

ATTACHMENT 12

Town of Bourne

Comprehensive Wastewater Management Planning Project

Plan of Study

March 17, 2021, revised July 21, 2023



TOWN OF BOURNE

COMPREHENSIVE WASTEWATER MANAGEMENT PLANNING PROJECT

Plan of Study

March 17, 2021, revised July 21, 2023

Environmental Partners (EP) prepared this Plan of Study (POS) for the Town of Bourne (Town) to initiate the Comprehensive Wastewater Management Plan for the Town. EP prepared the POS in accordance with the Massachusetts Department of Environmental Protection's Guide to Comprehensive Wastewater Management Planning dated January 1996.

Project Background

The Town is located at the head of Cape Cod, stretching from Buzzards Bay to Cape Cod Bay. The Cape Cod Canal splits the Town into Northern and Southern halves, with an economic center in Buzzards Bay north of the canal and another economic center along MacArthur Boulevard south of the canal. The Town has 10 villages and harbors, and hosts the Massachusetts Maritime Academy, a secondary education complex located at the west end of the Cape Cod Canal. Joint Base Cape Cod, in the southeastern portion of Town, owns over 40% of land area. The Town's population is 20,500 (40,000 seasonally). Residents are converting summer homes into year-round residences and new subdivisions are highly sought after.

Bourne recognizes that it has a wealth of water sources and that protecting them is fundamental to the Town's economic future. In 2019, the Town adopted and the Cape Cod Commission accepted the Town's updated Local Comprehensive Plan (LCP). The LCP contains action items including:

"Identify, remediate, treat or contain identified sources of pollution in coastal embayments and estuaries to attain established TMDLs and create a comprehensive wastewater management plan to upgrade public and private wastewater treatment facilities and methods in appropriate areas especially in densely developed neighborhoods, and actively seek grants and other funding to carry out the plan."

The Town actively participates in the Massachusetts Estuaries Project (MEP) with the Department of Environmental Protection. Total Maximum Daily Loads (TMDLs) are in place for Phinney's Harbor, including Eel Pond and Back River, Wild Harbor, Fiddlers Cove, Rand Harbor, and Megansett-Squeteague Harbors. The Town continues to work with the Buzzards Bay Coalition for embayments, which MEP is no longer studying, including Buttermilk Bay, Pocasset Harbor, and Pocasset River. Bourne is a member of the Cape Cod Commission and is part of the Cape Cod Area Wide Water

Quality Management Plan (208 Plan). The 208 Plan supports Cape towns by providing a framework of traditional and nontraditional technologies for intercepting and treating nitrogen discharges on a watershed basis. The Commission assisted Bourne in applying for a \$2.3 million Economic Development Administration grant for the construction of the new Wastewater Treatment Plant (WWTP) in Buzzards Bay, awarded in February 2019. The WWTP is expected to be online in spring 2021.

The town of Bourne proposes to prepare a town-wide CWMP in a four-phased approach.

- Phase I – Needs Assessment
- Phase II – Identification of Alternatives
- Phase III – Draft Recommended Plan
- Phase IV – Massachusetts Environmental Policy Act (MEPA) and Cape Cod Commission (CCC) 208 Plan Consistency Review

Execution of this plan will be consistent with other local planning efforts including but not limited to Cape Cod Commission 208 Plan, potential regional approaches and plans, Bourne-Wareham Intermunicipal Agreement, Buzzards Bay Coalition Upper Bay Project, considerations of Joint Base Cape Cod proposals, and flow allocation to the new Buzzards Bay Wastewater Treatment Facility.

CWMP Detailed Plan of Study

Phase I - Needs Assessment

The objective of the Needs Assessment is to develop an understanding of the Existing and Future water quality conditions within the planning area, and review previous planning efforts related to watershed protection, economic development, and population growth. The Needs Assessment will describe water quality in the Town's watersheds, identify impacts associated with nitrogen loadings from wastewater disposal under existing and anticipated future population levels, and identify areas of need for wastewater disposal solutions based on each watershed's TMDL goals. The understanding developed through the Needs Assessment will provide the context of the alternative management and mitigation strategies developed in Phase II.

Review of Prior Planning Efforts

The Town has completed several types of previous wastewater evaluations including:

- 2007: Town wide Analysis (Tighe & Bond)
- 2012: Downtown Buzzards Bay Analysis (CH2M Hill)
- 2015 – Ongoing: Wareham-Marion-Plymouth-Bourne Regionalization Alternatives (Buzzards Bay Coalition, GHD)

EP will review these studies, as well as the 2019 Bourne Local Comprehensive Plan, and incorporate into the needs assessment, as applicable. Flow projections and needs areas will be updated using current Board of Health Title 5 compliance data, records of onsite system failures, I/A systems in operation and neighborhood treatment systems as well as incorporating Zoning changes. These figures will be prepared using GIS mapping that depicts wastewater disposal issues and historic

data. Additional data sources EP will incorporate into the assessment are water quality data and historic records for the Town's marine and freshwater surface water bodies and embayments.

The following Massachusetts Estuaries Project Total Nitrogen TMDL Final reports, and the associated linked watershed-embayment model final reports, will also be incorporated:

1. Phinney's Harbor, including Eel Pond and Back River (2007)
2. Wild Harbor (2017)
3. Fiddlers Cove and Rand Harbor (2017)
4. Megansett-Squeteague Harbors (2020)

We will collect and assess data from water quality monitoring programs in Bourne to aid in determining conditions in watersheds not assessed by the MEP program. Studies and data may include:

- Final Pathogen TMDL for Buzzards Bay Watershed (2009)
- Canal North – Cape Cod Bay Monitor – Station 15
- Buttermilk Bay - Buzzards Bay Coalition monitoring location data
- Pocasset Harbor - Buzzards Bay Coalition monitoring location data
- Red Brook Harbor – Buzzards Bay Coalition monitoring data and nitrogen modeling results

We will incorporate reports on regional initiatives, including the Buzzards Bay Coalition evaluation of alternatives to regionalize the Wareham WWTF, and the joint planning effort for the expansion of the Joint Base Cape Cod wastewater facilities. The Town will also coordinate with neighboring communities and joint stakeholders including but not limited to the Towns of Barnstable, Falmouth, Sandwich, and Wareham.

Assessment of Current and Future Conditions

We will assess current and future conditions town-wide and on an individual watershed, and village, basis. Figure 1 illustrates the town's watersheds and coastal waters in relation to its harbors and villages.

The 2019 Town of Bourne Local Comprehensive Plan (LCP) will be the basis for economic and demographic trends in the Town. The projection of build-out forecasts in the LCP, which provides a current assessment of existing population and future growth, will also be used as the basis for the Needs Assessment. The current condition of existing wastewater infrastructure, including large-scale facilities at Buzzards Bay, Wareham, and JBCC, as well as small-scale public and private wastewater treatment facilities, will be documented. The future condition of these facilities will be assessed by including the projected buildout in their service areas.

Base mapping showing existing conditions will be created using GIS data layers from Town, State, and Federal sources. The GIS mapping will portray conditions of the human-made and natural environment including land use, zoning, surficial geology, soil conditions, watershed delineations, water supply zones of contribution and environmentally sensitive areas.

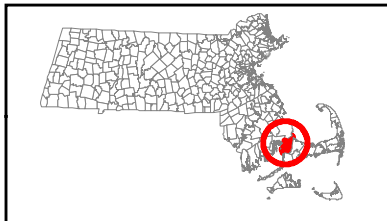
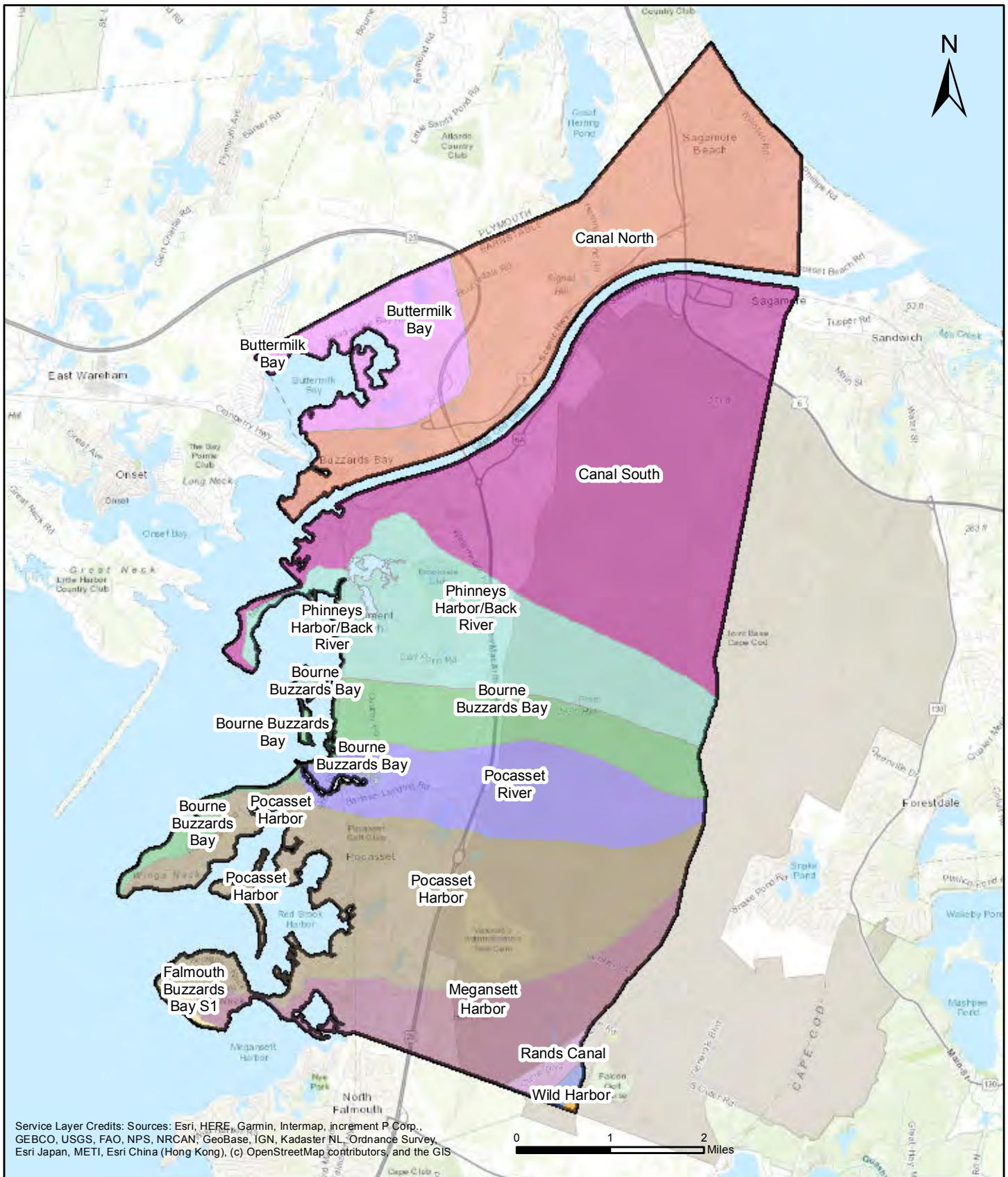
If not already documented by the MEP program, current wastewater nitrogen loading rates and septage/wastewater flows will be estimated on a watershed basis in the same manner as the MEP

process. Future septage/wastewater flows will be estimated on a watershed basis in a similar manner. If the appropriate Assessors data is available, these estimates will also be described with respect to residential, commercial and industrial property uses, and will also characterize discharges according to seasonal and year-round property uses.

Nitrogen loads provided in existing MEP reports will be used for those watersheds that have been evaluated. To establish nitrogen impacts on water quality and nitrogen load reductions in watersheds not studied under the MEP program, work being done by the Buzzard Bay Coalition in Bourne waters will be used. For other watersheds, comparable watersheds studied under the MEP program will be used. The Town will coordinate with MassDEP to identify watersheds on Cape Cod that are comparable to Bourne watersheds.

[Wastewater Needs and Problem Identifications](#)

Based on the findings of the above tasks, a technical report will summarize existing wastewater conditions and future wastewater needs in the Town, and provide recommendations for priority areas of need.



ENVIRONMENTAL
PARTNERS

Town of Bourne, MA
Comprehensive Wastewater Management Plan
STUDY AREA
FIGURE 1

Phase II – Identification and Screening of Alternatives

This phase includes an analysis and screening of wastewater treatment and management alternatives for addressing the water quality and infrastructure issues identified in the Needs Assessment. This Phase will consist of two screening processes:

- preliminary screening phase
- detailed evaluation of alternatives

We will assess both structural and non-structural measures. We will identify and evaluate management alternatives based on the following treatment factors:

- A baseline conditions alternative that would determine the level of treatment possible by optimizing the existing wastewater collection, treatment and disposal facilities;
- Identification of areas where on-site septic systems are inadequate;
- Decentralized treatment options for areas with inadequate on-site septic systems, including alternative treatment systems such as Permeable Reactive Barriers (PRB) or aquaculture, cluster systems, and package wastewater treatment facilities;
- Centralized treatment options, including expansion/upgrade of the existing WWTPs to improve nitrogen removal, and regional options for residuals reuse and/or disposal;
- Collection system alternatives for centralized and decentralized treatment; and
- Flow and load reduction measures, including water conservation.

The screening analysis will evaluate the options identified above and potential locations for the siting of facilities. Factors to be considered include cost, design flexibility for handling varying loads and upgrades, environmental impacts and constraints, effluent quality, permit requirements, odor emissions, land requirements, ease of implementation, maintenance/operation requirements, greenhouse gas (GHG) emissions, public acceptance, conformance with the LCP, and climate change resiliency. The Town will evaluate up to four alternatives of Town-wide wastewater management for further evaluation in the Draft Recommended Plan:

1. One alternative that establishes sewer needs areas, outlining a contingency plan considering conventional sewer and treatment approaches
2. One alternative that encompasses the regional approaches being evaluated through the Buzzards Bay Coalition and the JBCC, and is complemented with decentralized systems for those areas not served by the regional systems; and
3. Two alternatives comprised of decentralized and innovative/alternative technologies including but not limited to enhancement of onsite systems with advanced treatment and innovative/alternative strategies such as shellfish aquaculture, permeable reactive barriers

For each of these alternatives the specific management approach to be utilized in each of the Town's watershed and/or village areas will be described.

- For the Buzzards Bay area north of the canal, evaluate the cost-effectiveness of the regional approach being considered through the Buzzards Bay Coalition with Wareham and Marion versus “going it alone” by expanding the package treatment plant and forecast the cost to

ratepayers by pursuing either the regional or isolated solution. EP will take into consideration any additional accommodations for the North Sagamore neighborhood, as they may need a more tailored approach to take full advantage of the regional approach.

- For the area south of the Canal, evaluate whether a regional solution with the JBCC is more cost effective than developing local options on a village-by-village basis, or that considers alternative technologies such as advanced onsite systems, permeable reactive barriers, and aquaculture. Forecast the ratepayer costs under either a regional or a local approach, similar to the wastewater management approach north of the canal.
- Develop an approach to upgrade onsite and neighborhood treatment facilities, especially in areas of densely developed neighborhoods.

An alternatives matrix will be prepared and organized by findings from the Needs Analysis, including both structural and non-structural approaches. EP will draft evaluation criteria, and provide to the Town Board of Sewer Commissioners for review and modification. Based on discussions with the Board of Sewer Commissioners, the Commissioners will decide upon the recommended alternative strategies for detailed evaluation in Phase III.

EP will submit an interim report summarizing the findings and recommendations of this Phase to MassDEP and will hold an informal review meeting to discuss any pre-review comments.

Phase III – Draft Recommended Plan

The purpose of the draft Recommended Plan is to describe the impacts and potential mitigation measures associated with each of the alternatives selected through the Screening Analysis. It will detail the factors and evaluation methodology used to rank the alternatives identified in the Screening Analysis and select a Recommended Plan. Alternatives will be ranked based on environmental impacts, costs, implementation capability, regulatory requirements and constraints, public acceptance, reliability, flexibility, optimization of existing facilities, GHG emissions, climate change resiliency and other considerations identified during the planning process.

The four final alternatives include:

1. Sewer Expansion in Buttermilk Bay (Conventional)
2. General Use Approved I/A Systems (Conventional)
3. Stormwater BMP updates (policy-based, non-traditional)
4. Targeted Stormwater Improvements (non-traditional)

The following will be developed for each of the four final alternatives:

- Concept-level capital costs for design, permitting and construction (which is dependent upon specific locations and may not be feasible for all alternatives)
- Estimated operation and maintenance costs, including energy usage of the alternative
- Administrative and regulatory requirements associated with the alternative, including **Board of Health** bylaw changes associated with onsite systems and permitting requirements
- Water Quality Improvement Attributes, as outlined in the MassDEP CWMP guidelines, including main watershed/embayment and secondary watershed/embayment, as applicable

- Potential consequences on growth in the context of current zoning and on the goals articulated in the updated Local Comprehensive Plan

Based on discussions with the [Select Board Board of Sewer Commissioners](#), cost-allocation approaches will be considered for each alternative, such as betterments, property taxes, user fees or a combination of these. Once an approach consensus is determined by the [Select Board Board of Sewer Commissioners](#), a financial pro-forma will be developed for each alternative that identifies estimated annual costs to the Town and property owners.

Results will be compiled according to the detailed characterization of each alternative and summarized in a table according to the following factors:

- Watersheds impacted
- Present worth [\(depending on the projects only; may not be feasible for all alternatives\)](#)
- Cost effectiveness, including capital and operating costs
- Environmental Impacts, including impacts on wetlands, water supply considerations, historical and archeological considerations
- Institutional Considerations, such as the need for changes in local by-laws and government organizations
- Sitting considerations for any necessary pumping and/or treatment systems [\(depending on specific projects; may not be feasible for all alternatives\)](#)
- Phased Implementation opportunities that could reduce cost and environmental impacts [\(depending on specific projects; may not be feasible for all alternatives\)](#)
- Reliability and flexibility
- Other factors as determined by the planning process

Based on the comparison results, the [Select Board Board of Sewer Commissioners](#) will select a recommended plan; including formulating an implementation schedule for the recommended plan that considers design, permitting and construction stages.

Phase IV – MEPA and CCC DRI Reviews

Once the Town presents the Draft Plan to the public, EP will compile findings and comments from public workshops, and include them in the Draft Recommended Plan/Single Environmental Impact Report (SEIR) for submission to MassDEP and MEPA. The Town will submit notices to the MEPA Environmental Monitor and local newspaper, in compliance with Section 11.16 of the MEPA regulations. MEPA will perform a 47-day review, including a Public Site Visit. The Town will also complete a Public Information Hearing during this review period.

The Town will concurrently submit the Draft Recommended Plan/SEIR plan to the Cape Cod Commission to complete a 208 Plan Consistency Review (formerly the Development of Regional Impact Review). The 208 Plan Consistency Review application will include an additional summary articulating the relationship of the CWMP to the 208 Area Wide Water Quality Management Plan, for which the Cape Cod Commission is the lead agency. The Town and EP will meet with the Commission to review comments and address any revisions.

The Final CWMP will be compiled including addressing comments received from MEPA, the MEPA Public Comment Period, and the Cape Cod Commission. The Town will conduct a final public hearing confirming revisions or changes. EP will then finalize and distribute the CWMP.

Public Participation

Public Participation will be initiated at the start of the project and be ongoing throughout the life of the project. We intend to create an opportunity for public education, outreach and participation throughout the execution of the project. The public workshops/meetings will begin with an announcement of the meeting date, location and agenda. Announcements on the town website, local cable channel, and other outlets for distribution as chosen by the Town will inform participants of upcoming meetings and workshops. The Town will provide agendas and background information to attendees prior to the meeting. The Town will structure workshops to ensure engagement and time for interaction and sharing of opinions and ideas, including breakout sessions with smaller groups of individuals.

There will be three public hearings for presentation of the Recommended Plan, one with the Town and two with the Cape Cod Commission, to meet the requirements of the CWMP process. A summary report on the public participation activities of Phases I, II and III will be prepared and included in the final CWMP and Final Environmental Impact Report (FEIR). Table 1 shows a preliminary schedule for the public participation activities associated with Phase I, II and III.

Table 1: Stakeholder Meeting Schedule

Scope of Work Task	Targeted Population			
	Town wide	North of the Canal	South of the Canal	Cape Cod Commission
Phase I - Needs Assessment				
a. Wastewater Issues	One*	One	One	
b. Wastewater Needs and Problem Identification	One			
Phase II - Identification and Screening of Alternatives				
a. Proposed Criteria	One*			
b. Refine criteria and matrix	One*			
c. Present Refinement	One			
Phase III - Formulation of Plan				
a. Cost Allocation Discussion	One*			
b. Review the evaluation results and the plan	One			
c. Public Hearing	One			
Phase IV - MEPA & CCC DRI Reviews	One**			Two**

Notes: *One meeting will be presented with Board of Sewer Commissioners, a public meeting.

**Considered Public Hearings, in accordance with CWMP process requirements.

The Town will be providing a page on the Town's website specifically for the CWMP project, where information will be regularly uploaded and shared with the public. This website information may include 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.

Quarterly meetings with the Board of Sewer Commissioners will provide an opportunity for communication amongst the project team and town leaders, and a forum for the public to gain insight on the project and how it is progressing. A preliminary schedule for the deliverables to be shared to the Town CWMP website associated with public participation activities is provided in Table 2.

Table 2: Public Participation Plan - Targeted Information Sharing Schedule

Scope of Work Task	Type of Document Shared			
	Public Notice and Agenda	Workshop Findings	Summary Document	Other
All Tasks				Monthly Progress Update
1. Project Startup & Plan Review				Project Introduction
4. Needs Assessment				
a. Wastewater Issues	Two	One		
b. Wastewater Needs and Problem Identification	One	One	Needs Assessment	Task 4 Scope of Work
5. Identification of Alternatives				
a. Proposed Criteria	One	One		
b. Refine criteria and matrix	One*			
c. Present Refinement	One	One	Alternatives Matrix	Task 5 Scope of Work
6. Formulation of Plan				
a. Cost Allocation Discussion	One*			
b. Review the evaluation results and the plan	One	One	Evaluation results	Plan Draft
c. Public Hearing	One	One	Response to Comment	Final Draft
7. Completion of MEPA & CCC DRI	Two		Final CWMP	

Notes: *Document will be part of regularly scheduled Board of Sewer Commissioners meeting.

Schedule and Costs

An anticipated schedule is attached as Figure 2, and a cost estimate for the total costs of the plan, broken down by task, is included in Table 3 below.

Table 3: Town of Bourne CWMP Costs

CWMP Phase	Description	Cost	% of Total
	MassDEP Plan of Study	\$39,600	7.1%
I - IV	Project Updates and Public Participation Facilitation	\$151,500	27%
I	Needs Assessment	\$48,010	8.6%
II	Identification, Screening and Evaluation of Alternatives	\$144,900	25.8%
III - IV	Formulation of Recommended Plan	\$176,300	31.4%
	TOTAL BUDGET:	\$561,000	100%

Figure 2: Town of Bourne CWMP Project Schedule

**Bourne, MA - Comprehensive Wastewater Management Plan
CWMP Schedule of Activities**

27 May 21

Legend: Solid colors match tasks, Hatched cells indicate flexibility or float time, "X" indicates completed

Phase	Description	2021												2022												2023											
		Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23	Dec-23
Project Management																																					
	General Project Management (Monthly Meetings with Staff)																																				
	Funding Support																																				
Project Coordination and Meetings																																					
	Town Staff Working Group																																				
	Sewer Commissioners																																				
	Public Information Meeting - Townwide																																				
	Public Information Meeting - North of the Canal																																				
	Public Information Meeting - South of the Canal																																				
	Regulatory Meeting																																				
MassDEP Plan of Study																																					
	Review Historical Assessment Information																																				
	Pre-Planning Meeting with Regulators																																				
	Prepare for Board of Sewer Com. Workplan Disc.																																				
	Kickoff Meeting																																				
	Workplan Meeting with Board of Commissioners																																				
I	Needs Assessment																																				
	Current Wastewater Management Issues																																				
	Assess Future Conditions																																				
	Wastewater Needs & Problem Identification																																				
	Prepare Needs Assessment Report																																				
	Submit Notice of Project Change																																				
II	Identification & Evaluation of Alternatives																																				
	Prepare Matrix of Options																																				
	Develop List of Criteria																																				
	Board of Sewer Commissioners (BSC) Meeting																																				
	Financial Analysis of Regional Options																																				
	Perform Screening																																				
	Develop Strategies																																				
	BSC Results Meeting																																				
	Prepare Draft Report																																				
	Pre-Submission Meeting with MassDEP																																				
	Public Information Meeting																																				
III	Formulation of Recommended Plan																																				
	Develop Further Details of Chosen Alternatives																																				
	Discuss Cost Allocation with BSC																																				
	Prepare Financial Model of Recommended Plan																																				
	Review Mtg. with BSC																																				
	Draft Recommended Plan																																				
	Public Workshop																																				
IV-a	Prepare Draft CWMP & Single EIR																																				
	Submit Draft CWMP/Single EIR for MEPA review 47 days for review. Public Hearing is held during that time																																				
	MEPA Site Visit (Public Visit)																																				
	Public Information Meeting on Draft CWMP (Bourne Mtg)																																				
IV-b	Cape Cod Commission 208 Plan Consistency Review																																				
	Cape Cod Commission Review																																				
	Cape Cod Commission Comments Review Meeting for 208 Consistency																																				
V	Prepare Final CWMP																																				
	Final Public Hearing/Meeting																																				
	Final Submission																																				

Materials for all meetings should be fully developed and delivered 2 weeks prior to the meeting
For full sections of the CWMP, schedule deliveries 3 weeks prior to the next meeting