.00	12	3.00	33.47	280.00	93.71	2,400	25.61	0.94	2.50
92.00	93.00	9	2.00	15.40	579.00	89.18	1,800	20.18	1.19	4.05
93.00	94.00	18	3.00	33.47	582.00	194.77	3,600	18.48	1.30	2.86
94.00	79.00	32	3.00	33.47	252.00	84.34	6,400	75.89	0.32	1.57
95.00	79.00	274	6.00	119.90	263.00	315.33	54,800	173.78	0.14	1.39
96.00	97.00	9	2.00	15.40	555.00	85.49	1,800	21.06	1.14	4.07
97.00	98.00	18	3.00	33.47	407.00	136.21	3,600	26.43	0.91	2.93
98.00	95.00	23	3.00	33.47	361.00	120.81	4,600	38.08	0.63	2.02
99.00	95.00	248	6.00	119.90	293.00	351.30	49,600	141.19	0.17	1.56
100.00	101.00	9	2.00	15.40	417.00	64.23	1,800	28.02	0.86	4.16
101.00	102.00	18	3.00	33.47	431.00	144.24	3,600	24.96	0.96	3.31
102.00	99.00	23	3.00	33.47	451.00	150.93	4,600	30.48	0.79	2.35

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME(HR)

Bourne, MA Low Pressure Sewer Design

Prepared By:

M. Crowley

February 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Gals per Day per Dwelling		200	
103.00	99.00	223	4.00	55.31	280.00	154.88	44,600	287.97	0.08	1.64
104.00	105.00	9	2.00	15.40	496.00	76.40	1,800	23.56	1.02	4.19
105.00	106.00	18	3.00	33.47	429.00	143.57	3,600	25.07	0.96	3.17
106.00	103.00	23	3.00	33.47	326.00	109.10	4,600	42.16	0.57	2.21
107.00	103.00	197	4.00	55.31	278.00	153.77	39,400	256.23	0.09	1.73
108.00	109.00	9	2.00	15.40	58.00	8.93	1,800	201.49	0.12	3.23
109.00	110.00	18	3.00	33.47	321.00	107.43	3,600	33.51	0.72	3.11
110.00	107.00	23	3.00	33.47	380.00	127.17	4,600	36.17	0.66	2.40
111.00	112.00	9	2.00	15.40	771.00	118.76	1,800	15.16	1.58	5.94
112.00	117.00	18	3.00	33.47	893.00	298.86	3,600	12.05	1.99	4.36
113.00	115.00	5	2.00	15.40	214.00	32.96	1,000	30.34	0.79	5.57
114.00	115.00	3	2.00	15.40	445.00	68.54	600	8.75	2.74	7.52
115.00	116.00	17	3.00	33.47	765.00	256.02	3,400	13.28	1.81	4.78
116.00	117.00	21	3.00	33.47	318.00	106.42	4,200	39.47	0.61	2.97
117.00	121.00	46	3.00	33.47	483.00	161.64	9,200	56.92	0.42	2.37
118.00	119.00	9	2.00	15.40	406.00	62.54	1,800	28.78	0.83	5.16
119.00	120.00	18	3.00	33.47	810.00	271.08	3,600	13.28	1.81	4.32
120.00	121.00	24	3.00	33.47	342.00	114.46	4,800	41.94	0.57	2.52
121.00	107.00	70	3.00	33.47	367.00	122.82	14,000	113.99	0.21	1.95
122.00	107.00	101	4.00	55.31	364.00	201.34	20,200	100.33	0.24	1.97
123.00	125.00	7	2.00	15.40	354.00	54.53	1,400	25.68	0.93	5.93
124.00	125.00	6	2.00	15.40	212.00	32.65	1,200	36.75	0.65	5.65
125.00	128.00	19	3.00	33.47	942.00	315.25	3,800	12.05	1.99	4.99
126.00	127.00	9	2.00	15.40	597.00	91.96	1,800	19.57	1.23	5.80
127.00	128.00	16	3.00	33.47	626.00	209.50	3,200	15.27	1.57	4.57
128.00	130.00	38	3.00	33.47	307.00	102.74	7,600	73.97	0.32	3.00
129.00	130.00	8	2.00	15.40	525.00	80.86	1,600	19.79	1.21	3.89
130.00	132.00	52	3.00	33.47	401.00	134.20	10,400	77.50	0.31	2.68
131.00	132.00	7	2.00	15.40	454.00	69.93	1,400	20.02	1.20	3.57
132.00	134.00	63	3.00	33.47	307.00	102.74	12,600	122.64	0.20	2.37
133.00	134.00	4	2.00	15.40	314.00	48.36	800	16.54	1.45	3.62
134.00	122.00	69	3.00	33.47	343.00	114.79	13,800	120.22	0.20	2.17
135.00	122.00	29	3.00	33.47	161.00	53.88	5,800	107.64	0.22	2.20
136.00	137.00	9	2.00	15.40	935.00	144.02	1,800	12.50	1.92	4.87
137.00	135.00	27	3.00	33.47	507.00	169.68	5,400	31.83	0.75	2.95

PRELIMINARY PRESSURE SEWER - ACCUMULATED RETENTION TIME (HR)

Bourne, MA Low Pressure Sewer Design

Prepared By:
M. Crowley

February 14, 2024

Zone Number	Connects to Zone	Accumulated Total of Pumps this Zone	Pipe Size (inches)	Gallons per 100 lineal feet	Length of Zone	Capacity of Zone	Average Daily Flow	Average Fluid Changes per Day	Average Retention Time (Hr)	Accumulated Retention Time (Hr)
This spreadsheet was calculated using pipe diameters for: SDR11HDPE							Gals per Day per Dwelling		200	
138.00	137.00	2	2.00	15.40	312.00	48.06	400	8.32	2.88	5.83
139.00	137.00	6	2.00	15.40	833.00	128.31	1,200	9.35	2.57	5.52
140.00	141.00	134	4.00	55.31	257.00	142.15	26,800	188.53	0.13	0.35
141.00	142.00	370	6.00	119.90	250.00	299.75	74,000	246.87	0.10	0.22
142.00	142.00	858	8.00	203.19	428.00	869.65	171,600	197.32	0.12	0.12

APPENDIX D:
TITLE 5 (DEFAULT) IMPLEMENTATION SCHEDULE AND COST ESTIMATE

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
I/A	Tier 1										
	Megansett Squeteague	57	57	57	57	57	0	0	0	0	0
	Phinney's Harbor	227	227	227	227	227	0	0	0	0	0
	Tier 1 Subtotal	284	284	284	284	284	0	0	0	0	0
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	25
	Buttermilk Bay - EIA	0	0	0	0	0	22	22	22	22	22
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	187	187	187	187	187
	Total Installations	284	284	284	284	284	187	187	187	187	187
	Megansett Squeteague	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Phinney's Harbor	\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Tier 1 Cost Subtotal	\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,354,000	\$ 1,422,000	\$ 1,494,000	\$ 1,569,000	\$ 1,648,000
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,118,000	\$ 1,173,900	\$ 1,232,600	\$ 1,294,230	\$ 1,358,950
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,517,000	\$ 5,794,000	\$ 6,087,000	\$ 6,393,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000	\$ 2,699,000	\$ 2,834,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,054,000	\$ 10,558,900	\$ 11,089,600	\$ 11,649,230	\$ 12,233,950
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000
	Annual Capital Cost	\$ 13,504,800	\$ 14,182,000	\$ 14,895,000	\$ 15,641,000	\$ 16,426,000	\$ 11,923,000	\$ 12,522,900	\$ 13,153,600	\$ 13,818,230	\$ 14,512,950
Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,581,800	\$ 58,222,800	\$ 74,648,800	\$ 86,571,800	\$ 99,094,700	\$ 112,248,300	\$ 126,066,530	\$ 140,579,480

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	
Calendar Year		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Plan Year		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total
I/A	Tier 1											
	Megansett Squeteague	0	0	0	0	0	0	0	0	0	0	285
	Phinney's Harbor	0	0	0	0	0	0	0	0	0	0	1,135
	Tier 1 Subtotal	0	0	0	0	0	0	0	0	0	0	1,420
	Tier 2											
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	25	375
	Buttermilk Bay - EIA	22	22	22	22	22	22	22	22	22	22	330
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97	1,455
	Pocasset River	43	43	43	43	43	43	43	43	43	43	645
	Tier 2 Subtotal	187	187	187	187	187	187	187	187	187	187	2,805
	Total Installations	187	187	187	187	187	187	187	187	187	187	4,225
	Megansett Squeteague	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 13,369,000
	Phinney's Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 53,217,000
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 66,586,000
	Buttermilk Bay - GUIA	\$ 1,731,000	\$ 1,818,000	\$ 1,909,000	\$ 2,005,000	\$ 2,106,000	\$ 2,212,000	\$ 2,323,000	\$ 2,440,000	\$ 2,562,000	\$ 2,691,000	\$ 29,284,000
	Buttermilk Bay - EIA	\$ 1,426,900	\$ 1,498,250	\$ 1,573,170	\$ 1,651,830	\$ 1,734,430	\$ 1,821,160	\$ 1,912,220	\$ 2,007,840	\$ 2,108,240	\$ 2,213,660	\$ 24,125,380
	Pocasset Harbor	\$ 6,714,000	\$ 7,053,000	\$ 7,407,000	\$ 7,778,000	\$ 8,169,000	\$ 8,580,000	\$ 9,012,000	\$ 9,464,000	\$ 9,941,000	\$ 10,438,000	\$ 113,600,000
	Pocasset River	\$ 2,977,000	\$ 3,127,000	\$ 3,284,000	\$ 3,448,000	\$ 3,622,000	\$ 3,804,000	\$ 3,995,000	\$ 4,196,000	\$ 4,407,000	\$ 4,627,000	\$ 50,364,000
	Tier 2 Cost Subtotal	\$ 12,848,900	\$ 13,496,250	\$ 14,173,170	\$ 14,882,830	\$ 15,631,430	\$ 16,417,160	\$ 17,242,220	\$ 18,107,840	\$ 19,018,240	\$ 19,969,660	\$ 217,373,380
SW BMP	STORMWATER BMP											
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000	\$ 3,465,600
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000	\$ 10,247,100
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000	\$ 8,465,400
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
	Annual Capital Cost	\$ 15,243,900	\$ 16,013,250	\$ 16,818,170	\$ 17,661,830	\$ 18,552,430	\$ 19,486,160	\$ 20,466,220	\$ 21,494,840	\$ 22,577,240	\$ 23,708,660	
Total Cost to Date		\$ 155,823,380	\$ 171,836,630	\$ 188,654,800	\$ 206,316,630	\$ 224,869,060	\$ 244,355,220	\$ 264,821,440	\$ 286,316,280	\$ 308,893,520	\$ 332,602,180	

Title 5 Timeline		Capital Cost									4/4/2024
Buttermilk Bay - Core Sewer Area											
Sewer Alternative 1	Inflation Rate	5%	5%	5%	5%	5%	5%	5%	5%	5%	
	Plan Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
	Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	
	Tier 1 - TMDL										
I/A	Megansett Squeteague	57	57	57	57	57	0	0	0	0	
	Phinney's Harbor	227	227	227	227	227	0	0	0	0	
	Tier 1 Subtotal	284	284	284	284	284	0	0	0	0	
	Tier 2 - N Impaired										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	
	Pocasset River	0	0	0	0	0	43	43	43	43	
	Tier 2 Subtotal	0	0	0	0	0	165	165	165	165	
	Total Installations	284	284	284	284	284	165	165	165	165	
	Megansett Squeteague	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -	\$ -	
	Phinney's Harbor	\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -	\$ -	
	Tier 1 Cost Subtotal	\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,354,000	\$ 1,421,700	\$ 1,492,790	\$ 1,567,430	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,516,000	\$ 5,792,000	\$ 6,082,000	
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000	\$ 2,698,000	
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,936,000	\$ 9,383,700	\$ 9,853,790	\$ 10,347,430	
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 20,000,000	\$ -	\$ -		
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,100,000	\$ 14,250,000	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 21,100,000	\$ 14,250,000	\$ -	\$ -	
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	
	Annual Capital Cost	\$ 13,504,800	\$ 14,182,000	\$ 15,245,000	\$ 16,141,000	\$ 17,426,000	\$ 31,905,000	\$ 25,597,700	\$ 11,917,790	\$ 12,516,430	
Program Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,931,800	\$ 59,072,800	\$ 76,498,800	\$ 108,403,800	\$ 134,001,500	\$ 145,919,290	\$ 158,435,720	

Title 5 Timeline		Capital Cost									4/4/2024
Buttermilk Bay - Core Sewer Area											
Sewer Alternative 1	Inflation Rate	5%	5%	5%	5%	5%	5%	5%	5%	5%	
	Plan Year	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	
	Calendar Year	2034	2035	2036	2037	2038	2039	2040	2041	2042	
	Tier 1 - TMDL										
I/A	Megansett Squeteague	0	0	0	0	0	0	0	0	0	
	Phinney's Harbor	0	0	0	0	0	0	0	0	0	
	Tier 1 Subtotal	0	0	0	0	0	0	0	0	0	
	Tier 2 - N Impaired										
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	
	Pocasset River	43	43	43	43	43	43	43	43	43	
	Tier 2 Subtotal	165	165	165	165	165	165	165	165	165	
	Total Installations	165	165	165	165	165	165	165	165	165	
	Megansett Squeteague	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Phinney's Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay - GUIA	\$ 1,645,810	\$ 1,728,110	\$ 1,814,520	\$ 1,905,250	\$ 2,000,520	\$ 2,100,550	\$ 2,205,580	\$ 2,315,860	\$ 2,431,660	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ 6,387,000	\$ 6,707,000	\$ 7,043,000	\$ 7,396,000	\$ 7,766,000	\$ 8,155,000	\$ 8,563,000	\$ 8,992,000	\$ 9,442,000	
	Pocasset River	\$ 2,833,000	\$ 2,975,000	\$ 3,124,000	\$ 3,281,000	\$ 3,446,000	\$ 3,619,000	\$ 3,800,000	\$ 3,990,000	\$ 4,190,000	
	Tier 2 Cost Subtotal	\$ 10,865,810	\$ 11,410,110	\$ 11,981,520	\$ 12,582,250	\$ 13,212,520	\$ 13,874,550	\$ 14,568,580	\$ 15,297,860	\$ 16,063,660	
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades										
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	
	Phinney's Harbor	\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	
	Buttermilk Bay	\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	
	Pocasset Harbor	\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	
	Pocasset River	\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	
	Stormwater BMP Subtotal	\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	
Annual Capital Cost		\$ 13,144,810	\$ 13,805,110	\$ 14,498,520	\$ 15,227,250	\$ 15,991,520	\$ 16,795,550	\$ 17,637,580	\$ 18,521,860	\$ 19,450,660	
Program Total Cost to Date		\$ 171,580,530	\$ 185,385,640	\$ 199,884,160	\$ 215,111,410	\$ 231,102,930	\$ 247,898,480	\$ 265,536,060	\$ 284,057,920	\$ 303,508,580	

	Plan Year	Year 19	Year 20	Plan Total
	Calendar Year	2043	2044	
	Tier 1 - TMDL			
I/A	Megansett Squeteague	0	0	285
	Phinney's Harbor	0	0	1,135
	Tier 1 Subtotal	0	0	1,420
	Tier 2 - N Impaired			Tier 2 Subtotals
	Buttermilk Bay - GUIA	25	25	375
	Buttermilk Bay - EIA	0	0	0
	Pocasset Harbor	97	97	1,455
	Pocasset River	43	43	645
	Tier 2 Subtotal	165	165	2,475
	Total Installations	165	165	3,895
	Megansett Squeteague	\$ -	\$ -	\$ 13,369,000
	Phinney's Harbor	\$ -	\$ -	\$ 53,217,000
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ 66,586,000
	Buttermilk Bay - GUIA	\$ 2,553,250	\$ 2,680,920	\$ 29,217,950
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ 9,915,000	\$ 10,411,000	\$ 113,420,000
	Pocasset River	\$ 4,400,000	\$ 4,620,000	\$ 50,320,000
	Tier 2 Cost Subtotal	\$ 16,868,250	\$ 17,711,920	\$ 192,957,950
Sewer	SEWER			
	Buzzards Bay WWTF Upgrades			\$ 21,850,000
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ 15,350,000
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ 37,200,000
SW BMP	STORMWATER BMP			
	Megansett Squeteague	\$ 256,000	\$ 269,000	\$ 3,465,600
	Phinney's Harbor	\$ 749,000	\$ 787,000	\$ 10,247,100
	Buttermilk Bay	\$ 620,000	\$ 651,000	\$ 8,465,400
	Pocasset Harbor	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
	Pocasset River	\$ 573,000	\$ 602,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
	Annual Capital Cost	\$ 20,427,250	\$ 21,450,920	
Program Total Cost to Date		\$ 323,935,830	\$ 345,386,750	

		Inflation		5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
Tier 1											
Megansett Squeteague		57	57	57	57	57	0	0	0	0	
Phinney's Harbor		227	227	227	227	227	0	0	0	0	
Tier 1 Subtotal		284	284	284	284	284	0	0	0	0	
Tier 2											
Buttermilk Bay - GUIA		0	0	0	0	0	0	0	0	0	
Buttermilk Bay - EIA		0	0	0	0	0	0	0	0	0	
Pocasset Harbor		0	0	0	0	0	97	97	97	97	
Pocasset River		0	0	0	0	0	43	43	43	43	
Tier 2 Subtotal		0	0	0	0	0	140	140	140	140	
Total Installations		284	284	284	284	284	140	140	140	140	
Megansett Squeteague		\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -	\$ -	
Phinney's Harbor		\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -	\$ -	
Tier 1 Cost Subtotal		\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -	\$ -	
Buttermilk Bay - GUIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Buttermilk Bay - EIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Pocasset Harbor		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,516,000	\$ 5,792,000	\$ 6,082,000	
Pocasset River		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000	\$ 2,698,000	
Tier 2 Cost Subtotal		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,582,000	\$ 7,962,000	\$ 8,361,000	\$ 8,780,000	
SEWER											
Buzzards Bay WWTF Upgrades		\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 35,000,000	\$ -	\$ -	\$ -	
Buttermilk Bay Alternative 1		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
Buttermilk Bay Entire Area		\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,200,000	\$ 28,200,000	\$ -	\$ -	
Sewer Subtotal		\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 37,200,000	\$ 28,200,000	\$ -	\$ -	
STORMWATER BMP											
Megansett Squeteague		\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	
Phinney's Harbor		\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	
Buttermilk Bay		\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	
Pocasset Harbor		\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	
Pocasset River		\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	
Stormwater BMP Subtotal		\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	
Annual Capital Cost		\$ 13,504,800	\$ 14,182,000	\$ 15,245,000	\$ 16,141,000	\$ 19,926,000	\$ 46,651,000	\$ 38,126,000	\$ 10,425,000	\$ 10,949,000	
Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,931,800	\$ 59,072,800	\$ 78,998,800	\$ 125,649,800	\$ 163,775,800	\$ 174,200,800	\$ 185,149,800	

		5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2034	2035	2036	2037	2038	2039	2040	2041	2042
Plan Year		Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18
Tier 1										
Megansett Squeteague		0	0	0	0	0	0	0	0	0
Phinney's Harbor		0	0	0	0	0	0	0	0	0
Tier 1 Subtotal		0	0	0	0	0	0	0	0	0
Tier 2										
Buttermilk Bay - GUIA		0	0	0	0	0	0	0	0	0
Buttermilk Bay - EIA		0	0	0	0	0	0	0	0	0
Pocasset Harbor		97	97	97	97	97	97	97	97	97
Pocasset River		43	43	43	43	43	43	43	43	43
Tier 2 Subtotal		140	140	140	140	140	140	140	140	140
Total Installations		140	140	140	140	140	140	140	140	140
Megansett Squeteague		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Phinney's Harbor		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Tier 1 Cost Subtotal		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay - GUIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay - EIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Pocasset Harbor		\$ 6,387,000	\$ 6,707,000	\$ 7,043,000	\$ 7,396,000	\$ 7,766,000	\$ 8,155,000	\$ 8,563,000	\$ 8,992,000	\$ 9,442,000
Pocasset River		\$ 2,833,000	\$ 2,975,000	\$ 3,124,000	\$ 3,281,000	\$ 3,446,000	\$ 3,619,000	\$ 3,800,000	\$ 3,990,000	\$ 4,190,000
Tier 2 Cost Subtotal		\$ 9,220,000	\$ 9,682,000	\$ 10,167,000	\$ 10,677,000	\$ 11,212,000	\$ 11,774,000	\$ 12,363,000	\$ 12,982,000	\$ 13,632,000
SEWER										
Buzzards Bay WWTF Upgrades		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay Alternative 1		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay Entire Area		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sewer Subtotal		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
STORMWATER BMP										
Megansett Squeteague		\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000
Phinney's Harbor		\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000
Buttermilk Bay		\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000
Pocasset Harbor		\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000
Pocasset River		\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000
Stormwater BMP Subtotal		\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000
Annual Capital Cost		\$ 11,499,000	\$ 12,077,000	\$ 12,684,000	\$ 13,322,000	\$ 13,991,000	\$ 14,695,000	\$ 15,432,000	\$ 16,206,000	\$ 17,019,000
Total Cost to Date		\$ 196,648,800	\$ 208,725,800	\$ 221,409,800	\$ 234,731,800	\$ 248,722,800	\$ 263,417,800	\$ 278,849,800	\$ 295,055,800	\$ 312,074,800

Calendar Year		5%	5%	
		2043	2044	
I/A	Plan Year	Year 19	Year 20	Total # Installations
	Tier 1			
	Megansett Squeteague	0	0	285
	Phinney's Harbor	0	0	1,135
	Tier 1 Subtotal	0	0	1,420
	Tier 2			
	Buttermilk Bay - GUIA	0	0	0
	Buttermilk Bay - EIA	0	0	0
	Pocasset Harbor	97	97	1,455
	Pocasset River	43	43	645
	Tier 2 Subtotal	140	140	2,100
	Total Installations	140	140	3,520
	Megansett Squeteague	\$ -	\$ -	\$ 13,369,000
	Phinney's Harbor	\$ -	\$ -	\$ 53,217,000
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ 66,586,000
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ 9,915,000	\$ 10,411,000	\$ 113,420,000
	Pocasset River	\$ 4,400,000	\$ 4,620,000	\$ 50,320,000
	Tier 2 Cost Subtotal	\$ 14,315,000	\$ 15,031,000	\$ 163,740,000
	SEWER			
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 39,350,000
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ 30,400,000
	Sewer Subtotal	\$ -	\$ -	\$ 69,750,000
SW BMP	STORMWATER BMP			
	Megansett Squeteague	\$ 256,000	\$ 269,000	\$ 3,465,600
	Phinney's Harbor	\$ 749,000	\$ 787,000	\$ 10,247,100
	Buttermilk Bay	\$ 620,000	\$ 651,000	\$ 8,465,400
	Pocasset Harbor	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
	Pocasset River	\$ 573,000	\$ 602,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
	Annual Capital Cost	\$ 17,874,000	\$ 18,770,000	
Total Cost to Date		\$ 329,948,800	\$ 348,718,800	

ENR CCI	Mar-24	13532.01	
Company	Model	Cost	Notes
Aquapoint	Bioclere Model 16/12ss	\$ 12,349.00	MA Sales Tax added
Bio-Microbics	MicroFAST® 0.5 - 9.0, HighStrengthFAST® 1.0 - 9.0, NitriFAST® 0.5 - 9.0	\$ 6,052.60	MA Sales Tax added
Septi-Tech	STAAR 0.5 Denite (M400N)	\$ 10,123.00	MA Sales Tax added
Norweco	Singulair 960 DN models 600, 750, 1000, and 1500;	\$ 8,962.00	Tax Included
	Singulair 960 DN Green model 600	\$ 8,962.00	Tax Included
Orenco	Advantex AX20, AX20-RT, AX25-RT, AX100 <10,000 GPD	\$ 48,600.00	Tax Included

\$ 15,841.43

GU I/A System Capital Cost	OPCC (March 2024)	EIA Unit
Average GUIA Unit	\$ 15,850.00	\$ 19,020.00
Design & Permitting	\$ 3,170.00	\$ 3,804.00
Construction (Electrical and Sitework) ¹	\$ 19,020.00	\$ 22,824.00
Permits/Fees ²	\$ 525.00	\$ 525.00
Contingency (10%)	\$ 3,860.00	\$ 4,620.00
Total	\$ 42,425.00	\$ 50,793.00

1. Landscaping and/or asphalt pavement is not included in base estimate.
2. Includes current Bourne Permit fees for General Permit, I/A Technology, and one Percolation Test

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Number of GUIA Parcels	Estimated Nitrogen Removal GUIA (kg-N/yr.)	Estimated Stormwater BMP Removal (kg-N/yr.)*
Megansett-Squeteague Harbor	564	285 - 357	504 - 631	113
Phinneys Harbor	1,706	1,133 - 1,235	2,001 - 2,182	341
Buttermilk Bay	1,402	374 - 704	588 - 1,245	280
Pocasset Harbor	3,120	1,450	2,562	624
Pocasset River	1,289	650	1,148	258
Total	8,072	3,892 - 4,396	6,803 - 7,768	1,616

Town of Bourne Capital Improvement Plan

Item	Watershed	FY25	FY26	FY27	FY28	FY29
Electric Ave. Boat Ramp	Buttermilk Bay	\$99,000				
Queen Sewell Green Infrastructure	Buttermilk Bay		\$150,000			
Sagamore Beach Boat Ramp	Cape Cod Bay		\$150,000			
Circuit Ave. Roadway	Pocasset Harbor		\$500,000			
Wings Neck Roadway	Pocasset Harbor/Buzzards Bay		\$500,000			
Eel Pond Rd. Outfall	Phinney's Harbor			\$150,000		
Shore Rd. Park Outfall	Pocasset River			\$340,000		
Massasoit Ave. or Circuit Ave. Outfall	Pocasset Harbor			\$25,000	\$150,000	
Old Head of the Bay Outfall	Buttermilk Bay				\$25,000	\$150,000
Drainage Repairs (DPW)	Townwide		\$250,000			
Replace Street Sweeper (DPW)	Townwide					\$800,000
Subtotal		\$99,000	\$1,550,000	\$515,000	\$175,000	\$950,000

Cape Cod Watershed Plan Estimate

Watershed	Total Nitrogen Load Values (kg-N/yr.)		Total Load to Remove (kg-N/yr.)	Bourne's % Responsibility for	Bourne Total Removal (kg-N/yr.)	20% Stormwater (kg N/y)	Cost per Kg removed for
	Septic	Total Load					
Megansett-Squeteague Harbor	7611	11658	1446	39%	564	113	\$ 101,600
Phinneys Harbor	5948	8730	1706	100%	1,706	341	\$ 307,100
Buttermilk Bay	4058	5610	1,402*	100%	1,402*	280	\$ 252,400
Pocasset Harbor	7958	12479	3,120*	100%	3,120*	624	\$ 561,600
Pocasset River	3762	5157	1,289*	100%	1,289*	258	\$ 232,100
Buzzards Bay	16830		4,208*	N/A	TBD	0	\$ -
Cape Cod Canal	164028		41,007*	N/A	TBD	0	\$ -
Total					8,072	1,616	\$ 1,454,800

*Estimated 25% removal, subject to revision and MassDEP approval.

** Each septic system assumed to contribute 5 kg N per year per housing unit (2 kg N per capita per year and 2.49 average people per Bourne unit).

***Cape Cod 208 Plan

	2017	2024
ENR	10737	13532.01
Cost per Kg nitrogen	\$ 695.00	\$ 900.00

Line Item	Inflation		0	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	FY24 Approved	Percent of Total Budget	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
1 Salaries - Dept. Heads	\$ 12,500	6.1%	\$ 13,353	\$ 13,900	\$ 14,600	\$ 15,300	\$ 16,100	\$ 16,900	\$ 27,000	\$ 28,400	\$ 29,800	\$ 31,200	\$ 32,800	\$ 34,500	\$ 36,200	\$ 38,000	\$ 39,900	\$ 41,900	\$ 44,000	\$ 46,200	\$ 48,500	\$ 51,000
2 Salaries Supervisors/ ADM.SEC	\$ 14,135	6.9%	\$ 15,100	\$ 16,000	\$ 17,000	\$ 18,000	\$ 19,000	\$ 20,000	\$ 31,000	\$ 33,000	\$ 34,000	\$ 36,000	\$ 38,000	\$ 39,000	\$ 41,000	\$ 43,000	\$ 46,000	\$ 48,000	\$ 50,000	\$ 53,000	\$ 55,000	\$ 58,000
3 Salaries - Laborers	\$ 137,505	67%	\$ 146,893	\$ 153,000	\$ 160,000	\$ 168,000	\$ 177,000	\$ 185,000	\$ 297,000	\$ 312,000	\$ 328,000	\$ 344,000	\$ 361,000	\$ 379,000	\$ 398,000	\$ 418,000	\$ 439,000	\$ 461,000	\$ 484,000	\$ 509,000	\$ 534,000	\$ 561,000
4 Overtime	\$ 40,000	19%	\$ 42,731	\$ 45,000	\$ 47,000	\$ 49,000	\$ 52,000	\$ 54,000	\$ 87,000	\$ 91,000	\$ 96,000	\$ 100,000	\$ 105,000	\$ 111,000	\$ 116,000	\$ 122,000	\$ 128,000	\$ 135,000	\$ 141,000	\$ 148,000	\$ 156,000	\$ 163,000
5 Longevity	\$ 1,500	0.7%	\$ 1,602	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 3,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 7,000
6 Incentive Pay	\$ 300	0.1%	\$ 320	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
7 Subtotal	\$ 205,940	12.9%	\$ 220,000	\$ 228,000	\$ 239,000	\$ 251,000	\$ 264,000	\$ 277,000	\$ 444,000	\$ 467,000	\$ 490,000	\$ 514,000	\$ 540,000	\$ 567,000	\$ 596,000	\$ 625,000	\$ 657,000	\$ 690,000	\$ 724,000	\$ 761,000	\$ 799,000	\$ 839,000
8 Energy - Electricity	\$ 130,000	16.53%	\$ 136,690	\$ 143,632	\$ 150,739	\$ 158,342	\$ 166,275	\$ 174,705	\$ 280,156	\$ 294,205	\$ 309,081	\$ 324,452	\$ 340,815	\$ 357,839	\$ 375,690	\$ 394,532	\$ 414,366	\$ 435,192	\$ 457,010	\$ 479,819	\$ 503,785	\$ 529,073
9 Energy-other fuels	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 2,155	\$ 2,263	\$ 2,378	\$ 2,496	\$ 2,622	\$ 2,753	\$ 2,890	\$ 3,035	\$ 3,187	\$ 3,348	\$ 3,515	\$ 3,691	\$ 3,875	\$ 4,070
10 Non-Energy - Water	\$ 750	0.10%	\$ 789	\$ 829	\$ 870	\$ 914	\$ 959	\$ 1,008	\$ 1,616	\$ 1,697	\$ 1,783	\$ 1,872	\$ 1,966	\$ 2,064	\$ 2,167	\$ 2,276	\$ 2,391	\$ 2,511	\$ 2,637	\$ 2,768	\$ 2,906	\$ 3,052
11 R&M - Bldgs. & Grounds	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 647	\$ 679	\$ 713	\$ 749	\$ 786	\$ 826	\$ 867	\$ 910	\$ 956	\$ 1,004	\$ 1,055	\$ 1,107	\$ 1,163	\$ 1,221
12 R&M - Light Trucks	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 2,155	\$ 2,263	\$ 2,378	\$ 2,496	\$ 2,622	\$ 2,753	\$ 2,890	\$ 3,035	\$ 3,187	\$ 3,348	\$ 3,515	\$ 3,691	\$ 3,875	\$ 4,070
13 R&M - Mach and Equip by others	\$ 30,000	3.81%	\$ 31,544	\$ 33,146	\$ 34,786	\$ 36,540	\$ 38,371	\$ 40,317	\$ 64,651	\$ 67,893	\$ 71,326	\$ 74,874	\$ 78,650	\$ 82,578	\$ 86,698	\$ 91,046	\$ 95,623	\$ 100,429	\$ 105,464	\$ 110,727	\$ 116,258	\$ 122,094
14 Rentals - Heavy Equip	\$ 2,500	0.32%	\$ 2,629	\$ 2,762	\$ 2,899	\$ 3,045	\$ 3,198	\$ 3,360	\$ 5,388	\$ 5,658	\$ 5,944	\$ 6,239	\$ 6,554	\$ 6,882	\$ 7,225	\$ 7,587	\$ 7,969	\$ 8,369	\$ 8,789	\$ 9,227	\$ 9,688	\$ 10,174
15 Rental - Uniforms	\$ 550	0.07%	\$ 578	\$ 608	\$ 638	\$ 670	\$ 703	\$ 739	\$ 1,185	\$ 1,245	\$ 1,308	\$ 1,373	\$ 1,442	\$ 1,514	\$ 1,589	\$ 1,669	\$ 1,753	\$ 1,841	\$ 1,934	\$ 2,030	\$ 2,131	\$ 2,238
16 Services - Consultants	\$ 25,000	3.18%	\$ 26,286	\$ 27,621	\$ 28,988	\$ 30,450	\$ 31,976	\$ 33,597	\$ 53,876	\$ 56,578	\$ 59,439	\$ 62,395	\$ 65,541	\$ 68,815	\$ 72,248	\$ 75,872	\$ 79,686	\$ 83,691	\$ 87,886	\$ 92,273	\$ 96,882	\$ 101,745
17 Services - Legal, Outside Counsel	\$ 5,000	0.64%	\$ 5,257	\$ 5,524	\$ 5,798	\$ 6,090	\$ 6,395	\$ 6,719	\$ 10,775	\$ 11,316	\$ 11,888	\$ 12,479	\$ 13,108	\$ 13,763	\$ 14,450	\$ 15,174	\$ 15,937	\$ 16,738	\$ 17,577	\$ 18,455	\$ 19,376	\$ 20,349
18 Services - Waste Removal Wareham	\$ 441,526	56.14%	\$ 464,247	\$ 487,824	\$ 511,962	\$ 537,785	\$ 564,730	\$ 593,360	\$ 951,509	\$ 999,225	\$ 1,049,747	\$ 1,101,954	\$ 1,157,529	\$ 1,215,349	\$ 1,275,976	\$ 1,339,972	\$ 1,407,335	\$ 1,478,067	\$ 1,552,167	\$ 1,629,635	\$ 1,711,032	\$ 1,796,921
19 Communications - Telephone	\$ 2,000	0.25%	\$ 2,103	\$ 2,210	\$ 2,319	\$ 2,436	\$ 2,558	\$ 2,688	\$ 4,310	\$ 4,526	\$ 4,755	\$ 4,992	\$ 5,243	\$ 5,505	\$ 5,780	\$ 6,070	\$ 6,375	\$ 6,695	\$ 7,031	\$ 7,382	\$ 7,751	\$ 8,140
20 Communications - Postage	\$ 900	0.11%	\$ 946	\$ 994	\$ 1,044	\$ 1,096	\$ 1,151	\$ 1,209	\$ 1,940	\$ 2,037	\$ 2,140	\$ 2,246	\$ 2,359	\$ 2,477	\$ 2,601	\$ 2,731	\$ 2,869	\$ 3,013	\$ 3,164	\$ 3,322	\$ 3,488	\$ 3,663
21 Communications - Printing	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 647	\$ 679	\$ 713	\$ 749	\$ 786	\$ 826	\$ 867	\$ 910	\$ 956	\$ 1,004	\$ 1,055	\$ 1,107	\$ 1,163	\$ 1,221
22 WWTF - Contracted Services	\$ 92,800	11.80%	\$ 97,575	\$ 102,531	\$ 107,604	\$ 113,032	\$ 118,695	\$ 124,712	\$ 199,988	\$ 210,017	\$ 220,636	\$ 231,609	\$ 243,290	\$ 255,442	\$ 268,185	\$ 281,635	\$ 295,794	\$ 310,660	\$ 326,235	\$ 342,517	\$ 359,625	\$ 377,677
23 WWTF Chemicals	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 25,861	\$ 27,157	\$ 28,531	\$ 29,949	\$ 31,460	\$ 33,031	\$ 34,679	\$ 36,418	\$ 38,249	\$ 40,172	\$ 42,186	\$ 44,291	\$ 46,503	\$ 48,838
24 WWTF - Outside Svcs / Sludge removal	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 25,861	\$ 27,157	\$ 28,531	\$ 29,949	\$ 31,460	\$ 33,031	\$ 34,679	\$ 36,418	\$ 38,249	\$ 40,172	\$ 42,186	\$ 44,291	\$ 46,503	\$ 48,838
25 WWTF SCADA / Fiber Communications	\$ 28,900	3.67%	\$ 30,387	\$ 31,930	\$ 33,510	\$ 35,201	\$ 36,964	\$ 38,838	\$ 62,281	\$ 65,404	\$ 68,711	\$ 72,128	\$ 75,766	\$ 79,550	\$ 83,519	\$ 87,708	\$ 92,117	\$ 96,747	\$ 101,597	\$ 106,667	\$ 111,995	\$ 117,617
26 Subtotal	\$ 786,526	49%	\$ 827,000	\$ 869,000	\$ 912,000	\$ 958,000	\$ 1,006,000	\$ 1,057,000	\$ 1,695,000	\$ 1,780,000	\$ 1,870,000	\$ 1,963,000	\$ 2,062,000	\$ 2,165,000	\$ 2,273,000	\$ 2,387,000	\$ 2,507,000	\$ 2,633,000	\$ 2,765,000	\$ 2,903,000	\$ 3,048,000	\$ 3,201,000
27 Office Supplies - General	\$ 150	1%	\$ 158	\$ 166	\$ 174	\$ 183	\$ 192	\$ 201	\$ 323	\$ 339	\$ 356	\$ 374										
28 Bldg./Equip. Sup - Tools	\$ 5,000	24%	\$ 5,253	\$ 5,518	\$ 5,796	\$ 6,086	\$ 6,392	\$ 6,714	\$ 10,773	\$ 11,314	\$ 11,882	\$ 12,478	\$ 13,103	\$ 13,758	\$ 14,448	\$ 15,172	\$ 15,934	\$ 16,733	\$ 17,572	\$ 18,452	\$ 19,376	\$ 20,347
29 Hazardous Material Equip.	\$ 4,000	19%	\$ 4,202	\$ 4,415	\$ 4,637	\$ 4,869	\$ 5,114	\$ 5,371	\$ 8,618	\$ 9,051	\$ 9,506	\$ 9,983	\$ 10,482	\$ 11,006	\$ 11,558	\$ 12,138	\$ 12,747	\$ 13,386	\$ 14,058	\$ 14,762	\$ 15,501	\$ 16,278
30 Veh. Sup. - Diesel	\$ 4,200	20%	\$ 4,412	\$ 4,635	\$ 4,869	\$ 5,112	\$ 5,369	\$ 5,639	\$ 9,049	\$ 9,504	\$ 9,981	\$ 10,482	\$ 11,006	\$ 11,557	\$ 12,136	\$ 12,744	\$ 13,384	\$ 14,055	\$ 14,761	\$ 15,500	\$ 16,276	\$ 17,091
31 Veh. Sup -Parts	\$ 2,500	12%	\$ 2,626	\$ 2,759	\$ 2,898	\$ 3,043	\$ 3,196	\$ 3,357	\$ 5,386	\$ 5,657	\$ 5,941	\$ 6,239	\$ 6,551	\$ 6,879	\$ 7,224	\$ 7,586	\$ 7,967	\$ 8,366	\$ 8,786	\$ 9,226	\$ 9,688	\$ 10,173
32 Veh. Sup - Reg/ Insp	\$ 350	2%	\$ 368	\$ 386	\$ 406	\$ 426	\$ 447	\$ 470	\$ 754	\$ 792	\$ 832	\$ 873	\$ 917	\$ 963	\$ 1,011	\$ 1,062	\$ 1,115	\$ 1,171	\$ 1,230	\$ 1,292	\$ 1,356	\$ 1,424
33 Other Supp. - Protective Clothing	\$ 4,500	22%	\$ 4,728	\$ 4,966	\$ 5,216	\$ 5,478	\$ 5,753	\$ 6,042	\$ 9,696	\$ 10,183	\$ 10,694	\$ 11,231	\$ 11,792	\$ 12,382	\$ 13,003	\$ 13,655	\$ 14,340	\$ 15,059	\$ 15,815	\$ 16,607	\$ 17,439	\$ 18,312
34 Subtotal	\$ 20,700	1.3%	\$ 21,747	\$ 22,845	\$ 23,995	\$ 25,197	\$ 26,463	\$ 27,794	\$ 44,600	\$ 46,841	\$ 49,193	\$ 51,661	\$ 54,245	\$ 56,959	\$ 59,814	\$ 62,812	\$ 65,965	\$ 69,273	\$ 72,749	\$ 76,393	\$ 80,217	\$ 84,236
35 Capital Assessment - Wareham	\$ 329,306	99.9%																				
36 License Reimbursement	\$ 375	0.1%																				
37 Subtotal	\$ 329,681	21%	\$ 346,358																			
38 Replacment Equipment	\$ 90,000																					
39 New Equipment	\$ 5,000																					
40 Total	\$ 95,000	6%	\$ 99,806																			
41 Principal Long Term Debt	\$ 107,078																					
42 Interest Long Term Debt	\$ 57,040																					
43 Subtotal	\$ 164,118	10%	\$ 172,420																			
		Units																				
44 DPW Sewer Totals	\$ 1,601,965		\$ 1,683,000	\$ 1,768,000	\$ 1,857,000	\$ 1,950,000	\$ 2,048,000	\$ 2,151,000	\$ 3,451,574	\$ 3,625,000	\$ 3,807,000	\$ 3,998,000	\$ 4,198,000	\$ 4,408,000	\$ 4,629,000	\$ 4,861,000	\$ 5,105,000	\$ 5,361,000	\$ 5,630,000	\$ 5,912,000	\$ 6,208,000	\$ 6,519,000
45 Annual Flow Treated (MG)	\$ 37,850,000		37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500
46 Cost per gallon	\$ 0	Per gallon	\$ 0.04	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.08	\$ 0.08	\$ 0.08	\$ 0.09	\$ 0.09	\$ 0.10	\$ 0.10	\$ 0.11
47 Cost per mile of collection system	\$ 200,246	per mile	\$ 210,375	\$ 221,000	\$ 232,125	\$ 243,750	\$ 256,000	\$ 268,875	\$ 246,541	\$ 258,929	\$ 271,929	\$ 285,571	\$ 299,857	\$ 314,857	\$ 330,643	\$ 347,214	\$ 364,643	\$ 382,929	\$ 402,143	\$ 422,286	\$ 443,429	\$ 465,643
48 Cost per user	\$ 2,446	per user	\$ 2,569	\$ 2,699	\$ 2,835	\$ 2,977	\$ 3,127	\$ 3,284	\$ 3,504	\$ 3,680	\$ 3,865	\$ 4,059	\$ 4,262	\$ 4,475	\$ 4,699	\$ 4,935	\$ 5,183	\$ 5,443	\$ 5,716	\$ 6,002	\$ 6,303	\$ 6,618

Projecting Debt Service to be calculated after Capital Option Selected for Recommended Plan Implementation

Town of Bourne CWMP
Draft Recommended Plan
April 2024

2 of 2

APPENDIX E:

WATERSHED PERMIT OPTION IMPLEMENTATION SCHEDULE AND COST ESTIMATE

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Tier 1											
I/A	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	25
	Buttermilk Bay - EIA	0	0	0	0	0	22	22	22	22	22
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	187	187	187	187	187
	Total Installations	71	71	71	71	71	258	258	258	258	258
	Megansett Squeteague	\$ 594,000	\$ 624,000	\$ 656,000	\$ 689,000	\$ 724,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	\$ 927,000
	Phinney's Harbor	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ 3,090,000	\$ 3,245,000	\$ 3,408,000	\$ 3,579,000	\$ 3,758,000
	Tier 1 Cost Subtotal	\$ 3,013,000	\$ 3,164,000	\$ 3,323,000	\$ 3,490,000	\$ 3,666,000	\$ 3,851,000	\$ 4,045,000	\$ 4,248,000	\$ 4,461,000	\$ 4,685,000
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,355,000	\$ 1,423,000	\$ 1,495,000	\$ 1,570,000	\$ 1,649,000
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,118,000	\$ 1,173,900	\$ 1,232,600	\$ 1,294,230	\$ 1,358,950
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,257,000	\$ 5,521,000	\$ 5,798,000	\$ 6,091,000	\$ 6,397,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,331,000	\$ 2,448,000	\$ 2,570,000	\$ 2,700,000	\$ 2,836,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,061,000	\$ 10,565,900	\$ 11,095,600	\$ 11,655,230	\$ 12,240,950
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000
	Annual Capital Cost	\$ 4,467,800	\$ 4,694,000	\$ 4,933,000	\$ 5,181,000	\$ 5,443,000	\$ 15,781,000	\$ 16,574,900	\$ 17,407,600	\$ 18,285,230	\$ 19,204,950
Total Cost to Date		\$ 4,467,800	\$ 9,161,800	\$ 14,094,800	\$ 19,275,800	\$ 24,718,800	\$ 40,499,800	\$ 57,074,700	\$ 74,482,300	\$ 92,767,530	\$ 111,972,480

Inflation											
5%5%5%5%5%5%5%5%5%5%											
Calendar Year	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Plan Year	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total
Tier 1											
I/A	Megansett Squeteague	14	14	14	14	14	14	14	14	14	266
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	1,083
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	1,349
	Tier 2										
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	375
	Buttermilk Bay - EIA	22	22	22	22	22	22	22	22	22	330
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	1,455
	Pocasset River	43	43	43	43	43	43	43	43	43	645
	Tier 2 Subtotal	187	187	187	187	187	187	187	187	187	2,805
	Total Installations	258	258	258	258	258	258	258	258	258	4,225
	Megansett Squeteague	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 19,775,000
	Phinney's Harbor	\$ 3,946,000	\$ 4,144,000	\$ 4,352,000	\$ 4,570,000	\$ 4,799,000	\$ 5,039,000	\$ 5,291,000	\$ 5,556,000	\$ 5,834,000	\$ 80,106,000
	Tier 1 Cost Subtotal	\$ 4,920,000	\$ 5,167,000	\$ 5,427,000	\$ 5,699,000	\$ 5,985,000	\$ 6,285,000	\$ 6,600,000	\$ 6,931,000	\$ 7,278,000	\$ 99,881,000
	Buttermilk Bay - GUIA	\$ 1,732,000	\$ 1,819,000	\$ 1,910,000	\$ 2,006,000	\$ 2,107,000	\$ 2,213,000	\$ 2,324,000	\$ 2,441,000	\$ 2,564,000	\$ 29,301,000
	Buttermilk Bay - EIA	\$ 1,426,900	\$ 1,498,250	\$ 1,573,170	\$ 1,651,830	\$ 1,734,430	\$ 1,821,160	\$ 1,912,220	\$ 2,007,840	\$ 2,108,240	\$ 24,125,380
	Pocasset Harbor	\$ 6,719,000	\$ 7,057,000	\$ 7,411,000	\$ 7,782,000	\$ 8,173,000	\$ 8,584,000	\$ 9,016,000	\$ 9,468,000	\$ 9,945,000	\$ 113,665,000
	Pocasset River	\$ 2,979,000	\$ 3,128,000	\$ 3,286,000	\$ 3,450,000	\$ 3,623,000	\$ 3,806,000	\$ 3,997,000	\$ 4,198,000	\$ 4,409,000	\$ 50,392,000
	Tier 2 Cost Subtotal	\$ 12,856,900	\$ 13,502,250	\$ 14,180,170	\$ 14,889,830	\$ 15,637,430	\$ 16,424,160	\$ 17,249,220	\$ 18,114,840	\$ 19,026,240	\$ 217,483,380
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 3,465,600
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 10,247,100
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 8,465,400
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 18,659,600
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 48,642,800
	Annual Capital Cost	\$ 20,171,900	\$ 21,186,250	\$ 22,252,170	\$ 23,367,830	\$ 24,543,430	\$ 25,778,160	\$ 27,073,220	\$ 28,432,840	\$ 29,863,240	\$ 31,365,660
Total Cost to Date		\$ 132,144,380	\$ 153,330,630	\$ 175,582,800	\$ 198,950,630	\$ 223,494,060	\$ 249,272,220	\$ 276,345,440	\$ 304,778,280	\$ 334,641,520	\$ 366,007,180

		Inflation		5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
I/A	Tier 1										
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	
	Pocasset River	0	0	0	0	0	43	43	43	43	
	Tier 2 Subtotal	0	0	0	0	0	165	165	165	165	
	Total Installations	71	71	71	71	71	236	236	236	236	
	Megansett Squeteague	\$ 594,000	\$ 624,000	\$ 656,000	\$ 689,000	\$ 724,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	
	Phinney's Harbor	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ 3,090,000	\$ 3,245,000	\$ 3,408,000	\$ 3,579,000	
	Tier 1 Cost Subtotal	\$ 3,013,000	\$ 3,164,000	\$ 3,323,000	\$ 3,490,000	\$ 3,666,000	\$ 3,851,000	\$ 4,045,000	\$ 4,248,000	\$ 4,461,000	
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,355,000	\$ 1,422,750	\$ 1,493,890	\$ 1,568,590	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,257,000	\$ 5,520,000	\$ 5,796,000	\$ 6,086,000	
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,331,000	\$ 2,448,000	\$ 2,571,000	\$ 2,700,000	
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,943,000	\$ 9,390,750	\$ 9,860,890	\$ 10,354,590	
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 20,000,000	\$ -	\$ -		
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,258,476	\$ 15,730,944	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 21,258,476	\$ 15,730,944	\$ -	\$ -	
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	
Annual Capital Cost		\$ 4,467,800	\$ 4,694,000	\$ 5,283,000	\$ 5,681,000	\$ 6,443,000	\$ 35,921,476	\$ 31,130,694	\$ 16,172,890	\$ 16,984,590	
Total Cost to Date		\$ 4,467,800	\$ 9,161,800	\$ 14,444,800	\$ 20,125,800	\$ 26,568,800	\$ 62,490,276	\$ 93,620,969	\$ 109,793,859	\$ 126,778,449	

		Inflation	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Plan Year		Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total
I/A	Tier 1												
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14	14	280
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57	57	1,140
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71	71	1,349
	Tier 2												
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	25	25	375
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0	0	0
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97	97	1,455
	Pocasset River	43	43	43	43	43	43	43	43	43	43	43	645
	Tier 2 Subtotal	165	165	165	165	165	165	165	165	165	165	165	2,475
	Total Installations	236	236	236	236	236	236	236	236	236	236	236	3,895
	Megansett Squeteague	\$ 927,000	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 1,517,000	\$ 19,775,000
	Phinney's Harbor	\$ 3,758,000	\$ 3,946,000	\$ 4,144,000	\$ 4,352,000	\$ 4,570,000	\$ 4,799,000	\$ 5,039,000	\$ 5,291,000	\$ 5,556,000	\$ 5,834,000	\$ 6,126,000	\$ 80,106,000
	Tier 1 Cost Subtotal	\$ 4,685,000	\$ 4,920,000	\$ 5,167,000	\$ 5,427,000	\$ 5,699,000	\$ 5,985,000	\$ 6,285,000	\$ 6,600,000	\$ 6,931,000	\$ 7,278,000	\$ 7,643,000	\$ 99,881,000
	Buttermilk Bay - GUIA	\$ 1,647,020	\$ 1,729,380	\$ 1,815,850	\$ 1,906,650	\$ 2,001,990	\$ 2,102,090	\$ 2,207,200	\$ 2,317,560	\$ 2,433,440	\$ 2,555,120	\$ 2,682,880	\$ 29,239,410
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ 6,391,000	\$ 6,711,000	\$ 7,047,000	\$ 7,400,000	\$ 7,770,000	\$ 8,159,000	\$ 8,567,000	\$ 8,996,000	\$ 9,446,000	\$ 9,919,000	\$ 10,415,000	\$ 113,480,000
	Pocasset River	\$ 2,835,000	\$ 2,977,000	\$ 3,126,000	\$ 3,283,000	\$ 3,448,000	\$ 3,621,000	\$ 3,803,000	\$ 3,994,000	\$ 4,194,000	\$ 4,404,000	\$ 4,625,000	\$ 50,360,000
	Tier 2 Cost Subtotal	\$ 10,873,020	\$ 11,417,380	\$ 11,988,850	\$ 12,589,650	\$ 13,219,990	\$ 13,882,090	\$ 14,577,200	\$ 15,307,560	\$ 16,073,440	\$ 16,878,120	\$ 17,722,880	\$ 193,079,410
Sewer	SEWER												
	Buzzards Bay WWTF Upgrades												\$ 21,850,000
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 16,989,419
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 38,839,419
SW BMP	STORMWATER BMP												
	Megansett Squeteague	\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000	\$ 3,465,600
	Phinney's Harbor	\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000	\$ 10,247,100
	Buttermilk Bay	\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000	\$ 8,465,400
	Pocasset Harbor	\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
	Pocasset River	\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
Annual Capital Cost		\$ 17,837,020	\$ 18,732,380	\$ 19,672,850	\$ 20,661,650	\$ 21,697,990	\$ 22,788,090	\$ 23,931,200	\$ 25,131,560	\$ 26,391,440	\$ 27,715,120	\$ 29,104,880	
Total Cost to Date		\$ 144,615,469	\$ 163,347,849	\$ 183,020,699	\$ 203,682,349	\$ 225,380,339	\$ 248,168,429	\$ 272,099,629	\$ 297,231,189	\$ 323,622,629	\$ 351,337,749	\$ 380,442,629	

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Plan Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
I/A	Tier 1										
	Megansett Squeteague	15	15	15	15	15	14	14	14	14	14
	Phinney's Harbor	58	58	58	58	58	57	57	57	57	57
	Tier 1 Subtotal	73	73	73	73	73	71	71	71	71	71
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	0	0	0	0	0
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	140	140	140	140	140
	Total Installations	73	73	73	73	73	211	211	211	211	211
	Megansett Squeteague	\$ 637,000	\$ 669,000	\$ 703,000	\$ 739,000	\$ 776,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	\$ 927,000
	Phinney's Harbor	\$ 2,461,000	\$ 2,584,000	\$ 2,714,000	\$ 2,850,000	\$ 2,993,000	\$ 3,089,000	\$ 3,244,000	\$ 3,407,000	\$ 3,578,000	\$ 3,757,000
	Tier 1 Cost Subtotal	\$ 3,098,000	\$ 3,253,000	\$ 3,417,000	\$ 3,589,000	\$ 3,769,000	\$ 3,850,000	\$ 4,044,000	\$ 4,247,000	\$ 4,460,000	\$ 4,684,000
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,256,000	\$ 5,519,000	\$ 5,795,000	\$ 6,085,000	\$ 6,390,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,330,000	\$ 2,447,000	\$ 2,570,000	\$ 2,699,000	\$ 2,834,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,586,000	\$ 7,966,000	\$ 8,365,000	\$ 8,784,000	\$ 9,224,000
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 35,000,000	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ 500,000	\$ 350,000	\$ 2,188,653	\$ 27,358,163	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 1,000,000	\$ 3,850,000	\$ 37,188,653	\$ 27,358,163	\$ -	\$ -	\$ -
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000
Annual Capital Cost		\$ 4,552,800	\$ 4,783,000	\$ 5,377,000	\$ 6,280,000	\$ 9,396,000	\$ 50,493,653	\$ 41,332,163	\$ 14,676,000	\$ 15,413,000	\$ 16,187,000
Total Cost to Date		\$ 4,552,800	\$ 9,335,800	\$ 14,712,800	\$ 20,992,800	\$ 30,388,800	\$ 80,882,453	\$ 122,214,616	\$ 136,890,616	\$ 152,303,616	\$ 168,490,616

		Inflation	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Plan Year		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	Total
I/A	Tier 1											
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14	285
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57	1,145
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71	1,430
	Tier 2											
	Buttermilk Bay - GUIA	0	0	0	0	0	0	0	0	0	0	0
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0	0
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97	1,455
	Pocasset River	43	43	43	43	43	43	43	43	43	43	645
	Tier 2 Subtotal	140	140	140	140	140	140	140	140	140	140	2,100
	Total Installations	211	211	211	211	211	211	211	211	211	211	3,530
	Megansett Squeteague	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 1,517,000	\$ 20,012,000
	Phinney's Harbor	\$ 3,945,000	\$ 4,143,000	\$ 4,351,000	\$ 4,569,000	\$ 4,798,000	\$ 5,038,000	\$ 5,290,000	\$ 5,555,000	\$ 5,833,000	\$ 6,125,000	\$ 80,324,000
	Tier 1 Cost Subtotal	\$ 4,919,000	\$ 5,166,000	\$ 5,426,000	\$ 5,698,000	\$ 5,984,000	\$ 6,284,000	\$ 6,599,000	\$ 6,930,000	\$ 7,277,000	\$ 7,642,000	\$ 100,336,000
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ 6,710,000	\$ 7,046,000	\$ 7,399,000	\$ 7,769,000	\$ 8,158,000	\$ 8,566,000	\$ 8,995,000	\$ 9,445,000	\$ 9,918,000	\$ 10,414,000	\$ 113,465,000
	Pocasset River	\$ 2,976,000	\$ 3,125,000	\$ 3,282,000	\$ 3,447,000	\$ 3,620,000	\$ 3,801,000	\$ 3,992,000	\$ 4,192,000	\$ 4,402,000	\$ 4,623,000	\$ 50,340,000
	Tier 2 Cost Subtotal	\$ 9,686,000	\$ 10,171,000	\$ 10,681,000	\$ 11,216,000	\$ 11,778,000	\$ 12,367,000	\$ 12,987,000	\$ 13,637,000	\$ 14,320,000	\$ 15,037,000	\$ 163,805,000
Sewer	SEWER											
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 39,350,000
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 30,396,816
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 69,746,816
SW BMP	STORMWATER BMP											
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000	\$ 3,465,600
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000	\$ 10,247,100
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000	\$ 8,465,400
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
Annual Capital Cost		\$ 17,000,000	\$ 17,854,000	\$ 18,752,000	\$ 19,693,000	\$ 20,683,000	\$ 21,720,000	\$ 22,810,000	\$ 23,954,000	\$ 25,156,000	\$ 26,418,000	
Total Cost to Date		\$ 185,490,616	\$ 203,344,616	\$ 222,096,616	\$ 241,789,616	\$ 262,472,616	\$ 284,192,616	\$ 307,002,616	\$ 330,956,616	\$ 356,112,616	\$ 382,530,616	

ENR CCI	Mar-24	13532.01	
Company	Model	Cost	Notes
Aquapoint	Bioclere Model 16/12ss	\$ 12,349.00	MA Sales Tax added
Bio-Microbics	MicroFAST® 0.5 - 9.0, HighStrengthFAST® 1.0 - 9.0, NitriFAST® 0.5 - 9.0	\$ 6,052.60	MA Sales Tax added
Septi-Tech	STAAR 0.5 Denite (M400N)	\$ 10,123.00	MA Sales Tax added
Norweco	Singulair 960 DN models 600, 750, 1000, and 1500;	\$ 8,962.00	Tax Included
	Singulair 960 DN Green model 600	\$ 8,962.00	Tax Included
Orenco	Advantex AX20, AX20-RT, AX25-RT, AX100 <10,000 GPD	\$ 48,600.00	Tax Included

\$ 15,841.43

GU I/A System Capital Cost	OPCC (March 2024)	EIA Unit
Average GUIA Unit	\$ 15,850.00	\$ 19,020.00
Design & Permitting	\$ 3,170.00	\$ 3,804.00
Construction (Electrical and Sitework) ¹	\$ 19,020.00	\$ 22,824.00
Permits/Fees ²	\$ 525.00	\$ 525.00
Contingency (10%)	\$ 3,860.00	\$ 4,620.00
Total	\$ 42,425.00	\$ 50,793.00

1. Landscaping and/or asphalt pavement is not included in base estimate.
2. Includes current Bourne Permit fees for General Permit, I/A Technology, and one Percolation Test

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Number of GUIA Parcels	Estimated Nitrogen Removal GUIA (kg-N/yr.)	Estimated Stormwater BMP Removal (kg-N/yr.)*
Megansett-Squeteague Harbor	564	285 - 357	504 - 631	113
Phinneys Harbor	1,706	1,133 - 1,235	2,001 - 2,182	341
Buttermilk Bay	1,402	374 - 704	588 - 1,245	280
Pocasset Harbor	3,120	1,450	2,562	624
Pocasset River	1,289	650	1,148	258
Total	8,072	3,892 - 4,396	6,803 - 7,768	1,616

Town of Bourne Capital Improvement Plan

Item	Watershed	FY25	FY26	FY27	FY28	FY29
Electric Ave. Boat Ramp	Buttermilk Bay	\$99,000				
Queen Sewell Green Infrastructure	Buttermilk Bay		\$150,000			
Sagamore Beach Boat Ramp	Cape Cod Bay		\$150,000			
Circuit Ave. Roadway	Pocasset Harbor		\$500,000			
Wings Neck Roadway	Pocasset Harbor/Buzzards Bay		\$500,000			
Eel Pond Rd. Outfall	Phinney's Harbor			\$150,000		
Shore Rd. Park Outfall	Pocasset River			\$340,000		
Massasoit Ave. or Circuit Ave. Outfall	Pocasset Harbor			\$25,000	\$150,000	
Old Head of the Bay Outfall	Buttermilk Bay				\$25,000	\$150,000
Drainage Repairs (DPW)	Townwide		\$250,000			
Replace Street Sweeper (DPW)	Townwide					\$800,000
Subtotal		\$99,000	\$1,550,000	\$515,000	\$175,000	\$950,000

Cape Cod Watershed Plan Estimate

Watershed	Total Nitrogen Load Values (kg-N/yr.)		Total Load to Remove (kg-N/yr.)	Bourne's % Responsibility for	Bourne Total Removal (kg-N/yr.)	20% Stormwater (kg N/y)	Cost per Kg removed for
	Septic	Total Load					
Megansett-Squeteague Harbor	7611	11658	1446	39%	564	113	\$ 101,600
Phinneys Harbor	5948	8730	1706	100%	1,706	341	\$ 307,100
Buttermilk Bay	4058	5610	1,402*	100%	1,402*	280	\$ 252,400
Pocasset Harbor	7958	12479	3,120*	100%	3,120*	624	\$ 561,600
Pocasset River	3762	5157	1,289*	100%	1,289*	258	\$ 232,100
Buzzards Bay	16830		4,208*	N/A	TBD	0	\$ -
Cape Cod Canal	164028		41,007*	N/A	TBD	0	\$ -
Total					8,072	1,616	\$ 1,454,800

*Estimated 25% removal, subject to revision and MassDEP approval.

** Each septic system assumed to contribute 5 kg N per year per housing unit (2 kg N per capita per year and 2.49 average people per Bourne unit).

***Cape Cod 208 Plan

ENR	2017	2024
	10737	13532.01
Cost per Kg nitrogen	\$ 695.00	\$ 900.00

Line Item	Inflation		0	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	FY24 Approved	Percent of Total Budget	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
			2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
1 Salaries - Dept. Heads	\$ 12,500	6.1%	\$ 13,353	\$ 13,900	\$ 14,600	\$ 15,300	\$ 16,100	\$ 16,900	\$ 27,000	\$ 28,400	\$ 29,800	\$ 31,200	\$ 32,800	\$ 34,500	\$ 36,200	\$ 38,000	\$ 39,900	\$ 41,900	\$ 44,000	\$ 46,200	\$ 48,500	\$ 51,000
2 Salaries Supervisors/ ADM.SEC	\$ 14,135	6.9%	\$ 15,100	\$ 16,000	\$ 17,000	\$ 18,000	\$ 19,000	\$ 20,000	\$ 31,000	\$ 33,000	\$ 34,000	\$ 36,000	\$ 38,000	\$ 39,000	\$ 41,000	\$ 43,000	\$ 46,000	\$ 48,000	\$ 50,000	\$ 53,000	\$ 55,000	\$ 58,000
3 Salaries - Laborers	\$ 137,505	67%	\$ 146,893	\$ 153,000	\$ 160,000	\$ 168,000	\$ 177,000	\$ 185,000	\$ 297,000	\$ 312,000	\$ 328,000	\$ 344,000	\$ 361,000	\$ 379,000	\$ 398,000	\$ 418,000	\$ 439,000	\$ 461,000	\$ 484,000	\$ 509,000	\$ 534,000	\$ 561,000
4 Overtime	\$ 40,000	19%	\$ 42,731	\$ 45,000	\$ 47,000	\$ 49,000	\$ 52,000	\$ 54,000	\$ 87,000	\$ 91,000	\$ 96,000	\$ 100,000	\$ 105,000	\$ 111,000	\$ 116,000	\$ 122,000	\$ 128,000	\$ 135,000	\$ 141,000	\$ 148,000	\$ 156,000	\$ 163,000
5 Longevity	\$ 1,500	0.7%	\$ 1,602	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 3,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 4,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 5,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 7,000
6 Incentive Pay	\$ 300	0.1%	\$ 320	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
7 Subtotal	\$ 205,940	12.9%	\$ 220,000	\$ 228,000	\$ 239,000	\$ 251,000	\$ 264,000	\$ 277,000	\$ 444,000	\$ 467,000	\$ 490,000	\$ 514,000	\$ 540,000	\$ 567,000	\$ 596,000	\$ 625,000	\$ 657,000	\$ 690,000	\$ 724,000	\$ 761,000	\$ 799,000	\$ 839,000
8 Energy - Electricity	\$ 130,000	16.53%	\$ 136,690	\$ 143,632	\$ 150,739	\$ 158,342	\$ 166,275	\$ 174,705	\$ 280,156	\$ 294,205	\$ 309,081	\$ 324,452	\$ 340,815	\$ 357,839	\$ 375,690	\$ 394,532	\$ 414,366	\$ 435,192	\$ 457,010	\$ 479,819	\$ 503,785	\$ 529,073
9 Energy-other fuels	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 2,155	\$ 2,263	\$ 2,378	\$ 2,496	\$ 2,622	\$ 2,753	\$ 2,890	\$ 3,035	\$ 3,187	\$ 3,348	\$ 3,515	\$ 3,691	\$ 3,875	\$ 4,070
10 Non-Energy - Water	\$ 750	0.10%	\$ 789	\$ 829	\$ 870	\$ 914	\$ 959	\$ 1,008	\$ 1,616	\$ 1,697	\$ 1,783	\$ 1,872	\$ 1,966	\$ 2,064	\$ 2,167	\$ 2,276	\$ 2,391	\$ 2,511	\$ 2,637	\$ 2,768	\$ 2,906	\$ 3,052
11 R&M - Bldgs. & Grounds	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 647	\$ 679	\$ 713	\$ 749	\$ 786	\$ 826	\$ 867	\$ 910	\$ 956	\$ 1,004	\$ 1,055	\$ 1,107	\$ 1,163	\$ 1,221
12 R&M - Light Trucks	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 2,155	\$ 2,263	\$ 2,378	\$ 2,496	\$ 2,622	\$ 2,753	\$ 2,890	\$ 3,035	\$ 3,187	\$ 3,348	\$ 3,515	\$ 3,691	\$ 3,875	\$ 4,070
13 R&M - Mach and Equip by others	\$ 30,000	3.81%	\$ 31,544	\$ 33,146	\$ 34,786	\$ 36,540	\$ 38,371	\$ 40,317	\$ 64,651	\$ 67,893	\$ 71,326	\$ 74,874	\$ 78,650	\$ 82,578	\$ 86,698	\$ 91,046	\$ 95,623	\$ 100,429	\$ 105,464	\$ 110,727	\$ 116,258	\$ 122,094
14 Rentals - Heavy Equip	\$ 2,500	0.32%	\$ 2,629	\$ 2,762	\$ 2,899	\$ 3,045	\$ 3,198	\$ 3,360	\$ 5,388	\$ 5,658	\$ 5,944	\$ 6,239	\$ 6,554	\$ 6,882	\$ 7,225	\$ 7,587	\$ 7,969	\$ 8,369	\$ 8,789	\$ 9,227	\$ 9,688	\$ 10,174
15 Rental - Uniforms	\$ 550	0.07%	\$ 578	\$ 608	\$ 638	\$ 670	\$ 703	\$ 739	\$ 1,185	\$ 1,245	\$ 1,308	\$ 1,373	\$ 1,442	\$ 1,514	\$ 1,589	\$ 1,669	\$ 1,753	\$ 1,841	\$ 1,934	\$ 2,030	\$ 2,131	\$ 2,238
16 Services - Consultants	\$ 25,000	3.18%	\$ 26,286	\$ 27,621	\$ 28,988	\$ 30,450	\$ 31,976	\$ 33,597	\$ 53,876	\$ 56,578	\$ 59,439	\$ 62,395	\$ 65,541	\$ 68,815	\$ 72,248	\$ 75,872	\$ 79,686	\$ 83,691	\$ 87,886	\$ 92,273	\$ 96,882	\$ 101,745
17 Services - Legal, Outside Counsel	\$ 5,000	0.64%	\$ 5,257	\$ 5,524	\$ 5,798	\$ 6,090	\$ 6,395	\$ 6,719	\$ 10,775	\$ 11,316	\$ 11,888	\$ 12,479	\$ 13,108	\$ 13,763	\$ 14,450	\$ 15,174	\$ 15,937	\$ 16,738	\$ 17,577	\$ 18,455	\$ 19,376	\$ 20,349
18 Services - Waste Removal Wareham	\$ 441,526	56.14%	\$ 464,247	\$ 487,824	\$ 511,962	\$ 537,785	\$ 564,730	\$ 593,360	\$ 951,509	\$ 999,225	\$ 1,049,747	\$ 1,101,954	\$ 1,157,529	\$ 1,215,349	\$ 1,275,976	\$ 1,339,972	\$ 1,407,335	\$ 1,478,067	\$ 1,552,167	\$ 1,629,635	\$ 1,711,032	\$ 1,796,921
19 Communications - Telephone	\$ 2,000	0.25%	\$ 2,103	\$ 2,210	\$ 2,319	\$ 2,436	\$ 2,558	\$ 2,688	\$ 4,310	\$ 4,526	\$ 4,755	\$ 4,992	\$ 5,243	\$ 5,505	\$ 5,780	\$ 6,070	\$ 6,375	\$ 6,695	\$ 7,031	\$ 7,382	\$ 7,751	\$ 8,140
20 Communications - Postage	\$ 900	0.11%	\$ 946	\$ 994	\$ 1,044	\$ 1,096	\$ 1,151	\$ 1,209	\$ 1,940	\$ 2,037	\$ 2,140	\$ 2,246	\$ 2,359	\$ 2,477	\$ 2,601	\$ 2,731	\$ 2,869	\$ 3,013	\$ 3,164	\$ 3,322	\$ 3,488	\$ 3,663
21 Communications - Printing	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 647	\$ 679	\$ 713	\$ 749	\$ 786	\$ 826	\$ 867	\$ 910	\$ 956	\$ 1,004	\$ 1,055	\$ 1,107	\$ 1,163	\$ 1,221
22 WWTF - Contracted Services	\$ 92,800	11.80%	\$ 97,575	\$ 102,531	\$ 107,604	\$ 113,032	\$ 118,695	\$ 124,712	\$ 199,988	\$ 210,017	\$ 220,636	\$ 231,609	\$ 243,290	\$ 255,442	\$ 268,185	\$ 281,635	\$ 295,794	\$ 310,660	\$ 326,235	\$ 342,517	\$ 359,625	\$ 377,677
23 WWTF Chemicals	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 25,861	\$ 27,157	\$ 28,531	\$ 29,949	\$ 31,460	\$ 33,031	\$ 34,679	\$ 36,418	\$ 38,249	\$ 40,172	\$ 42,186	\$ 44,291	\$ 46,503	\$ 48,838
24 WWTF - Outside Svcs / Sludge removal	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 25,861	\$ 27,157	\$ 28,531	\$ 29,949	\$ 31,460	\$ 33,031	\$ 34,679	\$ 36,418	\$ 38,249	\$ 40,172	\$ 42,186	\$ 44,291	\$ 46,503	\$ 48,838
25 WWTF SCADA / Fiber Communications	\$ 28,900	3.67%	\$ 30,387	\$ 31,930	\$ 33,510	\$ 35,201	\$ 36,964	\$ 38,838	\$ 62,281	\$ 65,404	\$ 68,711	\$ 72,128	\$ 75,766	\$ 79,550	\$ 83,519	\$ 87,708	\$ 92,117	\$ 96,747	\$ 101,597	\$ 106,667	\$ 111,995	\$ 117,617
26 Subtotal	\$ 786,526	49%	\$ 827,000	\$ 869,000	\$ 912,000	\$ 958,000	\$ 1,006,000	\$ 1,057,000	\$ 1,695,000	\$ 1,780,000	\$ 1,870,000	\$ 1,963,000	\$ 2,062,000	\$ 2,165,000	\$ 2,273,000	\$ 2,387,000	\$ 2,507,000	\$ 2,633,000	\$ 2,765,000	\$ 2,903,000	\$ 3,048,000	\$ 3,201,000
27 Office Supplies - General	\$ 150	1%	\$ 158	\$ 166	\$ 174	\$ 183	\$ 192	\$ 201	\$ 323	\$ 339	\$ 356	\$ 374										
28 Bldg./Equip. Sup - Tools	\$ 5,000	24%	\$ 5,253	\$ 5,518	\$ 5,796	\$ 6,086	\$ 6,392	\$ 6,714	\$ 10,773	\$ 11,314	\$ 11,882	\$ 12,478	\$ 13,103	\$ 13,758	\$ 14,448	\$ 15,172	\$ 15,934	\$ 16,733	\$ 17,572	\$ 18,452	\$ 19,376	\$ 20,347
29 Hazardous Material Equip.	\$ 4,000	19%	\$ 4,202	\$ 4,415	\$ 4,637	\$ 4,869	\$ 5,114	\$ 5,371	\$ 8,618	\$ 9,051	\$ 9,506	\$ 9,983	\$ 10,482	\$ 11,006	\$ 11,558	\$ 12,138	\$ 12,747	\$ 13,386	\$ 14,058	\$ 14,762	\$ 15,501	\$ 16,278
30 Veh. Sup. - Diesel	\$ 4,200	20%	\$ 4,412	\$ 4,635	\$ 4,869	\$ 5,112	\$ 5,369	\$ 5,639	\$ 9,049	\$ 9,504	\$ 9,981	\$ 10,482	\$ 11,006	\$ 11,557	\$ 12,136	\$ 12,744	\$ 13,384	\$ 14,055	\$ 14,761	\$ 15,500	\$ 16,276	\$ 17,091
31 Veh. Sup -Parts	\$ 2,500	12%	\$ 2,626	\$ 2,759	\$ 2,898	\$ 3,043	\$ 3,196	\$ 3,357	\$ 5,386	\$ 5,657	\$ 5,941	\$ 6,239	\$ 6,551	\$ 6,879	\$ 7,224	\$ 7,586	\$ 7,967	\$ 8,366	\$ 8,786	\$ 9,226	\$ 9,688	\$ 10,173
32 Veh. Sup - Reg/ Insp	\$ 350	2%	\$ 368	\$ 386	\$ 406	\$ 426	\$ 447	\$ 470	\$ 754	\$ 792	\$ 832	\$ 873	\$ 917	\$ 963	\$ 1,011	\$ 1,062	\$ 1,115	\$ 1,171	\$ 1,230	\$ 1,292	\$ 1,356	\$ 1,424
33 Other Supp. - Protective Clothing	\$ 4,500	22%	\$ 4,728	\$ 4,966	\$ 5,216	\$ 5,478	\$ 5,753	\$ 6,042	\$ 9,696	\$ 10,183	\$ 10,694	\$ 11,231	\$ 11,792	\$ 12,382	\$ 13,003	\$ 13,655	\$ 14,340	\$ 15,059	\$ 15,815	\$ 16,607	\$ 17,439	\$ 18,312
34 Subtotal	\$ 20,700	1.3%	\$ 21,747	\$ 22,845	\$ 23,995	\$ 25,197	\$ 26,463	\$ 27,794	\$ 44,600	\$ 46,841	\$ 49,193	\$ 51,661	\$ 54,245	\$ 56,959	\$ 59,814	\$ 62,812	\$ 65,965	\$ 69,273	\$ 72,749	\$ 76,393	\$ 80,217	\$ 84,236
35 Capital Assessment - Wareham	\$ 329,306	99.9%																				
36 License Reimbursement	\$ 375	0.1%																				
37 Subtotal	\$ 329,681	21%	\$ 346,358																			
38 Replacment Equipment	\$ 90,000																					
39 New Equipment	\$ 5,000																					
40 Total	\$ 95,000	6%	\$ 99,806																			
41 Principal Long Term Debt	\$ 107,078																					
42 Interest Long Term Debt	\$ 57,040																					
43 Subtotal	\$ 164,118	10%	\$ 172,420																			
		Units																				
44 DPW Sewer Totals	\$ 1,601,965		\$ 1,683,000	\$ 1,768,000	\$ 1,857,000	\$ 1,950,000	\$ 2,048,000	\$ 2,151,000	\$ 3,451,574	\$ 3,625,000	\$ 3,807,000	\$ 3,998,000	\$ 4,198,000	\$ 4,408,000	\$ 4,629,000	\$ 4,861,000	\$ 5,105,000	\$ 5,361,000	\$ 5,630,000	\$ 5,912,000	\$ 6,208,000	\$ 6,519,000
45 Annual Flow Treated (MG)	\$ 37,850,000		37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500	60,735,500
46 Cost per gallon	\$ 0	Per gallon	\$ 0.04	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.08	\$ 0.08	\$ 0.08	\$ 0.09	\$ 0.09	\$ 0.10	\$ 0.10	\$ 0.11
47 Cost per mile of collection system	\$ 200,246	per mile	\$ 210,375	\$ 221,000	\$ 232,125	\$ 243,750	\$ 256,000	\$ 268,875	\$ 246,541	\$ 258,929	\$ 271,929	\$ 285,571	\$ 299,857	\$ 314,857	\$ 330,643	\$ 347,214	\$ 364,643	\$ 382,929	\$ 402,143	\$ 422,286	\$ 443,429	\$ 465,643
48 Cost per user	\$ 2,446	per user	\$ 2,569	\$ 2,699	\$ 2,835	\$ 2,977	\$ 3,127	\$ 3,284	\$ 3,504	\$ 3,680	\$ 3,865	\$ 4,059	\$ 4,262	\$ 4,475	\$ 4,699	\$ 4,935	\$ 5,183	\$ 5,443	\$ 5,716	\$ 6,002	\$ 6,303	\$ 6,618

Town of Bourne CWMP
Draft Recommended Plan
April 2024

2 of 2



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Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
I/A	Tier 1										
	Megansett Squeteague	57	57	57	57	57	0	0	0	0	0
	Phinney's Harbor	227	227	227	227	227	0	0	0	0	0
	Tier 1 Subtotal	284	284	284	284	284	0	0	0	0	0
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	25
	Buttermilk Bay - EIA	0	0	0	0	0	22	22	22	22	22
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	187	187	187	187	187
	Total Installations	284	284	284	284	284	187	187	187	187	187
	Megansett Squeteague	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Phinney's Harbor	\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Tier 1 Cost Subtotal	\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,354,000	\$ 1,422,000	\$ 1,494,000	\$ 1,569,000	\$ 1,648,000
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,118,000	\$ 1,173,900	\$ 1,232,600	\$ 1,294,230	\$ 1,358,950
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,517,000	\$ 5,794,000	\$ 6,087,000	\$ 6,393,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000	\$ 2,699,000	\$ 2,834,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,054,000	\$ 10,558,900	\$ 11,089,600	\$ 11,649,230	\$ 12,233,950
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000
	Annual Capital Cost	\$ 13,504,800	\$ 14,182,000	\$ 14,895,000	\$ 15,641,000	\$ 16,426,000	\$ 11,923,000	\$ 12,522,900	\$ 13,153,600	\$ 13,818,230	\$ 14,512,950
Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,581,800	\$ 58,222,800	\$ 74,648,800	\$ 86,571,800	\$ 99,094,700	\$ 112,248,300	\$ 126,066,530	\$ 140,579,480

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Plan Year		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
I/A	Tier 1										
	Megansett Squeteague	0	0	0	0	0	0	0	0	0	0
	Phinney's Harbor	0	0	0	0	0	0	0	0	0	0
	Tier 1 Subtotal	0	0	0	0	0	0	0	0	0	0
	Tier 2										
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	25
	Buttermilk Bay - EIA	22	22	22	22	22	22	22	22	22	22
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97
	Pocasset River	43	43	43	43	43	43	43	43	43	43
	Tier 2 Subtotal	187	187	187	187	187	187	187	187	187	187
	Total Installations	187	187	187	187	187	187	187	187	187	187
	Megansett Squeteague	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Phinney's Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - GUIA	\$ 1,731,000	\$ 1,818,000	\$ 1,909,000	\$ 2,005,000	\$ 2,106,000	\$ 2,212,000	\$ 2,323,000	\$ 2,440,000	\$ 2,562,000	\$ 2,691,000
	Buttermilk Bay - EIA	\$ 1,426,900	\$ 1,498,250	\$ 1,573,170	\$ 1,651,830	\$ 1,734,430	\$ 1,821,160	\$ 1,912,220	\$ 2,007,840	\$ 2,108,240	\$ 2,213,660
	Pocasset Harbor	\$ 6,714,000	\$ 7,053,000	\$ 7,407,000	\$ 7,778,000	\$ 8,169,000	\$ 8,580,000	\$ 9,012,000	\$ 9,464,000	\$ 9,941,000	\$ 10,438,000
	Pocasset River	\$ 2,977,000	\$ 3,127,000	\$ 3,284,000	\$ 3,448,000	\$ 3,622,000	\$ 3,804,000	\$ 3,995,000	\$ 4,196,000	\$ 4,407,000	\$ 4,627,000
	Tier 2 Cost Subtotal	\$ 12,848,900	\$ 13,496,250	\$ 14,173,170	\$ 14,882,830	\$ 15,631,430	\$ 16,417,160	\$ 17,242,220	\$ 18,107,840	\$ 19,018,240	\$ 19,969,660
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000
Annual Capital Cost		\$ 15,243,900	\$ 16,013,250	\$ 16,818,170	\$ 17,661,830	\$ 18,552,430	\$ 19,486,160	\$ 20,466,220	\$ 21,494,840	\$ 22,577,240	\$ 23,708,660
Total Cost to Date		\$ 155,823,380	\$ 171,836,630	\$ 188,654,800	\$ 206,316,630	\$ 224,869,060	\$ 244,355,220	\$ 264,821,440	\$ 286,316,280	\$ 308,893,520	\$ 332,602,180

Inflation		
Calendar Year		
Plan Year		Total
I/A	Tier 1	
	Megansett Squeteague	285
	Phinney's Harbor	1,135
	Tier 1 Subtotal	1,420
	Tier 2	
	Buttermilk Bay - GUIA	375
	Buttermilk Bay - EIA	330
	Pocasset Harbor	1,455
	Pocasset River	645
	Tier 2 Subtotal	2,805
	Total Installations	4,225
	Megansett Squeteague	\$ 13,369,000
	Phinney's Harbor	\$ 53,217,000
	Tier 1 Cost Subtotal	\$ 66,586,000
	Buttermilk Bay - GUIA	\$ 29,284,000
	Buttermilk Bay - EIA	\$ 24,125,380
	Pocasset Harbor	\$ 113,600,000
	Pocasset River	\$ 50,364,000
	Tier 2 Cost Subtotal	\$ 217,373,380
SW BMP	STORMWATER BMP	
	Megansett Squeteague	\$ 3,465,600
	Phinney's Harbor	\$ 10,247,100
	Buttermilk Bay	\$ 8,465,400
	Pocasset Harbor	\$ 18,659,600
	Pocasset River	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 48,642,800
Annual Capital Cost		
Total Cost to Date		

Buttermilk Bay - Core Sewer Area

Sewer Alternative 1	Inflation Rate	5%	5%	5%	5%	5%	5%	5%	5%
Plan Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	
Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	
Tier 1 - TMDL									
I/A	Megansett Squeteague	57	57	57	57	57	0	0	0
	Phinney's Harbor	227	227	227	227	227	0	0	0
	Tier 1 Subtotal	284	284	284	284	284	0	0	0
	Tier 2 - N Impaired								
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0
	Pocasset Harbor	0	0	0	0	0	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	165	165	165
	Total Installations	284	284	284	284	284	165	165	165
	Megansett Squeteague	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -
	Phinney's Harbor	\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -
	Tier 1 Cost Subtotal	\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,354,000	\$ 1,421,700	\$ 1,492,790
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,516,000	\$ 5,792,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,936,000	\$ 9,383,700	\$ 9,853,790
Sewer	SEWER								
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 20,000,000	\$ -	\$ -
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,100,000	\$ 14,250,000	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 21,100,000	\$ 14,250,000	\$ -
SW BMP	STORMWATER BMP								
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000
Annual Capital Cost		\$ 13,504,800	\$ 14,182,000	\$ 15,245,000	\$ 16,141,000	\$ 17,426,000	\$ 31,905,000	\$ 25,597,700	\$ 11,917,790
Program Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,931,800	\$ 59,072,800	\$ 76,498,800	\$ 108,403,800	\$ 134,001,500	\$ 145,919,290

Buttermilk Bay - Core Sewer Area

Sewer Alternative 1	Inflation Rate	5%
I/A	Plan Year	Year 9
	Calendar Year	2033
	Tier 1 - TMDL	
	Megansett Squeteague	0
	Phinney's Harbor	0
	Tier 1 Subtotal	0
	Tier 2 - N Impaired	
	Buttermilk Bay - GUIA	25
	Buttermilk Bay - EIA	0
	Pocasset Harbor	97
	Pocasset River	43
	Tier 2 Subtotal	165
	Total Installations	165
	Megansett Squeteague	\$ -
	Phinney's Harbor	\$ -
	Tier 1 Cost Subtotal	\$ -
	Buttermilk Bay - GUIA	\$ 1,567,430
	Buttermilk Bay - EIA	\$ -
	Pocasset Harbor	\$ 6,082,000
	Pocasset River	\$ 2,698,000
	Tier 2 Cost Subtotal	\$ 10,347,430
Sewer	SEWER	
	Buzzards Bay WWTF Upgrades	
	Buttermilk Bay Alternative 1	\$ -
	Buttermilk Bay Entire Area	\$ -
	Sewer Subtotal	\$ -
SW BMP	STORMWATER BMP	
	Megansett Squeteague	\$ 154,000
	Phinney's Harbor	\$ 457,000
	Buttermilk Bay	\$ 378,000
	Pocasset Harbor	\$ 833,000
	Pocasset River	\$ 347,000
	Stormwater BMP Subtotal	\$ 2,169,000
Annual Capital Cost		\$ 12,516,430
Program Total Cost to Date		\$ 158,435,720

Title 5 Timeline		Capital Cost								4/5/2024
Buttermilk Bay - Core Sewer Area										
Sewer Alternative 1	Inflation Rate	5%	5%	5%	5%	5%	5%	5%	5%	
	Plan Year	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	
	Calendar Year	2034	2035	2036	2037	2038	2039	2040	2041	
I/A	Tier 1 - TMDL									
	Megansett Squeteague	0	0	0	0	0	0	0	0	
	Phinney's Harbor	0	0	0	0	0	0	0	0	
	Tier 1 Subtotal	0	0	0	0	0	0	0	0	
	Tier 2 - N Impaired									
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	
	Pocasset Harbor	97	97	97	97	97	97	97	97	
	Pocasset River	43	43	43	43	43	43	43	43	
	Tier 2 Subtotal	165	165	165	165	165	165	165	165	
	Total Installations	165	165	165	165	165	165	165	165	
	Megansett Squeteague	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Phinney's Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay - GUIA	\$ 1,645,810	\$ 1,728,110	\$ 1,814,520	\$ 1,905,250	\$ 2,000,520	\$ 2,100,550	\$ 2,205,580	\$ 2,315,860	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ 6,387,000	\$ 6,707,000	\$ 7,043,000	\$ 7,396,000	\$ 7,766,000	\$ 8,155,000	\$ 8,563,000	\$ 8,992,000	
	Pocasset River	\$ 2,833,000	\$ 2,975,000	\$ 3,124,000	\$ 3,281,000	\$ 3,446,000	\$ 3,619,000	\$ 3,800,000	\$ 3,990,000	
	Tier 2 Cost Subtotal	\$ 10,865,810	\$ 11,410,110	\$ 11,981,520	\$ 12,582,250	\$ 13,212,520	\$ 13,874,550	\$ 14,568,580	\$ 15,297,860	
Sewer	SEWER									
	Buzzards Bay WWTF Upgrades									
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
SW BMP	STORMWATER BMP									
	Megansett Squeteague	\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	
	Phinney's Harbor	\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	
	Buttermilk Bay	\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	
	Pocasset Harbor	\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	
	Pocasset River	\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	
	Stormwater BMP Subtotal	\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	
Annual Capital Cost		\$ 13,144,810	\$ 13,805,110	\$ 14,498,520	\$ 15,227,250	\$ 15,991,520	\$ 16,795,550	\$ 17,637,580	\$ 18,521,860	
Program Total Cost to Date		\$ 171,580,530	\$ 185,385,640	\$ 199,884,160	\$ 215,111,410	\$ 231,102,930	\$ 247,898,480	\$ 265,536,060	\$ 284,057,920	

Title 5 Timeline		Capital Cost				4/5/2024
Buttermilk Bay - Core Sewer Area						
Sewer Alternative 1	Inflation Rate	5%	5%	5%		
	Plan Year	Year 18	Year 19	Year 20	Plan Total	
	Calendar Year	2042	2043	2044		
	Tier 1 - TMDL				Tier 1 Subtotals	
I/A	Megansett Squeteague	0	0	0	285	
	Phinney's Harbor	0	0	0	1,135	
	Tier 1 Subtotal	0	0	0	1,420	
	Tier 2 - N Impaired				Tier 2 Subtotals	
	Buttermilk Bay - GUIA	25	25	25	375	
	Buttermilk Bay - EIA	0	0	0	0	
	Pocasset Harbor	97	97	97	1,455	
	Pocasset River	43	43	43	645	
	Tier 2 Subtotal	165	165	165	2,475	
	Total Installations	165	165	165	3,895	
	Megansett Squeteague	\$ -	\$ -	\$ -	\$ 13,369,000	
	Phinney's Harbor	\$ -	\$ -	\$ -	\$ 53,217,000	
	Tier 1 Cost Subtotal	\$ -	\$ -	\$ -	\$ 66,586,000	
	Buttermilk Bay - GUIA	\$ 2,431,660	\$ 2,553,250	\$ 2,680,920	\$ 29,217,950	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ 9,442,000	\$ 9,915,000	\$ 10,411,000	\$ 113,420,000	
	Pocasset River	\$ 4,190,000	\$ 4,400,000	\$ 4,620,000	\$ 50,320,000	
	Tier 2 Cost Subtotal	\$ 16,063,660	\$ 16,868,250	\$ 17,711,920	\$ 192,957,950	
Sewer	SEWER					
	Buzzards Bay WWTF Upgrades				\$ 21,850,000	
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ 15,350,000	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ 37,200,000	
SW BMP	STORMWATER BMP					
	Megansett Squeteague	\$ 243,000	\$ 256,000	\$ 269,000	\$ 3,465,600	
	Phinney's Harbor	\$ 713,000	\$ 749,000	\$ 787,000	\$ 10,247,100	
	Buttermilk Bay	\$ 590,000	\$ 620,000	\$ 651,000	\$ 8,465,400	
	Pocasset Harbor	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600	
	Pocasset River	\$ 545,000	\$ 573,000	\$ 602,000	\$ 7,805,100	
	Stormwater BMP Subtotal	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800	
	Annual Capital Cost	\$ 19,450,660	\$ 20,427,250	\$ 21,450,920		
	Program Total Cost to Date	\$ 303,508,580	\$ 323,935,830	\$ 345,386,750		

		Inflation		5%		5%		5%		5%		5%		5%			
Calendar Year		2025		2026		2027		2028		2029		2030		2031		2032	
Plan Year		Year 1		Year 2		Year 3		Year 4		Year 5		Year 6		Year 7		Year 8	
I/A	Tier 1																
	Megansett Squeteague	57	57	57	57	57	0	0	0								
	Phinney's Harbor	227	227	227	227	227	0	0	0								
	Tier 1 Subtotal	284	284	284	284	284	0	0	0								
	Tier 2																
	Buttermilk Bay - GUIA	0	0	0	0	0	0	0	0								
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0								
	Pocasset Harbor	0	0	0	0	0	97	97	97								
	Pocasset River	0	0	0	0	0	43	43	43								
	Tier 2 Subtotal	0	0	0	0	0	140	140	140								
	Total Installations	284	284	284	284	284	140	140	140								
	Megansett Squeteague	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ -	\$ -	\$ -								
	Phinney's Harbor	\$ 9,631,000	\$ 10,112,000	\$ 10,618,000	\$ 11,149,000	\$ 11,707,000	\$ -	\$ -	\$ -								
	Tier 1 Cost Subtotal	\$ 12,050,000	\$ 12,652,000	\$ 13,285,000	\$ 13,950,000	\$ 14,649,000	\$ -	\$ -	\$ -								
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -								
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -								
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,253,000	\$ 5,516,000	\$ 5,792,000								
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,329,000	\$ 2,446,000	\$ 2,569,000								
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,582,000	\$ 7,962,000	\$ 8,361,000								
Sewer	SEWER																
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 35,000,000	\$ -	\$ -								
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -								
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,200,000	\$ 28,200,000	\$ -								
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 37,200,000	\$ 28,200,000	\$ -								
SW BMP	STORMWATER BMP																
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000								
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000								
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000								
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000								
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000								
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000								
	Annual Capital Cost	\$ 13,504,800	\$ 14,182,000	\$ 15,245,000	\$ 16,141,000	\$ 19,926,000	\$ 46,651,000	\$ 38,126,000	\$ 10,425,000								
Total Cost to Date		\$ 13,504,800	\$ 27,686,800	\$ 42,931,800	\$ 59,072,800	\$ 78,998,800	\$ 125,649,800	\$ 163,775,800	\$ 174,200,800								

Calendar Year		5%	5%	5%	5%	5%	5%	5%	5%
		2033	2034	2035	2036	2037	2038	2039	2040
Plan Year		Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16
Tier 1									
Megansett Squeteague		0	0	0	0	0	0	0	0
Phinney's Harbor		0	0	0	0	0	0	0	0
Tier 1 Subtotal		0	0	0	0	0	0	0	0
Tier 2									
Buttermilk Bay - GUIA		0	0	0	0	0	0	0	0
Buttermilk Bay - EIA		0	0	0	0	0	0	0	0
Pocasset Harbor		97	97	97	97	97	97	97	97
Pocasset River		43	43	43	43	43	43	43	43
Tier 2 Subtotal		140	140	140	140	140	140	140	140
Total Installations		140	140	140	140	140	140	140	140
Megansett Squeteague		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Phinney's Harbor		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Tier 1 Cost Subtotal		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay - GUIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay - EIA		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Pocasset Harbor		\$ 6,082,000	\$ 6,387,000	\$ 6,707,000	\$ 7,043,000	\$ 7,396,000	\$ 7,766,000	\$ 8,155,000	\$ 8,563,000
Pocasset River		\$ 2,698,000	\$ 2,833,000	\$ 2,975,000	\$ 3,124,000	\$ 3,281,000	\$ 3,446,000	\$ 3,619,000	\$ 3,800,000
Tier 2 Cost Subtotal		\$ 8,780,000	\$ 9,220,000	\$ 9,682,000	\$ 10,167,000	\$ 10,677,000	\$ 11,212,000	\$ 11,774,000	\$ 12,363,000
SEWER									
Buzzards Bay WWTF Upgrades		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay Alternative 1		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay Entire Area		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Sewer Subtotal		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
STORMWATER BMP									
Megansett Squeteague		\$ 154,000	\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000
Phinney's Harbor		\$ 457,000	\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000
Buttermilk Bay		\$ 378,000	\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000
Pocasset Harbor		\$ 833,000	\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000
Pocasset River		\$ 347,000	\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000
Stormwater BMP Subtotal		\$ 2,169,000	\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000
Annual Capital Cost		\$ 10,949,000	\$ 11,499,000	\$ 12,077,000	\$ 12,684,000	\$ 13,322,000	\$ 13,991,000	\$ 14,695,000	\$ 15,432,000
Total Cost to Date		\$ 185,149,800	\$ 196,648,800	\$ 208,725,800	\$ 221,409,800	\$ 234,731,800	\$ 248,722,800	\$ 263,417,800	\$ 278,849,800

Calendar Year		5%	5%	5%	5%	
		2041	2042	2043	2044	
Plan Year		Year 17	Year 18	Year 19	Year 20	Total # Installations
Tier 1						
Megansett Squeteague		0	0	0	0	285
Phinney's Harbor		0	0	0	0	1,135
Tier 1 Subtotal		0	0	0	0	1,420
Tier 2						
Buttermilk Bay - GUIA		0	0	0	0	0
Buttermilk Bay - EIA		0	0	0	0	0
Pocasset Harbor		97	97	97	97	1,455
Pocasset River		43	43	43	43	645
Tier 2 Subtotal		140	140	140	140	2,100
Total Installations		140	140	140	140	3,520
Megansett Squeteague		\$ -	\$ -	\$ -	\$ -	\$ 13,369,000
Phinney's Harbor		\$ -	\$ -	\$ -	\$ -	\$ 53,217,000
Tier 1 Cost Subtotal		\$ -	\$ -	\$ -	\$ -	\$ 66,586,000
Buttermilk Bay - GUIA		\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay - EIA		\$ -	\$ -	\$ -	\$ -	\$ -
Pocasset Harbor		\$ 8,992,000	\$ 9,442,000	\$ 9,915,000	\$ 10,411,000	\$ 113,420,000
Pocasset River		\$ 3,990,000	\$ 4,190,000	\$ 4,400,000	\$ 4,620,000	\$ 50,320,000
Tier 2 Cost Subtotal		\$ 12,982,000	\$ 13,632,000	\$ 14,315,000	\$ 15,031,000	\$ 163,740,000
SEWER						
Buzzards Bay WWTF Upgrades		\$ -	\$ -	\$ -	\$ -	\$ 39,350,000
Buttermilk Bay Alternative 1		\$ -	\$ -	\$ -	\$ -	\$ -
Buttermilk Bay Entire Area		\$ -	\$ -	\$ -	\$ -	\$ 30,400,000
Sewer Subtotal		\$ -	\$ -	\$ -	\$ -	\$ 69,750,000
STORMWATER BMP						
Megansett Squeteague		\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000	\$ 3,465,600
Phinney's Harbor		\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000	\$ 10,247,100
Buttermilk Bay		\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000	\$ 8,465,400
Pocasset Harbor		\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	\$ 18,659,600
Pocasset River		\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000	\$ 7,805,100
Stormwater BMP Subtotal		\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	\$ 48,642,800
Annual Capital Cost		\$ 16,206,000	\$ 17,019,000	\$ 17,874,000	\$ 18,770,000	
Total Cost to Date		\$ 295,055,800	\$ 312,074,800	\$ 329,948,800	\$ 348,718,800	

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Tier 1												
I/A	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14	
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57	
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71	
	Tier 2											
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	22	22	22	22	22	
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97	
	Pocasset River	0	0	0	0	0	43	43	43	43	43	
	Tier 2 Subtotal	0	0	0	0	0	187	187	187	187	187	
	Total Installations	71	71	71	71	71	258	258	258	258	258	
	Megansett Squeteague	\$ 594,000	\$ 624,000	\$ 656,000	\$ 689,000	\$ 724,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	\$ 927,000	
	Phinney's Harbor	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ 3,090,000	\$ 3,245,000	\$ 3,408,000	\$ 3,579,000	\$ 3,758,000	
	Tier 1 Cost Subtotal	\$ 3,013,000	\$ 3,164,000	\$ 3,323,000	\$ 3,490,000	\$ 3,666,000	\$ 3,851,000	\$ 4,045,000	\$ 4,248,000	\$ 4,461,000	\$ 4,685,000	
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,355,000	\$ 1,423,000	\$ 1,495,000	\$ 1,570,000	\$ 1,649,000	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,118,000	\$ 1,173,900	\$ 1,232,600	\$ 1,294,230	\$ 1,358,950	
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,257,000	\$ 5,521,000	\$ 5,798,000	\$ 6,091,000	\$ 6,397,000	
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,331,000	\$ 2,448,000	\$ 2,570,000	\$ 2,700,000	\$ 2,836,000	
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 10,061,000	\$ 10,565,900	\$ 11,095,600	\$ 11,655,230	\$ 12,240,950	
SW BMP	STORMWATER BMP											
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000	
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000	
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000	
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000	
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000	
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000	
Annual Capital Cost		\$ 4,467,800	\$ 4,694,000	\$ 4,933,000	\$ 5,181,000	\$ 5,443,000	\$ 15,781,000	\$ 16,574,900	\$ 17,407,600	\$ 18,285,230	\$ 19,204,950	
Total Cost to Date		\$ 4,467,800	\$ 9,161,800	\$ 14,094,800	\$ 19,275,800	\$ 24,718,800	\$ 40,499,800	\$ 57,074,700	\$ 74,482,300	\$ 92,767,530	\$ 111,972,480	

Inflation		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Plan Year		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Tier 1											
I/A	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71
	Tier 2										
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	25
	Buttermilk Bay - EIA	22	22	22	22	22	22	22	22	22	22
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97
	Pocasset River	43	43	43	43	43	43	43	43	43	43
	Tier 2 Subtotal	187	187	187	187	187	187	187	187	187	187
	Total Installations	258	258	258	258	258	258	258	258	258	258
	Megansett Squeteague	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 1,517,000
	Phinney's Harbor	\$ 3,946,000	\$ 4,144,000	\$ 4,352,000	\$ 4,570,000	\$ 4,799,000	\$ 5,039,000	\$ 5,291,000	\$ 5,556,000	\$ 5,834,000	\$ 6,126,000
	Tier 1 Cost Subtotal	\$ 4,920,000	\$ 5,167,000	\$ 5,427,000	\$ 5,699,000	\$ 5,985,000	\$ 6,285,000	\$ 6,600,000	\$ 6,931,000	\$ 7,278,000	\$ 7,643,000
	Buttermilk Bay - GUIA	\$ 1,732,000	\$ 1,819,000	\$ 1,910,000	\$ 2,006,000	\$ 2,107,000	\$ 2,213,000	\$ 2,324,000	\$ 2,441,000	\$ 2,564,000	\$ 2,693,000
	Buttermilk Bay - EIA	\$ 1,426,900	\$ 1,498,250	\$ 1,573,170	\$ 1,651,830	\$ 1,734,430	\$ 1,821,160	\$ 1,912,220	\$ 2,007,840	\$ 2,108,240	\$ 2,213,660
	Pocasset Harbor	\$ 6,719,000	\$ 7,057,000	\$ 7,411,000	\$ 7,782,000	\$ 8,173,000	\$ 8,584,000	\$ 9,016,000	\$ 9,468,000	\$ 9,945,000	\$ 10,446,000
	Pocasset River	\$ 2,979,000	\$ 3,128,000	\$ 3,286,000	\$ 3,450,000	\$ 3,623,000	\$ 3,806,000	\$ 3,997,000	\$ 4,198,000	\$ 4,409,000	\$ 4,631,000
	Tier 2 Cost Subtotal	\$ 12,856,900	\$ 13,502,250	\$ 14,180,170	\$ 14,889,830	\$ 15,637,430	\$ 16,424,160	\$ 17,249,220	\$ 18,114,840	\$ 19,026,240	\$ 19,983,660
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000
	Annual Capital Cost	\$ 20,171,900	\$ 21,186,250	\$ 22,252,170	\$ 23,367,830	\$ 24,543,430	\$ 25,778,160	\$ 27,073,220	\$ 28,432,840	\$ 29,863,240	\$ 31,365,660
Total Cost to Date		\$ 132,144,380	\$ 153,330,630	\$ 175,582,800	\$ 198,950,630	\$ 223,494,060	\$ 249,272,220	\$ 276,345,440	\$ 304,778,280	\$ 334,641,520	\$ 366,007,180

Inflation		
Calendar Year		
	Plan Year	Total
	Tier 1	
I/A	Megansett Squeteague	266
	Phinney's Harbor	1,083
	Tier 1 Subtotal	1,349
	Tier 2	
	Buttermilk Bay - GUIA	375
	Buttermilk Bay - EIA	330
	Pocasset Harbor	1,455
	Pocasset River	645
	Tier 2 Subtotal	2,805
	Total Installations	4,225
	Megansett Squeteague	\$ 19,775,000
	Phinney's Harbor	\$ 80,106,000
	Tier 1 Cost Subtotal	\$ 99,881,000
	Buttermilk Bay - GUIA	\$ 29,301,000
	Buttermilk Bay - EIA	\$ 24,125,380
	Pocasset Harbor	\$ 113,665,000
	Pocasset River	\$ 50,392,000
	Tier 2 Cost Subtotal	\$ 217,483,380
SW BMP	STORMWATER BMP	
	Megansett Squeteague	\$ 3,465,600
	Phinney's Harbor	\$ 10,247,100
	Buttermilk Bay	\$ 8,465,400
	Pocasset Harbor	\$ 18,659,600
	Pocasset River	\$ 7,805,100
	Stormwater BMP Subtotal	\$ 48,642,800
	Annual Capital Cost	
	Total Cost to Date	

		Inflation		5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	
I/A	Tier 1										
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	25	25	25	25	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	
	Pocasset River	0	0	0	0	0	43	43	43	43	
	Tier 2 Subtotal	0	0	0	0	0	165	165	165	165	
	Total Installations	71	71	71	71	71	236	236	236	236	
	Megansett Squeteague	\$ 594,000	\$ 624,000	\$ 656,000	\$ 689,000	\$ 724,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	
	Phinney's Harbor	\$ 2,419,000	\$ 2,540,000	\$ 2,667,000	\$ 2,801,000	\$ 2,942,000	\$ 3,090,000	\$ 3,245,000	\$ 3,408,000	\$ 3,579,000	
	Tier 1 Cost Subtotal	\$ 3,013,000	\$ 3,164,000	\$ 3,323,000	\$ 3,490,000	\$ 3,666,000	\$ 3,851,000	\$ 4,045,000	\$ 4,248,000	\$ 4,461,000	
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,355,000	\$ 1,422,750	\$ 1,493,890	\$ 1,568,590	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,257,000	\$ 5,520,000	\$ 5,796,000	\$ 6,086,000	
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,331,000	\$ 2,448,000	\$ 2,571,000	\$ 2,700,000	
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 8,943,000	\$ 9,390,750	\$ 9,860,890	\$ 10,354,590	
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 20,000,000	\$ -	\$ -		
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 1,258,476	\$ 15,730,944	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 1,000,000	\$ 21,258,476	\$ 15,730,944	\$ -	\$ -	
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	
	Annual Capital Cost	\$ 4,467,800	\$ 4,694,000	\$ 5,283,000	\$ 5,681,000	\$ 6,443,000	\$ 35,921,476	\$ 31,130,694	\$ 16,172,890	\$ 16,984,590	
Total Cost to Date		\$ 4,467,800	\$ 9,161,800	\$ 14,444,800	\$ 20,125,800	\$ 26,568,800	\$ 62,490,276	\$ 93,620,969	\$ 109,793,859	\$ 126,778,449	

		Inflation	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
Plan Year		Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
I/A	Tier 1											
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14	14
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57	57
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71	71
	Tier 2											
	Buttermilk Bay - GUIA	25	25	25	25	25	25	25	25	25	25	25
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0	0
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97	97
	Pocasset River	43	43	43	43	43	43	43	43	43	43	43
	Tier 2 Subtotal	165	165	165	165	165	165	165	165	165	165	165
	Total Installations	236	236	236	236	236	236	236	236	236	236	236
	Megansett Squeteague	\$ 927,000	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 1,517,000
	Phinney's Harbor	\$ 3,758,000	\$ 3,946,000	\$ 4,144,000	\$ 4,352,000	\$ 4,570,000	\$ 4,799,000	\$ 5,039,000	\$ 5,291,000	\$ 5,556,000	\$ 5,834,000	\$ 6,126,000
	Tier 1 Cost Subtotal	\$ 4,685,000	\$ 4,920,000	\$ 5,167,000	\$ 5,427,000	\$ 5,699,000	\$ 5,985,000	\$ 6,285,000	\$ 6,600,000	\$ 6,931,000	\$ 7,278,000	\$ 7,643,000
	Buttermilk Bay - GUIA	\$ 1,647,020	\$ 1,729,380	\$ 1,815,850	\$ 1,906,650	\$ 2,001,990	\$ 2,102,090	\$ 2,207,200	\$ 2,317,560	\$ 2,433,440	\$ 2,555,120	\$ 2,682,880
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ 6,391,000	\$ 6,711,000	\$ 7,047,000	\$ 7,400,000	\$ 7,770,000	\$ 8,159,000	\$ 8,567,000	\$ 8,996,000	\$ 9,446,000	\$ 9,919,000	\$ 10,415,000
	Pocasset River	\$ 2,835,000	\$ 2,977,000	\$ 3,126,000	\$ 3,283,000	\$ 3,448,000	\$ 3,621,000	\$ 3,803,000	\$ 3,994,000	\$ 4,194,000	\$ 4,404,000	\$ 4,625,000
	Tier 2 Cost Subtotal	\$ 10,873,020	\$ 11,417,380	\$ 11,988,850	\$ 12,589,650	\$ 13,219,990	\$ 13,882,090	\$ 14,577,200	\$ 15,307,560	\$ 16,073,440	\$ 16,878,120	\$ 17,722,880
Sewer	SEWER											
	Buzzards Bay WWTF Upgrades											
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
SW BMP	STORMWATER BMP											
	Megansett Squeteague	\$ 162,000	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000
	Phinney's Harbor	\$ 480,000	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000
	Buttermilk Bay	\$ 397,000	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000
	Pocasset Harbor	\$ 875,000	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000
	Pocasset River	\$ 365,000	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000
	Stormwater BMP Subtotal	\$ 2,279,000	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000
Annual Capital Cost		\$ 17,837,020	\$ 18,732,380	\$ 19,672,850	\$ 20,661,650	\$ 21,697,990	\$ 22,788,090	\$ 23,931,200	\$ 25,131,560	\$ 26,391,440	\$ 27,715,120	\$ 29,104,880
Total Cost to Date		\$ 144,615,469	\$ 163,347,849	\$ 183,020,699	\$ 203,682,349	\$ 225,380,339	\$ 248,168,429	\$ 272,099,629	\$ 297,231,189	\$ 323,622,629	\$ 351,337,749	\$ 380,442,629

Inflation	
Calendar Year	
Plan Year	Total
I/A	Tier 1
	Megansett Squeteague280
	Phinney's Harbor1,140
	Tier 1 Subtotal1,349
	Tier 2
	Buttermilk Bay - GUIA375
	Buttermilk Bay - EIA0
	Pocasset Harbor1,455
	Pocasset River645
	Tier 2 Subtotal2,475
	Total Installations3,895
	Megansett Squeteague\$19,775,000
	Phinney's Harbor\$80,106,000
	Tier 1 Cost Subtotal\$99,881,000
	Buttermilk Bay - GUIA\$29,239,410
	Buttermilk Bay - EIA\$-
	Pocasset Harbor\$113,480,000
	Pocasset River\$50,360,000
	Tier 2 Cost Subtotal\$193,079,410
Sewer	SEWER
	Buzzards Bay WWTF Upgrades\$21,850,000
	Buttermilk Bay Alternative 1\$16,989,419
	Buttermilk Bay Entire Area\$-
	Sewer Subtotal\$38,839,419
SW BMP	STORMWATER BMP
	Megansett Squeteague\$3,465,600
	Phinney's Harbor\$10,247,100
	Buttermilk Bay\$8,465,400
	Pocasset Harbor\$18,659,600
	Pocasset River\$7,805,100
	Stormwater BMP Subtotal\$48,642,800
Annual Capital Cost	
Total Cost to Date	

		Inflation		5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Plan Year		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
I/A	Tier 1										
	Megansett Squeteague	15	15	15	15	15	14	14	14	14	14
	Phinney's Harbor	58	58	58	58	58	57	57	57	57	57
	Tier 1 Subtotal	73	73	73	73	73	71	71	71	71	71
	Tier 2										
	Buttermilk Bay - GUIA	0	0	0	0	0	0	0	0	0	0
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0
	Pocasset Harbor	0	0	0	0	0	97	97	97	97	97
	Pocasset River	0	0	0	0	0	43	43	43	43	43
	Tier 2 Subtotal	0	0	0	0	0	140	140	140	140	140
	Total Installations	73	73	73	73	73	211	211	211	211	211
	Megansett Squeteague	\$ 637,000	\$ 669,000	\$ 703,000	\$ 739,000	\$ 776,000	\$ 761,000	\$ 800,000	\$ 840,000	\$ 882,000	\$ 927,000
	Phinney's Harbor	\$ 2,461,000	\$ 2,584,000	\$ 2,714,000	\$ 2,850,000	\$ 2,993,000	\$ 3,089,000	\$ 3,244,000	\$ 3,407,000	\$ 3,578,000	\$ 3,757,000
	Tier 1 Cost Subtotal	\$ 3,098,000	\$ 3,253,000	\$ 3,417,000	\$ 3,589,000	\$ 3,769,000	\$ 3,850,000	\$ 4,044,000	\$ 4,247,000	\$ 4,460,000	\$ 4,684,000
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Pocasset Harbor	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 5,256,000	\$ 5,519,000	\$ 5,795,000	\$ 6,085,000	\$ 6,390,000
	Pocasset River	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 2,330,000	\$ 2,447,000	\$ 2,570,000	\$ 2,699,000	\$ 2,834,000
	Tier 2 Cost Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ 7,586,000	\$ 7,966,000	\$ 8,365,000	\$ 8,784,000	\$ 9,224,000
Sewer	SEWER										
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ 350,000	\$ 500,000	\$ 3,500,000	\$ 35,000,000	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ 500,000	\$ 350,000	\$ 2,188,653	\$ 27,358,163	\$ -	\$ -	\$ -
	Sewer Subtotal	\$ -	\$ -	\$ 350,000	\$ 1,000,000	\$ 3,850,000	\$ 37,188,653	\$ 27,358,163	\$ -	\$ -	\$ -
SW BMP	STORMWATER BMP										
	Megansett Squeteague	\$ 101,600	\$ 107,000	\$ 113,000	\$ 119,000	\$ 125,000	\$ 132,000	\$ 139,000	\$ 146,000	\$ 154,000	\$ 162,000
	Phinney's Harbor	\$ 307,100	\$ 323,000	\$ 340,000	\$ 357,000	\$ 375,000	\$ 394,000	\$ 414,000	\$ 435,000	\$ 457,000	\$ 480,000
	Buttermilk Bay	\$ 252,400	\$ 266,000	\$ 280,000	\$ 294,000	\$ 309,000	\$ 325,000	\$ 342,000	\$ 360,000	\$ 378,000	\$ 397,000
	Pocasset Harbor	\$ 561,600	\$ 590,000	\$ 620,000	\$ 651,000	\$ 684,000	\$ 719,000	\$ 755,000	\$ 793,000	\$ 833,000	\$ 875,000
	Pocasset River	\$ 232,100	\$ 244,000	\$ 257,000	\$ 270,000	\$ 284,000	\$ 299,000	\$ 314,000	\$ 330,000	\$ 347,000	\$ 365,000
	Stormwater BMP Subtotal	\$ 1,454,800	\$ 1,530,000	\$ 1,610,000	\$ 1,691,000	\$ 1,777,000	\$ 1,869,000	\$ 1,964,000	\$ 2,064,000	\$ 2,169,000	\$ 2,279,000
Annual Capital Cost		\$ 4,552,800	\$ 4,783,000	\$ 5,377,000	\$ 6,280,000	\$ 9,396,000	\$ 50,493,653	\$ 41,332,163	\$ 14,676,000	\$ 15,413,000	\$ 16,187,000
Total Cost to Date		\$ 4,552,800	\$ 9,335,800	\$ 14,712,800	\$ 20,992,800	\$ 30,388,800	\$ 80,882,453	\$ 122,214,616	\$ 136,890,616	\$ 152,303,616	\$ 168,490,616

		Inflation	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Calendar Year		2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	
Plan Year		Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20	
I/A	Tier 1											
	Megansett Squeteague	14	14	14	14	14	14	14	14	14	14	
	Phinney's Harbor	57	57	57	57	57	57	57	57	57	57	
	Tier 1 Subtotal	71	71	71	71	71	71	71	71	71	71	
	Tier 2											
	Buttermilk Bay - GUIA	0	0	0	0	0	0	0	0	0	0	
	Buttermilk Bay - EIA	0	0	0	0	0	0	0	0	0	0	
	Pocasset Harbor	97	97	97	97	97	97	97	97	97	97	
	Pocasset River	43	43	43	43	43	43	43	43	43	43	
	Tier 2 Subtotal	140	140	140	140	140	140	140	140	140	140	
	Total Installations	211	211	211	211	211	211	211	211	211	211	
	Megansett Squeteague	\$ 974,000	\$ 1,023,000	\$ 1,075,000	\$ 1,129,000	\$ 1,186,000	\$ 1,246,000	\$ 1,309,000	\$ 1,375,000	\$ 1,444,000	\$ 1,517,000	
	Phinney's Harbor	\$ 3,945,000	\$ 4,143,000	\$ 4,351,000	\$ 4,569,000	\$ 4,798,000	\$ 5,038,000	\$ 5,290,000	\$ 5,555,000	\$ 5,833,000	\$ 6,125,000	
	Tier 1 Cost Subtotal	\$ 4,919,000	\$ 5,166,000	\$ 5,426,000	\$ 5,698,000	\$ 5,984,000	\$ 6,284,000	\$ 6,599,000	\$ 6,930,000	\$ 7,277,000	\$ 7,642,000	
	Buttermilk Bay - GUIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay - EIA	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Pocasset Harbor	\$ 6,710,000	\$ 7,046,000	\$ 7,399,000	\$ 7,769,000	\$ 8,158,000	\$ 8,566,000	\$ 8,995,000	\$ 9,445,000	\$ 9,918,000	\$ 10,414,000	
	Pocasset River	\$ 2,976,000	\$ 3,125,000	\$ 3,282,000	\$ 3,447,000	\$ 3,620,000	\$ 3,801,000	\$ 3,992,000	\$ 4,192,000	\$ 4,402,000	\$ 4,623,000	
	Tier 2 Cost Subtotal	\$ 9,686,000	\$ 10,171,000	\$ 10,681,000	\$ 11,216,000	\$ 11,778,000	\$ 12,367,000	\$ 12,987,000	\$ 13,637,000	\$ 14,320,000	\$ 15,037,000	
Sewer	SEWER											
	Buzzards Bay WWTF Upgrades	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay Alternative 1	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Buttermilk Bay Entire Area	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	Sewer Subtotal	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
SW BMP	STORMWATER BMP											
	Megansett Squeteague	\$ 171,000	\$ 180,000	\$ 189,000	\$ 199,000	\$ 209,000	\$ 220,000	\$ 231,000	\$ 243,000	\$ 256,000	\$ 269,000	
	Phinney's Harbor	\$ 504,000	\$ 530,000	\$ 557,000	\$ 585,000	\$ 615,000	\$ 646,000	\$ 679,000	\$ 713,000	\$ 749,000	\$ 787,000	
	Buttermilk Bay	\$ 417,000	\$ 438,000	\$ 460,000	\$ 483,000	\$ 508,000	\$ 534,000	\$ 561,000	\$ 590,000	\$ 620,000	\$ 651,000	
	Pocasset Harbor	\$ 919,000	\$ 965,000	\$ 1,014,000	\$ 1,065,000	\$ 1,119,000	\$ 1,175,000	\$ 1,234,000	\$ 1,296,000	\$ 1,361,000	\$ 1,430,000	
	Pocasset River	\$ 384,000	\$ 404,000	\$ 425,000	\$ 447,000	\$ 470,000	\$ 494,000	\$ 519,000	\$ 545,000	\$ 573,000	\$ 602,000	
	Stormwater BMP Subtotal	\$ 2,395,000	\$ 2,517,000	\$ 2,645,000	\$ 2,779,000	\$ 2,921,000	\$ 3,069,000	\$ 3,224,000	\$ 3,387,000	\$ 3,559,000	\$ 3,739,000	
Annual Capital Cost		\$ 17,000,000	\$ 17,854,000	\$ 18,752,000	\$ 19,693,000	\$ 20,683,000	\$ 21,720,000	\$ 22,810,000	\$ 23,954,000	\$ 25,156,000	\$ 26,418,000	
Total Cost to Date		\$ 185,490,616	\$ 203,344,616	\$ 222,096,616	\$ 241,789,616	\$ 262,472,616	\$ 284,192,616	\$ 307,002,616	\$ 330,956,616	\$ 356,112,616	\$ 382,530,616	

Inflation	
Calendar Year	
Plan Year	Total
I/A	Tier 1
	Megansett Squeteague285
	Phinney's Harbor1,145
	Tier 1 Subtotal1,430
	Tier 2
	Buttermilk Bay - GUIA0
	Buttermilk Bay - EIA0
	Pocasset Harbor1,455
	Pocasset River645
	Tier 2 Subtotal2,100
	Total Installations3,530
	Megansett Squeteague\$20,012,000
	Phinney's Harbor\$80,324,000
	Tier 1 Cost Subtotal\$100,336,000
	Buttermilk Bay - GUIA\$-
	Buttermilk Bay - EIA\$-
	Pocasset Harbor\$113,465,000
	Pocasset River\$50,340,000
	Tier 2 Cost Subtotal\$163,805,000
Sewer	SEWER
	Buzzards Bay WWTF Upgrades\$39,350,000
	Buttermilk Bay Alternative 1\$-
	Buttermilk Bay Entire Area\$30,396,816
	Sewer Subtotal\$69,746,816
SW BMP	STORMWATER BMP
	Megansett Squeteague\$3,465,600
	Phinney's Harbor\$10,247,100
	Buttermilk Bay\$8,465,400
	Pocasset Harbor\$18,659,600
	Pocasset River\$7,805,100
	Stormwater BMP Subtotal\$48,642,800
Annual Capital Cost	
Total Cost to Date	

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Company	Model	Cost	Notes
Aquapoint	Bioclere Model 16/12ss	\$ 12,349.00	MA Sales Tax added
Bio-Microbics	MicroFAST® 0.5 – 9.0, HighStrengthFAST® 1.0 – 9.0, NitrifAST® 0.5 - 9.0	\$ 6,052.60	MA Sales Tax added
Septi-Tech	STAAR 0.5 Denite (M400N)	\$ 10,123.00	MA Sales Tax added
Norweco	Singulair 960 DN models 600, 750, 1000, and 1500;	\$ 8,962.00	Tax Included
	Singulair 960 DN Green model 600	\$ 8,962.00	Tax Included
Orenco	Advantex AX20, AX20-RT, AX25-RT, AX100 <10,000 GPD	\$ 48,600.00	Tax Included
		\$ 15,841.43	

GU I/A System Capital Cost	OPCC (March 2024)	EIA Unit
Average GUIA Unit	\$ 15,850.00	\$ 19,020.00
Design & Permitting	\$ 3,170.00	\$ 3,804.00
Construction (Electrical and Sitework) ¹ :	\$ 19,020.00	\$ 22,824.00
Permits/Fees ²	\$ 525.00	\$ 525.00
Contingency (10%)	\$ 3,860.00	\$ 4,620.00
Total	\$ 42,425.00	\$ 50,793.00

1. Landscaping and/or asphalt pavement is not included in base estimate.
2. Includes current Bourne Permit fees for General Permit, I/A Technology, and one Percolation Test

Embayment	Nitrogen Removal Goal (Kg-N/yr.)	Number of GUIA Parcels	Estimated Nitrogen Removal GUIA (kg-N/yr.)	Estimated Stormwater BMP Removal (kg- N/yr.)*
Megansett-Squeteague Harbor	564	285 - 357	504 - 631	113
Phinneys Harbor	1,706	1,133 - 1,235	2,001 – 2,182	341
Buttermilk Bay	1,402	374 - 704	588 - 1,245	280
Pocasset Harbor	3,120	1,450	2,562	624
Pocasset River	1,289	650	1,148	258
Total	8,072	3,892 – 4,396	6,803 – 7,768	1,616

Town of Bourne Capital Improvement Plan

Item	Watershed	FY25	FY26	FY27	FY28	FY29
Electric Ave. Boat Ramp	Buttermilk Bay	\$99,000				
Queen Sewell Green Infrastructure	Buttermilk Bay		\$150,000			
Sagamore Beach Boat Ramp	Cape Cod Bay		\$150,000			
Circuit Ave. Roadway	Pocasset Harbor		\$500,000			
Wings Neck Roadway	Pocasset Harbor/Buzzards Bay		\$500,000			
Eel Pond Rd. Outfall	Phinney's Harbor			\$150,000		
Shore Rd. Park Outfall	Pocasset River			\$340,000		
Massasoit Ave. or Circuit Ave. Outfall	Pocasset Harbor			\$25,000	\$150,000	
Old Head of the Bay Outfall	Buttermilk Bay				\$25,000	\$150,000
Drainage Repairs (DPW)	Townwide		\$250,000			
Replace Street Sweeper (DPW)	Townwide					\$800,000
Subtotal		\$99,000	\$1,550,000	\$515,000	\$175,000	\$950,000

Cape Cod Watershed Plan Estimate

Watershed	Total Nitrogen Load Values (kg-N/yr.)		Total Load to Remove (kg-N/yr.)	Bourne's % Responsibility for	Bourne Total Removal (kg-N/yr.)	20% Stormwater (kg N/y)	Cost per Kg removed for Stormwater
	Septic	Total Load					
Megansett-Squeteague Harbor	7611	11658	1446	39%	564	113	\$ 101,600
Phinneys Harbor	5948	8730	1706	100%	1,706	341	\$ 307,100
Buttermilk Bay	4058	5610	1,402*	100%	1,402*	280	\$ 252,400
Pocasset Harbor	7958	12479	3,120*	100%	3,120*	624	\$ 561,600
Pocasset River	3762	5157	1,289*	100%	1,289*	258	\$ 232,100
Buzzards Bay	16830		4,208*	N/A	TBD	0	\$ -
Cape Cod Canal	164028		41,007*	N/A	TBD	0	\$ -
Total					8,072	1,616	\$ 1,454,800

*Estimated 25% removal, subject to revision and MassDEP approval.

** Each septic system assumed to contribute 5 kg N per year per housing unit (2 kg N per capita per year and 2.49 average people per Bourne unit).

***Cape Cod 208 Plan	2017	2024
ENR	10737	13532.01
Cost per Kg nitrogen	\$ 695.00	\$ 900.00

	Apr-14	Mar-24
ENR	9750	13532.01
Annual O&M Cost	2014 Cost (per curb mi)	2024 Cost (per curb mi)
Low	\$ 3,740.00	\$ 5,200.00
High	\$ 9,020.00	\$ 12,520.00
Average	\$ 6,380.00	\$ 8,860.00

ENR

Apr-14
9750

Mar-24
13532.01

Average Annual O&M Cost	"Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod" (2010, updated 2014)	2024 Cost Equ.*
General Use I/A	\$ 1,375.00	\$ 1,910.00
Enhanced I/A (Pilot or Provisional)	\$ 3,850.00	\$ 5,350.00

*Did not assume RME or Septic Utility

25%

Plus Municipal Procurement and Oversight (+25%)	
\$	2,390.00
\$	6,690.00

Line Item	FY23 Approved	FY23 Expended	FY24 Approved	FY24 Expended
Personal Services				
Salaries - Dept. Heads	\$ -	\$ -	\$ 12,500.00	\$ 4,413.51
Salaries Supervisors/ ADM.SEC	\$ 13,047.00	\$ 13,272.31	\$ 14,135.00	\$ 7,730.52
Salaries - Laborers	\$ 134,594.00	\$ 127,563.85	\$ 137,505.00	\$ 73,752.84
Overtime	\$ 40,000.00	\$ 29,954.12	\$ 40,000.00	\$ 23,219.95
Longevity	\$ 1,500.00	\$ 850.00	\$ 1,500.00	\$ 1,175.00
Incentive Pay	\$ 300.00	\$ -	\$ 300.00	\$ -
Total	\$ 189,441.00	\$ 171,640.28	\$ 205,940.00	\$ 110,291.82
Purchase of Services				
Energy - Electricity	\$ 70,048.00	\$ 78,241.71	\$ 130,000.00	\$ 60,252.49
Energy-other fuels	\$ 1,000.00	\$ 740.83	\$ 1,000.00	\$ 299.37
Non-Energy - Water	\$ 750.00	\$ 497.61	\$ 750.00	\$ 79.35
R&M - Bldgs. & Grounds	\$ 300.00	\$ 376.00	\$ 300.00	\$ -
R&M - Light Trucks	\$ 1,000.00	\$ 1,607.78	\$ 1,000.00	\$ 49.39
R&M - Mach and Equip by others	\$ 30,000.00	\$ 12,551.21	\$ 30,000.00	\$ 6,607.73
Rentals - Heavy Equip	\$ 2,500.00	\$ 50.00	\$ 2,500.00	\$ -
Rental - Uniforms	\$ 550.00	\$ 660.38	\$ 550.00	\$ -
Services - Consultants	\$ 25,000.00	\$ 8,898.00	\$ 25,000.00	\$ -
Services - Legal, Outside Counsel	\$ 5,000.00	\$ 227.88	\$ 5,000.00	\$ 3,117.84
Services - Waste Removal Wareham	\$ 430,757.00	\$ 430,756.25	\$ 441,526.00	\$ -
Communications - Telephone	\$ 2,000.00	\$ 1,265.00	\$ 2,000.00	\$ 526.74
Communications - Postage	\$ 900.00	\$ -	\$ 900.00	\$ -
Communications - Printing	\$ 300.00	\$ 159.65	\$ 300.00	\$ 332.71
WWTF - Contracted Services	\$ 246,000.00	\$ 244,332.53	\$ 92,800.00	\$ 60,520.08
WWTF Chemicals	\$ -	\$ -	\$ 12,000.00	\$ 6,195.86
WWTF - Outside Svcs / Sludge removal	\$ -	\$ -	\$ 12,000.00	\$ 38,295.00
WWTF SCADA / Fiber Communications	\$ -	\$ -	\$ 28,900.00	\$ 16,790.01
Total	\$ 816,105.00	\$ 780,364.83	\$ 786,526.00	\$ 193,066.57
Supplies				
Office Supplies - General	\$ 150.00	\$ 521.70	\$ 150.00	\$ 72.49
Bldg./Equip. Sup - Tools	\$ 5,000.00	\$ 2,011.11	\$ 5,000.00	\$ 789.04
Hazardous Material Equip.	\$ 4,000.00	\$ -	\$ 4,000.00	\$ 1,142.79
Veh. Sup. - Diesel	\$ 4,200.00	\$ 2,740.51	\$ 4,200.00	\$ 443.24
Veh. Sup - Parts	\$ 2,500.00	\$ 1,639.23	\$ 2,500.00	\$ -
Veh. Sup - Reg/ Insp	\$ 350.00	\$ -	\$ 350.00	\$ -
Other Supp. - Protective Clothing	\$ 4,500.00	\$ 2,240.15	\$ 4,500.00	\$ 2,000.00
Total	\$ 20,700.00	\$ 9,152.70	\$ 20,700.00	\$ 4,447.56
Other Charges and Expenditures				
Capital Assessment - Wareham	\$ 224,030.00	\$ 224,028.88	\$ 329,306.00	\$ -
License Reimbursement	\$ 375.00	\$ 100.00	\$ 375.00	\$ -
Total	\$ 224,405.00	\$ 224,128.88	\$ 329,681.00	\$ -
Capital Outlay				
Replacment Equipment	\$ 100,000.00	\$ 132,672.84	\$ 90,000.00	\$ 69,478.79
New Equipment	\$ 5,000.00	\$ -	\$ 5,000.00	\$ 3,834.68
Total	\$ 105,000.00	\$ 132,672.84	\$ 95,000.00	\$ 73,313.47
Permanent Debt Service				
Principal Long Term Debt	\$ 10,000.00	\$ 10,000.00	\$ 107,078.00	\$ 97,077.66
Interest Long Term Debt	\$ 1,400.00	\$ 1,400.00	\$ 57,040.00	\$ 56,540.41
Total	\$ 11,400.00	\$ 11,400.00	\$ 164,118.00	\$ 153,618.07
DPW Sewer Totals	\$ 1,367,051.00	\$ 1,329,359.53	\$ 1,601,965.00	\$ 534,737.49
Annual Flow Treated (MG)		37,848,857	37,850,000	37,850,000
Cost per gallon		\$ 0.04	\$ 0.04	\$ 0.01
Cost per mile (8 miles)		\$ 166,169.94	\$ 200,245.63	\$ 816.39
Cost per user (655 users)		\$ 2,029.56	\$ 2,445.75	\$ -67%

21%

FOR REFERENCE	
Rate per Gallon	2017
MWRA	\$ 0.01
Barnstable	\$ 0.02

Summary	FY23 Expended	FY24 Approved
Personal Services	\$ 171,640.28	\$ 205,940.00
Purchase of Services	\$ 780,364.83	\$ 786,526.00
Supplies	\$ 9,152.70	\$ 20,700.00
Other Charges and Expenditures	\$ 224,128.88	\$ 329,681.00
Capital Outlay	\$ 132,672.84	\$ 95,000.00
Permanent Debt Service	\$ 11,400.00	\$ 164,118.00
Total	\$ 1,329,359.53	#####

Projecting Debt Service to be calculated after Capital Option Selected for Recommended Plan Implementation

	Inflation		0	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
	FY24	Percent of	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	Year 15	Year 16	Year 17	Year 18	Year 19	Year 20
Line Item	Approved	Total Budget	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
1 Salaries - Dept. Heads	\$ 12,500	6.1%	\$ 13,353	\$ 13,900	\$ 14,600	\$ 15,300	\$ 16,100	\$ 16,900	\$ 43,300	\$ 45,400	\$ 47,700	\$ 50,100	\$ 52,600	\$ 55,200	\$ 58,000	\$ 60,900	\$ 63,900	\$ 67,100	\$ 70,500	\$ 74,000	\$ 77,700	\$ 81,600
2 Salaries Supervisors/ ADM.SEC	\$ 14,135	6.9%	\$ 15,100	\$ 16,000	\$ 17,000	\$ 18,000	\$ 19,000	\$ 20,000	\$ 49,000	\$ 52,000	\$ 54,000	\$ 57,000	\$ 60,000	\$ 63,000	\$ 66,000	\$ 69,000	\$ 73,000	\$ 76,000	\$ 80,000	\$ 84,000	\$ 88,000	\$ 93,000
3 Salaries - Laborers	\$ 137,505	67%	\$ 146,893	\$ 153,000	\$ 160,000	\$ 168,000	\$ 177,000	\$ 185,000	\$ 476,000	\$ 499,000	\$ 525,000	\$ 551,000	\$ 578,000	\$ 607,000	\$ 637,000	\$ 670,000	\$ 703,000	\$ 738,000	\$ 775,000	\$ 814,000	\$ 854,000	\$ 897,000
4 Overtime	\$ 40,000	19%	\$ 42,731	\$ 45,000	\$ 47,000	\$ 49,000	\$ 52,000	\$ 54,000	\$ 139,000	\$ 146,000	\$ 153,000	\$ 161,000	\$ 169,000	\$ 177,000	\$ 186,000	\$ 195,000	\$ 205,000	\$ 215,000	\$ 226,000	\$ 237,000	\$ 249,000	\$ 261,000
5 Longevity	\$ 1,500	0.7%	\$ 1,602	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 6,000	\$ 6,000	\$ 6,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 7,000	\$ 8,000	\$ 8,000	\$ 9,000	\$ 9,000	\$ 9,000	\$ 10,000	\$ 10,000
6 Incentive Pay	\$ 300	0.1%	\$ 320	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 1,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000	\$ 2,000
7 Subtotal	\$ 205,940	12.9%	\$ 220,000	\$ 228,000	\$ 239,000	\$ 251,000	\$ 264,000	\$ 277,000	\$ 712,000	\$ 747,000	\$ 785,000	\$ 824,000	\$ 865,000	\$ 909,000	\$ 954,000	\$ 1,002,000	\$ 1,052,000	\$ 1,105,000	\$ 1,160,000	\$ 1,218,000	\$ 1,279,000	\$ 1,343,000
8 Energy - Electricity	\$ 130,000	16.53%	\$ 136,690	\$ 143,632	\$ 150,739	\$ 158,342	\$ 166,275	\$ 174,705	\$ 449,076	\$ 471,555	\$ 495,190	\$ 519,983	\$ 546,098	\$ 573,369	\$ 602,129	\$ 632,211	\$ 663,945	\$ 697,002	\$ 732,042	\$ 768,570	\$ 807,081	\$ 847,410
9 Energy-other fuels	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 3,454	\$ 3,627	\$ 3,809	\$ 4,000	\$ 4,201	\$ 4,411	\$ 4,632	\$ 4,863	\$ 5,107	\$ 5,362	\$ 5,631	\$ 5,912	\$ 6,208	\$ 6,519
10 Non-Energy - Water	\$ 750	0.10%	\$ 789	\$ 829	\$ 870	\$ 914	\$ 959	\$ 1,008	\$ 2,591	\$ 2,721	\$ 2,857	\$ 3,000	\$ 3,151	\$ 3,308	\$ 3,474	\$ 3,647	\$ 3,830	\$ 4,021	\$ 4,223	\$ 4,434	\$ 4,656	\$ 4,889
11 R&M - Bldgs. & Grounds	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 1,036	\$ 1,088	\$ 1,143	\$ 1,200	\$ 1,260	\$ 1,323	\$ 1,390	\$ 1,459	\$ 1,532	\$ 1,608	\$ 1,689	\$ 1,774	\$ 1,862	\$ 1,956
12 R&M - Light Trucks	\$ 1,000	0.13%	\$ 1,051	\$ 1,105	\$ 1,160	\$ 1,218	\$ 1,279	\$ 1,344	\$ 3,454	\$ 3,627	\$ 3,809	\$ 4,000	\$ 4,201	\$ 4,411	\$ 4,632	\$ 4,863	\$ 5,107	\$ 5,362	\$ 5,631	\$ 5,912	\$ 6,208	\$ 6,519
13 R&M - Mach and Equip by others	\$ 30,000	3.81%	\$ 31,544	\$ 33,146	\$ 34,786	\$ 36,540	\$ 38,371	\$ 40,317	\$ 103,633	\$ 108,820	\$ 114,275	\$ 119,996	\$ 126,023	\$ 132,316	\$ 138,953	\$ 145,895	\$ 153,218	\$ 160,847	\$ 168,933	\$ 177,362	\$ 186,249	\$ 195,556
14 Rentals - Heavy Equip	\$ 2,500	0.32%	\$ 2,629	\$ 2,762	\$ 2,899	\$ 3,045	\$ 3,198	\$ 3,360	\$ 8,636	\$ 9,068	\$ 9,523	\$ 10,000	\$ 10,502	\$ 11,026	\$ 11,579	\$ 12,158	\$ 12,768	\$ 13,404	\$ 14,078	\$ 14,780	\$ 15,521	\$ 16,296
15 Rental - Uniforms	\$ 550	0.07%	\$ 578	\$ 608	\$ 638	\$ 670	\$ 703	\$ 739	\$ 1,900	\$ 1,995	\$ 2,095	\$ 2,200	\$ 2,310	\$ 2,426	\$ 2,547	\$ 2,675	\$ 2,809	\$ 2,949	\$ 3,097	\$ 3,252	\$ 3,415	\$ 3,585
16 Services - Consultants	\$ 25,000	3.18%	\$ 26,286	\$ 27,621	\$ 28,988	\$ 30,450	\$ 31,976	\$ 33,597	\$ 86,361	\$ 90,684	\$ 95,229	\$ 99,997	\$ 105,019	\$ 110,263	\$ 115,794	\$ 121,579	\$ 127,682	\$ 134,039	\$ 140,777	\$ 147,802	\$ 155,208	\$ 162,963
17 Services - Legal, Outside Counsel	\$ 5,000	0.64%	\$ 5,257	\$ 5,524	\$ 5,798	\$ 6,090	\$ 6,395	\$ 6,719	\$ 17,272	\$ 18,137	\$ 19,046	\$ 19,999	\$ 21,004	\$ 22,053	\$ 23,159	\$ 24,316	\$ 25,536	\$ 26,808	\$ 28,155	\$ 29,560	\$ 31,042	\$ 32,593
Services - Waste Removal																						
18 Wareham	\$ 441,526	56.14%	\$ 464,247	\$ 487,824	\$ 511,962	\$ 537,785	\$ 564,730	\$ 593,360	\$ 1,525,221	\$ 1,601,566	\$ 1,681,841	\$ 1,766,046	\$ 1,854,741	\$ 1,947,366	\$ 2,045,043	\$ 2,147,211	\$ 2,254,992	\$ 2,367,265	\$ 2,486,273	\$ 2,610,334	\$ 2,741,132	\$ 2,878,104
19 Communications - Telephone	\$ 2,000	0.25%	\$ 2,103	\$ 2,210	\$ 2,319	\$ 2,436	\$ 2,558	\$ 2,688	\$ 6,909	\$ 7,255	\$ 7,618	\$ 8,000	\$ 8,402	\$ 8,821	\$ 9,264	\$ 9,726	\$ 10,215	\$ 10,723	\$ 11,262	\$ 11,824	\$ 12,417	\$ 13,037
20 Communications - Postage	\$ 900	0.11%	\$ 946	\$ 994	\$ 1,044	\$ 1,096	\$ 1,151	\$ 1,209	\$ 3,109	\$ 3,265	\$ 3,428	\$ 3,600	\$ 3,781	\$ 3,969	\$ 4,169	\$ 4,377	\$ 4,597	\$ 4,825	\$ 5,068	\$ 5,321	\$ 5,587	\$ 5,867
21 Communications - Printing	\$ 300	0.04%	\$ 315	\$ 331	\$ 348	\$ 365	\$ 384	\$ 403	\$ 1,036	\$ 1,088	\$ 1,143	\$ 1,200	\$ 1,260	\$ 1,323	\$ 1,390	\$ 1,459	\$ 1,532	\$ 1,608	\$ 1,689	\$ 1,774	\$ 1,862	\$ 1,956
22 WWTF - Contracted Services	\$ 92,800	11.80%	\$ 97,575	\$ 102,531	\$ 107,604	\$ 113,032	\$ 118,695	\$ 124,712	\$ 320,571	\$ 336,617	\$ 353,490	\$ 371,188	\$ 389,830	\$ 409,298	\$ 429,827	\$ 451,301	\$ 473,955	\$ 497,552	\$ 522,565	\$ 548,640	\$ 576,131	\$ 604,920
23 WWTF Chemicals	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 41,453	\$ 43,528	\$ 45,710	\$ 47,998	\$ 50,409	\$ 52,926	\$ 55,581	\$ 58,358	\$ 61,287	\$ 64,339	\$ 67,573	\$ 70,945	\$ 74,500	\$ 78,222
WWTF - Outside Svcs / Sludge removal	\$ 12,000	1.53%	\$ 12,618	\$ 13,258	\$ 13,914	\$ 14,616	\$ 15,349	\$ 16,127	\$ 41,453	\$ 43,528	\$ 45,710	\$ 47,998	\$ 50,409	\$ 52,926	\$ 55,581	\$ 58,358	\$ 61,287	\$ 64,339	\$ 67,573	\$ 70,945	\$ 74,500	\$ 78,222
24 WWTF SCADA / Fiber																						
Communications	\$ 28,900	3.67%	\$ 30,387	\$ 31,930	\$ 33,510	\$ 35,201	\$ 36,964	\$ 38,838	\$ 99,833	\$ 104,830	\$ 110,085	\$ 115,596	\$ 121,402	\$ 127,464	\$ 133,858	\$ 140,545	\$ 147,600	\$ 154,949	\$ 162,739	\$ 170,859	\$ 179,420	\$ 188,386
25 Subtotal	\$ 786,526	49%	\$ 827,000	\$ 869,000	\$ 912,000	\$ 958,000	\$ 1,006,000	\$ 1,057,000	\$ 2,717,000	\$ 2,853,000	\$ 2,996,000	\$ 3,146,000	\$ 3,304,000	\$ 3,469,000	\$ 3,643,000	\$ 3,825,000	\$ 4,017,000	\$ 4,217,000	\$ 4,429,000	\$ 4,650,000	\$ 4,883,000	\$ 5,127,000
27 Office Supplies - General	\$ 150	1%	\$ 158	\$ 166	\$ 174	\$ 183	\$ 192	\$ 201	\$ 518	\$ 544	\$ 571	\$ 600										
28 Bldg./Equip. Sup - Tools	\$ 5,000	24%	\$ 5,253	\$ 5,518	\$ 5,796	\$ 6,086	\$ 6,392	\$ 6,714	\$ 17,268	\$ 18,134	\$ 19,042	\$ 19,997	\$ 20,999	\$ 22,051	\$ 23,156	\$ 24,314	\$ 25,531	\$ 26,808	\$ 28,150	\$ 29,557	\$ 31,037	\$ 32,591
29 Hazardous Material Equip.	\$ 4,000	19%	\$ 4,202	\$ 4,415	\$ 4,637	\$ 4,869	\$ 5,114	\$ 5,371	\$ 13,814	\$ 14,507	\$ 15,234	\$ 15,998	\$ 16,799	\$ 17,641	\$ 18,525	\$ 19,451	\$ 20,425	\$ 21,446	\$ 22,520	\$ 23,646	\$ 24,830	\$ 26,073
30 Veh. Sup. - Diesel	\$ 4,200	20%	\$ 4,412	\$ 4,635	\$ 4,869	\$ 5,112	\$ 5,369	\$ 5,639	\$ 14,505	\$ 15,233	\$ 15,995	\$ 16,798	\$ 17,639	\$ 18,523	\$ 19,451	\$ 20,424	\$ 21,446	\$ 22,518	\$ 23,646	\$ 24,828	\$ 26,071	\$ 27,377
31 Veh. Sup -Parts	\$ 2,500	12%	\$ 2,626	\$ 2,759	\$ 2,898	\$ 3,043	\$ 3,196	\$ 3,357	\$ 8,634	\$ 9,067	\$ 9,521	\$ 9,999	\$ 10,500	\$ 11,026	\$ 11,578	\$ 12,157	\$ 12,766	\$ 13,404	\$ 14,075	\$ 14,779	\$ 15,518	\$ 16,296
32 Veh. Sup - Reg/ Insp	\$ 350	2%	\$ 368	\$ 386	\$ 406	\$ 426	\$ 447	\$ 470	\$ 1,209	\$ 1,269	\$ 1,333	\$ 1,400	\$ 1,470	\$ 1,544	\$ 1,621	\$ 1,702	\$ 1,787	\$ 1,877	\$ 1,970	\$ 2,069	\$ 2,173	\$ 2,281
33 Other Supp. - Protective Clothing	\$ 4,500	22%	\$ 4,728	\$ 4,966	\$ 5,216	\$ 5,478	\$ 5,753	\$ 6,042	\$ 15,541	\$ 16,321	\$ 17,138	\$ 17,998	\$ 18,899	\$ 19,846	\$ 20,840	\$ 21,883	\$ 22,978	\$ 24,127	\$ 25,335	\$ 26,602	\$ 27,933	\$ 29,332
34 Subtotal	\$ 20,700	1.3%	\$ 21,747	\$ 22,845	\$ 23,995	\$ 25,197	\$ 26,463	\$ 27,794	\$ 71,489	\$ 75,075	\$ 78,835	\$ 82,789	\$ 86,937	\$ 91,291	\$ 95,866	\$ 100,660	\$ 105,699	\$ 110,984	\$ 116,540	\$ 122,368	\$ 128,493	\$ 134,928
35 Capital Assessment - Wareham	\$ 329,306	99.9%																				
36 License Reimbursement	\$ 375	0.1%																				
37 Subtotal	\$ 329,681	21%	\$ 346,358																			
38 Replacment Equipment	\$ 90,000																					
39 New Equipment	\$ 5,000																					
40 Total	\$ 95,000	6%	\$ 99,806																			
41 Principal Long Term Debt	\$ 107,078																					
42 Interest Long Term Debt	\$ 57,040																					
43 Subtotal	\$ 164,118	10%	\$ 172,420																			
		Unit																				
44 DPW Sewer Totals	\$ 1,601,965		\$ 1,683,000	\$ 1,768,000	\$ 1,857,000	\$ 1,950,000	\$ 2,048,000	\$ 2,151,000	\$ 5,532,491	\$ 5,810,000	\$ 6,101,000	\$ 6,407,000	\$ 6,728,000	\$ 7,065,000	\$ 7,419,000	\$ 7,790,000	\$ 8,180,000	\$ 8,589,000	\$ 9,019,000	\$ 9,470,000	\$ 9,944,000	\$ 10,442,000
45 Annual Flow Treated (MG)	\$ 37,850,000		37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	37,850,000	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300	97,352,300
46 Cost per gallon	\$ 0	Per gallon	\$ 0.04	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.05	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.06	\$ 0.07	\$ 0.07	\$ 0.07	\$ 0.08	\$ 0.08	\$ 0.08	\$ 0.09	\$ 0.09	\$ 0.10	\$ 0.10	\$ 0.11
47 Cost per mile of collection system	\$ 200,246	per mile	\$ 210,375	\$ 221,000	\$ 232,125	\$ 243,750	\$ 256,000	\$ 268,875	\$ 276,625	\$ 415,000	\$ 435,786	\$ 457,643	\$ 480,571	\$ 504,643	\$ 529,929	\$ 556,429	\$ 584,286	\$ 613,500	\$ 644,214	\$ 676,429	\$ 710,286	\$ 745,857
48 Cost per user	\$ 2,446																					



Innovative/Alternative (I/A) Systems

Description - Innovative/Alternative (I/A) on-site denitrifying systems typically consist of standard septic system components augmented to remove nutrients. I/A systems are commercial, proprietary systems intended to be designed as recirculating sand filter (RSF) equivalent by meeting the same treatment limits in a smaller footprint. Total N <19 mg/L.

Cost (Capital and O&M) - Costs are presented on a per unit (system) basis.

Project Cost			Annual O&M Cost		
Low	High	Average	Low	High	Average
\$11,200	\$33,600	\$22,400	\$1,100	\$1,650	\$1,375



Innovative/Alternative (I/A) Enhanced Systems

Description - Enhanced I/A systems for TMDL compliance. Enhanced I/A (RSF Equivalent) to achieve 50% would definitely require chemical systems to reliably meet such limits that would target near 10 mg/L for TN to consistently meet design of 13 mg/L. Nitrogen levels are typically treated to 10 to 13 mg/L.

Cost (Capital and O&M) - Costs are presented on a per unit (system) basis.

Project Cost			Annual O&M Cost		
Low	High	Average	Low	High	Average
\$16,800	\$39,200	\$28,000	\$3,300	\$4,400	\$3,850



Stormwater BMPs

Description - Non-Structural Stormwater strategies. These strategies include street sweeping, maintenance of stormwater utilities, education and public outreach programs, land use planning, and IC reduction and control.

Cost (Capital and O&M) - Costs are presented on a curb mile basis.

Project Cost			Annual O&M Cost		
Low	High	Average	Low	High	Average
\$75,600	\$140,000	\$107,800	\$3,740	\$9,020	\$6,380

Sensitivity Analysis for Individual Denitrifying Systems

For the Base Case, individual nitrogen-removing or Innovative/Alternative (I/A) systems were evaluated at 19 mg/l (approximating the current practice) and at 13 mg/l (assuming more rigorous design and operational oversight and, also with added monitoring to demonstrate TMDL compliance). The principal cost parameters were estimated as follows, with the lower capital and O&M costs typically pertaining to the 19 mg/l scenario:

Capital cost per property	\$22,400 to \$28,000
O&M cost per property	\$1,380 to \$3,850
Equivalent annual cost (EAC) per property	\$3,170/yr to \$6,100/yr
EAC per pound of N removed	\$820 (19 mg/l) to \$860 (13 mg/l)

The sensitivity analysis considered the impact of reusing existing Title 5 systems by adding new denitrifying equipment, a more conservative estimate of site restoration costs, possible reductions in monitoring requirements, added costs for municipal procurement and oversight, higher or lower effluent nitrogen concentrations, and the potential for future cost reductions related to advances in technology. The results are presented below, expressed as equivalent annual cost (EAC) per pound, and as a percentage reduction from the Base Case.

Individual Nitrogen-Removing Systems		Enhanced Current Practice (19 mg/l)	For TMDL Compliance (13 mg/l)
Base case		\$820	\$860
A	Adding \$4,000 for site restoration (Change from base case)	\$910 11%	\$910 6%
B	Municipal procurement (+20%) (Change from base case)	\$910 11%	\$920 7%
C	Municipal oversight of operations (Change from base case)	\$860 5%	\$880 2%
D	Reusing 50% of existing systems (Change from base case)	\$590 -28%	\$700 -19%
E	Dropping BOD and TSS sampling (Change from base case)	\$490 -40%	\$370 -57%
F	Reducing the effluent N by 3 mg/l (Change from base case)	\$580 -29%	\$700 -19%
G	Reducing effluent to 5 mg/l (Change from base case)	\$280 -66%	\$540 -37%

TUL	20	
Interest	0.05	
CRF	0.080242587	
		Per Year
Capital	42425	\$ 3,404.29
O&M	2390	\$ 2,390.00
Total Annualized Cost		\$ 5,800.00

TUL		15	
Interest		0.05	
CRF		0.096342288	
			Per Year
Capital	\$	42,425.00	\$ 4,087.32
O&M	\$	6,690.00	\$ 6,690.00
Total Annualized Cost			\$ 10,780.00

Useful Life - LPS	40
Useful Life - WWTF	20
Interest	0.05
CRF - LPS	0.06
CRF - WWTF	0.08
Existing Users	655
New Users	330

		Per Year	Per User
WWTF Capital	\$ 21,850,000.00	\$ 1,753,310.00	
Sewer Alternative 1 Capital	\$ 15,350,000.00	\$ 894,570.00	
O&M	\$ 3,451,573.59	\$ 3,451,580.00	
Total Annualized Cost	\$	6,099,460.00	\$ 9,642.15

Useful Life - LPS	40
Useful Life - WWTF	20
Interest	0.05
CRF - LPS	0.06
CRF - WWTF	0.08
Existing Users	655
New Users	858

		Per Year	Per User
WWTF Capital	\$ 39,350,000.00	\$ 3,157,550.00	
Sewer Alternative 1 Capital	\$ 30,400,000.00	\$ 1,771,660.00	
O&M	\$ 5,532,491.34	\$ 5,532,500.00	
Total Annualized Cost	\$	10,461,710.00	\$ 16,830.08