Town of Truro Comprehensive Watershed Management Plan

Alternatives Screening Analysis Report and Draft Recommended Plan – rev1

Town of Truro
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Executive summary

Introduction

The Truro Alternatives Screening Analysis and Draft Recommended Plan summarizes the evaluation of nitrogen management alternatives to present a draft Recommended Plan to reduce excessive nitrogen loading to the Town of Truro's coastal watersheds. Figure ES-1 shows the planning area for this project, which is the Town of Truro. This report supports compliance with the Massachusetts Department of Environmental Protection (MassDEP) Watershed Permit Regulations (314 CMR 21), and builds upon the findings of the Massachusetts Estuaries Project (MEP) and the Cape Cod Commission (CCC) Watershed Reports.

This report is subject to, and must be read in conjunction with, the limitations set out in Section 10 and the assumptions and qualifications contained throughout the Report.

Background and Purpose

Excess nitrogen from septic systems, fertilizers, and runoff has been identified as the primary cause of eutrophication and degraded water quality in Truro's coastal embayments. Elevated nitrogen concentrations in coastal estuaries contribute to algal blooms and habitat loss for aquatic life, which can negatively impact human and environmental health, degrade recreational water quality, and affect tourism and the local economy. In addition to water quality impacts, increased nitrogen loading in groundwater can increase the risk of elevated nitrogen concentrations in private drinking water wells.

While some nitrogen management strategies, such as upgrading individual septic systems, may appear to provide property specific benefits, the resulting improvements in estuarine health, recreation, and overall water quality represent significant public health benefits. Protecting and restoring water quality supports community well-being, public health, and long-term resilience of Truro's coastal environment. The purpose of this Report is to identify and evaluate feasible nitrogen management reduction strategies for all of Truro's watersheds to improve coastal water quality.

There are three coastal watersheds within the Town of Truro:

– Wellfleet Harbor (located primarily within Wellfleet, with small portions in Eastham and Truro)
– Provincetown Harbor (further referred to as East Harbor; located primarily within Provincetown, with a small portion in Truro)
– Pamet River (located entirely within Truro)

Although the Town has three watersheds, to date, only Wellfleet Harbor has a complete MEP Report and nitrogen Total Maximum Daily Load (TMDL) issued by MassDEP and EPA. The other two watersheds, Pamet River and Provincetown Harbor, do not currently have a MEP Report or an established nitrogen TMDL; however, both have undergone water quality testing that indicates water quality impairments and recommendations for further water quality evaluation. Truro's estimated nitrogen loads and threshold loads are presented in Table ES-1.1. The threshold load represents the maximum nitrogen load in a coastal estuary that will support its established water quality goals.

For Wellfleet Harbor, the nitrogen TMDL was used to determine Truro's threshold load and required reductions. For watersheds without a nitrogen TMDL, the Cape Cod Commission (CCC) 208 Plan recommends that nitrogen-impaired watersheds use an initial nitrogen management planning allowance reduction goal of 25%. The CCC 208 Plan planning allowance was used to establish an initial nitrogen management goal for Pamet River and East Harbor.

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Future growth allowances were applied to account for nitrogen loads and required reductions over the 20-year planning period (2027 – 2047). Truro's estimated nitrogen loads and threshold loads are presented in Table ES-1.1.

Table ES-1.1 Estimated Watershed Nitrogen Loads and Threshold Loads

Watershed	Current Total Watershed Nitrogen Load (kg-N/yr)[1,2]	Watersehd Threshold Nitrogen Load (kg-N/yr)	Truro's Portion: Current Watershed Nitrogen Load (kg-N/yr)[4,5]	Truro's Porton: Future (2047) Nitrogen Load (kg-N/yr)[3,4,5]	Truro's Portion: Watershed Threshold Nitrogen Load (kg-N/yr)
Wellfleet Harbor: Herring River / The Gut	10,118	9,902	4,249	4,249	4,159
East Harbor	16,544	4,136	1,158	1,186	869
Pamet River	4,502	3,377	4,502	4,518	3,377
Total	31,164	17,415	9,909	9,953	8,405

Notes:

1. East Harbor and Pamet River current nitrogen load is from the CCC Provincetown Harbor Watershed Report and the CCC Pamet River Watershed Report, respectively.
2. Wellfleet Harbor current nitrogen load is from the Wellfleet Harbor TMDL report.
3. Future nitrogen loads were estimated using the housing developments outlined in the 2025 HPP. The East Harbor future load was estimated using a growth allowance for septic nitrogen load in the Town of Truro.
4. Truro's portion of the watershed load for Provincetown Harbor and Pamet River was calculated using the percent of the load in Truro according to the respective CCC Watershed Report.
5. Truro's portion of the watershed load in Wellfleet Harbor was estimated based on land area.

Table ES-1.2 summarizes Truro's estimated nitrogen reduction goals.

Table ES-1.2 Planning Period Nitrogen Reduction Goals[5]

Watershed	Current Nitrogen Reduction Goal (kg-N/yr)	Future Nitrogen Reduction Goal[4] (kg-N/yr)
Wellfleet Harbor[1]	90	90
East Harbor[2]	289	317
Pamet River[3]	1,125	1,141
Total	**1,504**	**1,548**

Notes:

1. Nitrogen reduction goal is based on Truro's contribution to the Wellfleet Harbor Watershed, in accordance with the MEP reduction goal and methodology. Loads for Wellfleet Harbor are attenuated, in accordance with MEP reports. Attenuation in Wellfleet Harbor is minor.
2. Nitrogen reduction goal is 25% of Truro's load within the Provincetown Harbor watershed. Truro accounts for 7% of the Provincetown Harbor watershed load according to CCC. Loads for East Harbor are unattenuated, as presented in the CCC reports.
3. Nitrogen reduction goal is 25% of the watershed load. Loads for Pamet River are unattenuated, as presented in the CCC reports.
4. Future reduction goals are estimated using the established threshold loads and estimated future loads are based on the housing production plan.
5. For reference, an average single-family home with a Title 5 septic system is estimated to discharge approximately 4.7 kg-N/yr. (Source: Wellfleet Harbor MEP Report).

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Alternatives Screening Analysis

An Alternatives Screening Analysis was conducted to evaluate different combinations of nitrogen management strategies to meet the Town's reduction goals for the 20-year planning period in each of its watersheds. Both conventional and alternative nitrogen management strategies were evaluated.

The MassDEP Watershed Permit Regulations (314 CMR 21) define conventional control technologies as *'a combination of physical, chemical, and biological processes that provide primary, secondary, or tertiary treatment and have been proven to be consistently effective for treating wastewater or sewage to remove suspended solids, dissolved solids, biological decomposition of organic matter, pathogens, and nutrients from wastewater. Examples of Conventional Control Technology include but are not limited to sewage treatment plans and enhanced nutrient removal alternative septic systems that the Department accepts as conventional.'*

The MassDEP Watershed Permit Regulations (314 CMR 21) define alternative control technologies as *'a technology or approach that is not a conventional control approach or technology but can be effectively used to remove pollutants from a waterbody or prevent or reduce the introduction of pollutants into a waterbody.'*

Each alternative was screened for its technical feasibility, nitrogen removal efficiency, and cost-effectiveness. Following the technologies screening analysis, a Recommended Nitrogen Management Plan (Recommended Plan) and Contingency Nitrogen Management Plan (Contingency Plan) was developed. The Recommended Plan includes several Alternative Strategies; in accordance with 314 CMR 21, a contingency plan that consists only of Conventional Control technologies is provided. Adaptive management allows the Town to implement Alternative Control technologies, monitor performance over time, and adjust strategies as needed. Pilot strategies will be closely monitored for performance to confirm if nitrogen reduction targets are being met as intended.

Nitrogen Management Alternatives

Based on the Alternatives Screening Analysis, nitrogen management strategies for Truro's three coastal estuaries were selected for the Recommended and Contingency Plans. Tables ES-1.3 through ES-1.5 summarize the nitrogen management strategies and anticipated nitrogen reductions for each of Truro's watersheds.

Table ES-1.3 Wellfleet Harbor Watershed Nitrogen Management Plan

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Recommended Plan	Contingency Plan
Stormwater Best Management Practices	54	0
Fertilizer Bylaw	51	0
Conversion of Existing Title 5 Systems to General Use Nitrogen-Reducing Systems – Single and Multi-Family Residential Properties[1]	0	92
Estimated Nitrogen Removed through Nitrogen Management Plan	**105**	**92**
Nitrogen Reduction Goal to Meet TMDL - Truro (Current)	**90**	**90**
Nitrogen Reduction Goal to Meet TMDL - Truro (2047)	**90**	**90**

Notes:

1. General Use Nitrogen-Reducing systems are approved for residential use.

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Table ES-1.4 East Harbor Nitrogen Management Plan

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Alternative 1[1]	Alternative 2[1]
Stormwater Best Management Practices	51	0
Fertilizer Bylaw	21	0
Conversion of Existing Title 5 Systems to Provisional Use Nitrogen-Reducing Systems[2]	246	
Sewering[3]	0	989
Estimated Nitrogen Removed through Nitrogen Management Plan	**318**	**989**
Nitrogen Reduction Goal - Truro (Current)	**288**	**288**
Nitrogen Reduction Goal - Truro (2047)	**318**	**318**

Notes:

1. Alternatives 1 and 2 are presented in place of Recommended and Contingency plans because the findings of this report conclude that additional analyses should be performed in East Harbor prior to providing a Recommended Plan. For additional information, refer to Section 4.5.3.
2. Provisional Use Nitrogen-Reducing systems are approved for residential and commercial use.
3. Alternative 2 sewering load is the estimated nitrogen load reduction removed by connecting a portion of Beach Point to the Provincetown Wastewater Treatment Facility. The portion selected during discussions with the Town of Truro includes parcels between 361 Shore Drive - 563 Shore Drive.

Table ES-1.5 Pamet River Watershed Nitrogen Management Plan

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Recommended Plan	Contingency Plan
Stormwater Best Management Practices	186	0
Fertilizer Bylaw	66	0
Permeable Reactive Barrier	112	0
Cluster System – Pamet River East	220	303
Cluster System – Pamet River West	0	227
Conversion of Existing Title 5 Systems to Provisional Use Nitrogen-Reducing Systems[1]	561	0
Conversion of Existing Title 5 Systems to General Use Nitrogen-Reducing Systems – Single and Multi-Family Residential Properties[2]	0	614
Estimated Nitrogen Removed through Nitrogen Management Plan	**1,145**	**1,144**
Nitrogen Reduction Goal - Truro (Current)	**1,125**	**1,125**
Nitrogen Reduction Goal - Truro (2047)	**1,141**	**1,141**

Notes:

1. Provisional Use Nitrogen-Reducing systems are approved for residential and commercial use.
2. General Use Nitrogen-Reducing systems are approved for commercial use.

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Comprehensive Watershed Management Plan

The Comprehensive Watershed Management Plan presents the Recommended and Contingency Nitrogen Management Plans for the Town of Truro through a combination of septic and non-septic nitrogen management strategies.

The Recommended Plan integrates multiple nitrogen management strategies including stormwater best management practices, fertilizer management, onsite nitrogen-reducing septic systems (currently in Provisional Use Status), cluster systems, and permeable reactive barriers.

The Contingency Plan outlines a strategy comprised of traditional nitrogen management technologies (onsite nitrogen-reducing systems (currently in General Use status), centralized wastewater collection, and cluster systems) that would be implemented if the pilot technologies included in the Recommended Plan did not perform as anticipated.

The Adaptive Management Approach will enable the Recommended Plan to be adjusted based on the monitoring results of the various pilot technologies. Coordination with MassDEP will be conducted throughout this process. The Contingency Plan will then only require implementation through this Adaptive Management Program, in whole, or in part, based on the performance of the Recommended Plan.

A Responsible Management Entity (RME) will need to be established to implement the nitrogen-reducing onsite septic system program outlined in the Recommended Plan. The RME is anticipated to oversee the monitoring of the nitrogen-reducing onsite program as part of the Town's Recommended Plan. RME responsibilities could be fulfilled through a Town department or subcontracted.

Planning Level Capital Cost Estimates for the Recommended and Contingency Plan are summarized in Table ES-1.6.

Table ES-1.6 Truro Comprehensive Watershed Management Plan – Planning Level Capital Cost Estimates

Strategy	Recommended Plan – Full Estimated Capital Costs (2025 $)	Contingency Plan – Full Estimated Capital Costs (2025 $)
Fertilizer Management Allowance[1,2]	$-	$-
Stormwater Best Management Practices Allowance[2]	$8.66 M	$-
Permeable Reactive Barrier Allowance[2]	$1.38 M	$-
Nitrogen Reducing Onsite Septic System Program[3,4]	$9.06 M	$32.82 M
Centralized Sewering (Treated at Provincetown WWTF)[5,6]	$-	$14.78 M
Cluster System – Pamet River East[7]	$4.46 M	$5.94 M
Cluster System – Pamet River West[7]	$-	$6.31 M
Total Capital Costs (2025 $)	**$23.56 M**	**$59.86 M**

Notes:

1. No capital cost is carried for a fertilizer management allowance because this strategy does not involve any construction projects. All implementation measures are regulatory actions.
2. Stormwater best management practices, and permeable reactive barrier costs were based on planning level costs from the Cape Cod Commission 208 Plan 2015 Update. Stormwater BMP cost includes budget for implementation of non-structural strategies, including street sweeping, maintenance of stormwater utilities, education and public outreach programs, land use planning, and impervious cover reduction and control.
3. General Use nitrogen-reducing system costs were developed based on the planning values outlined in the 'Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod – Guidance to Cape Cod Towns Undertaking Comprehensive Wastewater Management Planning,' prepared by the Barnstable County wastewater Cost Task Force – April 2010, updated by AECOM (updated April 2014).
4. Provisional nitrogen-reducing system costs are based on recent (2023) construction bids from other Cape Cod towns.

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Strategy	Recommended Plan – Full Estimated Capital Costs (2025 $)	Contingency Plan – Full Estimated Capital Costs (2025 $)
5. Recent regional construction bids from Chatham, Barnstable, and Falmouth were used to develop an average per parcel construction cost for the collection system. The sewering cost includes allowances for Truro's contribution to Provincetown for capacity and infrastructure costs. 6. Centralized sewering cost includes an allowance for contributions to Provincetown for infrastructure and capacity costs which were established through discussions between Truro and Provincetown. 7. Cluster system cost estimates were based on vendor quotes obtained in 2025. 8. Planning level project costs are presented in 2025 dollars (ENR January 2025 = 13731.6). Once a construction timeframe is finalized for each project, project costs should be adjusted to the anticipated mid-point of construction. Planning level capital cost estimates for infrastructure recommended as part of a multi-year planning project are typically developed as part of the planning process. As the project progresses, it is critical that these initial estimates are updated and refined at each stage of the planning and design process and prior to construction financing to accurately reflect items that may affect the cost estimates.		

The targeted milestone implementation schedule is included in Table ES-1.7.

Table ES-1.7 Truro Comprehensive Watershed Management Plan – Targeted Milestone Implementation Schedule

Phase	Years		Activity	Nitrogen Reduction (kg/yr)
	Up to 2027		Develop methodology to implement nitrogen-reducing onsite septic system program (i.e. BOH triggers or phased approach)	
1	1 to 5	2027 - 2031	Obtain Watershed Permit for Wellfleet Harbor (by 2030)	
			Enact Fertilizer Reduction Bylaw	138
			Implement Non-Structural Stormwater Best Management Practices and Regulations	291
			Initiate installation of Nitrogen-Reducing Onsite Septic Systems	202[1]
			Initiate recommended evaluations including: Pamet River: PRB location groundwater characterization and piloting, Little Pamet delineation and evaluation Provincetown Harbor: discussions with Provincetown, vulnerability assessment, culvert sizing evaluation Structural stormwater BMPs: site evaluation Cluster systems: conceptual layout development, coordination with property owners, development of design and construction milestones	
1st Watershed Management Plan Update Report Goals: 1. Evaluate monitoring data 2. Outline any changes in Recommended Plans identified through the Adaptive Management Program				
2	6 to 10	2032 - 2036	Install Permeable Reactive Barrier in Pamet River watershed	112
			Install Pamet River East cluster system	220
			Install Nitrogen-Reducing Onsite Septic Systems	202[1]
2nd Watershed Management Plan Update Report Goals: Goals to be established in the 1st Watershed Management Plan Update.				

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Phase	Years		Activity	Nitrogen Reduction (kg/yr)
3	11 to 15	2037-2041	Install Nitrogen-Reducing Onsite Septic Systems	202[1]
3rd Watershed Management Plan Update Report Goals: Goals to be established in the 2nd Watershed Management Plan Update.				
4	16 to 20	2042-2046	Install Nitrogen-Reducing Onsite Septic Systems	202[1]
4th Watershed Management Plan Update Report Goals: Goals to be established in the 3rd Watershed Management Plan Update.				

Notes:

1. For planning purposes, it is assumed that the nitrogen-reducing onsite septic system program achieves 25% of its total estimated reduction in each implementation phase.

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Appendix A	Draft Needs Assessment Report
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Appendix D RMAT Analysis
Appendix E Environmental Justice Screening Form

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List of Commonly Used Acronyms

ACEC	Area of Critical Environmental Concern
ADT	Average Daily Traffic
BMP	Best Management Practice
CCC	Cape Cod Commission
CCNS	Cape Cod National Seashore
CCS	Center for Coastal Studies
CWMP	Comprehensive Watershed Management Plan
CWSRF	Clean Water State Revolving Fund
CZM	Coastal Zone Management
DGA	Designated Geographic Area
EENF	Expanded Environmental Notification Form
EIR	Environmental Impact Report
EJ	Environmental Justice
EOEEA	Executive Office of Energy and Environmental Affairs
FEMA	Federal Emergency Management Agency
GHG	Greenhouse Gas
HPP	Housing Production Plan
IPCC	Intergovernmental Panel on Climate Change
I/A	Innovative and Alternative
I/I	Inflow and Infiltration
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MASSTC	Massachusetts Alternative Septic System Test Center
MCM	Minimum Control Measures
MEPA	Massachusetts Environmental Protection Agency
MEP	Massachusetts Estuaries Project
MHC	Massachusetts Historical Commission
MS4	Municipal Separate Storm Sewer System
NAR	Needs Assessment Report
NEIWPCC	New England Interstate Water Pollution Control Commission
NHESP	Natural Heritage and Endangered Species Program
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NSA	Nitrogen Sensitive Area
OHM	Oil and/or Hazardous Materials
OSHA	Occupational Safety and Health Administration
PGP	Programmatic General Permit
PRB	Permeable Reactive Barrier
PV	Photovoltaic
QAPP	Quality Assurance Project Plan
RMAT	ResilientMass Action Team

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RME	Responsible Management Entity
SEIR	Single Environmental Impact Report
SMAST	School for Marine Science and Technology
SNEP	Southeast New England Program
SWPPP	Stormwater Pollution Prevention Program
TDH	Total Dynamic Head
TMDL	Total Maximum Daily Load
UIC	Underground Injection Control
UMDI	University of Massachusetts Donahue Institute
USEPA	United States Environmental Protection Agency
WPA	Wetlands Protection Act
WWTF	Wastewater Treatment Facility

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1. Introduction

1.1 Project Background and Purpose

The purpose of the Truro Comprehensive Watershed Management Plan (CWMP) Project is to provide an environmentally and economically sound plan for nitrogen management in the Project Planning Area (Planning Area). The Planning Area is defined as the entire Town of Truro, Massachusetts (Town).

In 2001, the Massachusetts Estuaries Project (MEP) was initiated to examine water quality issues in coastal estuaries in Southeastern Massachusetts. The program was created through a partnership between the Massachusetts Department of Environmental Protection (MassDEP), the University of Massachusetts – Dartmouth School of Marine Science and Technology (SMAST), and regional partners including the Cape Cod Commission (CCC) with the purpose of quantifying current nitrogen loads to Southeastern Massachusetts estuaries and to estimate the nitrogen reductions that would be required to support healthy ecosystems.

Although the Town has three watersheds, to date, only Wellfleet Harbor has a complete MEP Report and nitrogen Total Maximum Daily Load (TMDL). The other two watersheds, Pamet River and Provincetown Harbor, do not currently have a MEP Report or an established nitrogen TMDL; however, both have undergone water quality testing that indicates water quality impairments and recommendations for further water quality evaluation.

The CWMP consists of three phases: the Needs Assessment Report (NAR), the Alternatives Analysis, and the Recommended Plan. A Draft NAR was submitted to the Town in July 2024. The NAR evaluated existing conditions, defined a 20-year planning horizon, and estimated current and future wastewater flows and nitrogen loads in eight study areas known to have wastewater management challenges. The NAR estimated nitrogen removal goals for Truro's three watersheds. This Alternatives Screening Analysis Report and Draft Recommended Plan continues the CWMP process by analyzing alternative nitrogen management strategies, screening them for feasibility, evaluating costs and environmental impacts, and ultimately recommending a plan for long-term wastewater and nitrogen management over a 20-year planning period (2027 – 2047).

The Comprehensive Watershed Management Plan specifically focuses on reducing nitrogen loads to Truro's coastal embayments and meeting established nitrogen TMDLs. Other nutrients and contaminants, including phosphorus and contaminants of emerging concern (CECs) such as PFAS and pharmaceuticals, can also degrade water quality and impact ecosystem health. While these stressors are important to monitor and address through broader watershed management, they are not the focus of this analysis. In the future, the Town of Truro may elect to expand water quality monitoring programs, track emerging contaminants, and evaluate additional measures to address non-nitrogen pollutants as part of future watershed planning efforts. Future efforts should include evaluations for Ryder Pond, which has a phosphorous impairment according to the 2022 303(d) list. Future treatment of CECs is outlined in the alternatives assessment.

1.2 Project Area Description

The Town of Truro, Massachusetts is located on Cape Cod and is bordered by the Towns of Provincetown and Wellfleet. The Planning Area for this project is all of Truro within the Town's boundaries and includes the portions of the watersheds within Truro. The NAR identified the wastewater and other nitrogen-related needs within the Planning Area. Truro has three coastal estuary watersheds: Provincetown Harbor, Pamet River, and Wellfleet Harbor. Figure 1-1 provides a map of the Planning Area, delineating the watershed boundaries within Truro.

As stated in Section 1.1, of Truro's three watersheds, currently only Wellfleet Harbor has a nitrogen TMDL. Because nitrogen TMDLs have not yet been set for Provincetown Harbor and Pamet River, the *Cape Cod Commission Watershed Reports for Provincetown Harbor and Pamet River,* both dated October 2017, serve as the current basis for estimating Truro's nitrogen reduction targets in these areas. In the absence of an established TMDL, Cape Cod

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Commission reports are often used to provide planning-level nitrogen reduction targets because they apply methods consistent with the MEP approach to estimate watershed nitrogen loads and identify the reductions likely needed to achieve water quality goals.

1.2.1 Wellfleet Harbor

The Wellfleet Harbor watershed is shared by the Towns of Truro, Wellfleet, and Eastham. Wellfleet Harbor is the only watershed in Truro that currently has an established nitrogen TMDL. The Wellfleet Harbor Cape Cod Commission Watershed Report estimates that Wellfleet contributes 87% of the watershed nitrogen load, Eastham contributes 11%, and Truro contributes the remaining 2%. The sub-watersheds in Wellfleet Harbor are:

- Herring River/The Gut (located in the Towns of Truro and Wellfleet)
- Duck Creek (located completely outside of Truro)
- The Cove (located completely outside of Truro)
- Drummer Cove/Blackfish Creek (located completely outside of Truro)
- Hatches Creek (located completely outside of Truro)
- Wellfleet Harbor (located completely outside of Truro)
- Loagy Bay (located completely outside of Truro)

As indicated above, only the Herring River / The Gut sub-watershed is within Truro. A majority of Truro's portion of the watershed is located within the Cape Cod National Seashore (CCNS). The CCNS, managed by the National Park Service, protects sensitive coastal habitats while allowing limited residential and recreational use. Approximately 93% of Truro's portion of Wellfleet Harbor is within the CCNS boundary. The Wellfleet Harbor TMDL Report provides a breakdown of nitrogen thresholds on a sub-watershed level; Truro will need to implement nitrogen-management measures in its portion of Herring River/The Gut to meet the Town's portion of the removal goal.

1.2.2 Provincetown Harbor: East Harbor

The Provincetown Harbor watershed is a coastal estuary shared by Truro and Provincetown. The Provincetown Harbor Cape Cod Commission Watershed Report estimates that Provincetown contributes 93% of the watershed nitrogen load and Truro contributes the remaining 7% of Provincetown Harbor's nitrogen load. Approximately 85% of Truro's land area within the watershed is within the CCNS boundary.

While a nitrogen TMDL has not yet been established for the Provincetown Harbor Watershed, a Water Quality Monitoring Program (2007 – 2009), supported by the 604(b) grant indicated fair to poor water quality in East Harbor (within the Provincetown Harbor watershed). The findings indicated that the poor water quality in East Harbor is likely impacting the health of the estuarine habitat and the report recommended that the Towns of Truro and Provincetown would benefit from a detailed assessment of the levels of habitat impairment and the development of nutrient related thresholds for the embayment. The same study indicated moderate to high to moderate water quality in Provincetown Harbor and recommended that MEP analysis is warranted for the East Harbor Lagoon Estuary.

Additionally, the 'Integrated Water Resources Management Plan (IWRMP), Phase I and Phase II' reports, prepared by Weston & Sampson and dated October 2014 evaluated nutrient loading impacts to Truro's groundwater and surface water resources. The findings of the Phase I report indicate that the following locations within Provincetown Harbor require future efforts to address issues:

Beach Point: The primary concern identified in the Beach Point area is wastewater management options. Beach Point is a primarily commercial zone that sees a significant influx of summer visitors, creating significant increases in nitrogen loads. The IWRMP indicated that groundwater flow from Beach Point is carried to East Harbor.

East Harbor Lagoon (also referred to as Pilgrim Lake): East Harbor Lagoon is a significant water body situated just north and west of Moon Pond. East Harbor Lagoon has seen significant algal blooms, odor problems, and increasing eutrophication over the last two decades, which are attributed to increased nutrient loading from stormwater sources and wastewater inputs. According to Massachusetts Department of Transportation (MassDOT) records, the majority of

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stormwater drainage from Route 6 drains directly to East Harbor. Route 6 makes up a majority of the impervious surface that drains to East Harbor.

Because the findings of the various water quality monitoring and sampling programs in the Provincetown Harbor watershed indicate that the vulnerable portion of the watershed is East Harbor, this report will focus on addressing nutrient loading in the East Harbor Estuary. Although the CCC Provincetown Harbor Watershed Report does not include a subwatershed delineation of East Harbor, it is assumed that a majority of Truro's portion of land area in the Provincetown Harbor watershed, which includes Beach Point and Pilgrim Heights, drains into East Harbor. For the purposes of this report, this area (Truro's portion of the Provincetown Harbor watershed) will be referred to as East Harbor.

1.2.3 Pamet River

The Pamet River watershed is located entirely in the Town of Truro. The Pamet River Cape Cod Commission Report provides an estimate of the estuary's nitrogen load. Approximately 51% of the land area in the Pamet River watershed is within the CCNS boundary. The Pamet River is divided into two distinct hydrological sections: the upper Pamet River (upstream of the clapper valve installed west of Route 6) and the lower Pamet River (downstream of the clapper valve). The upper Pamet River is freshwater, while the lower Pamet River is a salt marsh estuary. During significant Atlantic Ocean storms in the late 1900s, Ballston Beach, located on the eastern coast of Truro, had been over-washed. A 1992 storm resulted in the Upper Pamet River valley being flooded with four feet of saltwater.[1] To this day, during storm events, Ballston Beach still floods the upper Pamet River Valley.

The Little Pamet River, located to the north of the main Pamet River system, is not included in the Cape Cod Commission watershed delineation and therefore was not part of the loading analysis. However, as shown in the Scientific Investigations Map I-2857, the U.S. Geological Survey (USGS) delineates the recharge area of the Little Pamet River, suggesting that it may contribute flow to the larger Pamet River system (Figure 1-2). When additional data becomes available and an MEP report is developed, the Little Pamet River should be considered and incorporated into Truro's nitrogen management planning. As discussed in further sections of this report, it is recommended that next steps include watershed delineations and water quality monitoring of the Little Pamet River.

While a nitrogen TMDL has not yet been established for the Pamet River Watershed, a Water Quality Monitoring Program (2007 – 2009), supported by the 604(b) grant indicated poor to moderate water quality in the Pamet River. The findings indicated that the poor water quality in Pamet River is likely impacting the health of the estuarine habitat and the report recommended that the Town of Truro would benefit from a detailed assessment of the levels of habitat impairment and the development of nutrient related thresholds for the watershed.

1.3 Planned Review Process

An environmental review process by the Executive Office of Energy and Environmental Affairs (EOEEA) will be initiated for this project through the Massachusetts Environmental Policy Act (MEPA) process. All of the documents prepared under the MEPA process will be submitted to the MassDEP, MEPA, and other interested parties for review and comment.

1.4 Public Participation and Outreach

The Town of Truro actively participates in public awareness outreach efforts on water quality issues. Public presentations were given at the following Town of Truro meetings:

– July 18th, 2023, Board of Health Meeting
– September 25th, 2025, Joint Select Board and Board of Health Meeting

[1] Eichner, E., Cambareri, T., Livingston, K., Sobzak, B., & Smith, B. (1997) *Pamet River Investigation Groundwater Assessment Study, Truro Massachusetts*. Cape Cod Commission Water Resources Office. Retrieved October 20, 2025, from https://www.truro-ma.gov/DocumentCenter/View/627/1997-Pamet-River-Investigation-GW-Assessment-Study-PDF

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– October 14th, 2025, Board of Health Meeting
– November 18th, 2025, Board of Health Meeting

Additionally, the Town's Board of Health issues a monthly Water Resources Report; the report covers wastewater and drinking water and is reviewed at the second monthly meeting each month.

Meeting documents (including monthly Water Resources Reports) can be found on the Town's Board of Health webpage: **Board of Health | Truro, MA**.

The Public Participation and Outreach Program includes both in-person and remote public meetings scheduled during varying times to provide multiple opportunities for interested parties to participate in scheduled meetings.

Advance notice of the MEPA filing for the Expanded Environmental Notification Form (EENF) with a request for a Single Environmental Impact Report (SEIR) will be provided to the Environmental Justice (EJ) Distribution List developed by MEPA. EJ populations will be provided with advance notice for all MEPA filings associated with the Truro CWMP.

1.5 References

This section provides documentation of the sources referenced in this report. References include materials provided to the project team that directly informed the findings, technical and reference materials used for background information, and previous reports developed by GHD that support the methodologies and analyses presented in this Alternatives Screening Analysis and Draft Recommended Plan. An abbreviated name for each reference is provided in parenthesis and is used consistently to refer to that source throughout the body of this report.

1.5.1 Summary of Prior Reports and Reference Resources

– *'Pamet River Investigation Groundwater Assessment Study, Truro Massachusetts'*, prepared by Eichner, Cambareri, Livingston, Sobczak and Smith for the Cape Cod Commission Water Resources Office and dated 1997 (short title: Pamet River Investigation)
– *'Source Water Assessment and Protection (SWAP) Report for Provincetown Water Department'*, prepared by the Massachusetts Department of Environmental Protection and dated April 2004 (short title: SWAP Report)
– 'Ground-Water Recharge Areas and Traveltimes to Pumped Wells, Ponds, Streams, and Coastal Water Bodies, Cape Cod, Massachusetts (Scientific Investigations Map I-2857), prepared by D. Walter, J. Masterson, and K. Hess of the US Geological Survey and dated 2004 (short title: USGS Scientific Investigations Map I-2857)
– *'Massachusetts Stormwater Handbook, Volumes 1–3'*, prepared by the Massachusetts Department of Environmental Protection and dated 2008 (updated 2016) (short title: Massachusetts Stormwater Handbook)
– *'Summary of Water Quality Monitoring Program for the Provincetown Harbor, East Harbor Lagoon, Pamet Harbor and Hatches Harbor Embayment Systems (2007–2009) Final'*, prepared by the Coastal Systems Laboratory School of Marine Science and Technology (University of Massachusetts Dartmouth) and dated September 2010 (short title: Water Quality Monitoring Program 2007–2009)
– *'Provincetown 604(b) Water Quality Report'*, prepared by the Massachusetts Department of Environmental Protection and dated 2010 (short title: Provincetown 604b Report)
– *'Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod; Guidance to Cape Cod Towns Undertaking Comprehensive Wastewater Management Planning'*, prepared by the Barnstable County Wastewater Task Force and updated by AECOM, dated April 2010 and updated April 2014 (short title: Cape Cod Wastewater System Costs Report)
– *'Truro Integrated Water Resources Management Plan, Phase I'*, prepared by Weston & Sampson and dated October 2014 (short title: IWRMP Phase I)
– *'Cape Cod Area Wide Water Quality Management Plan Update (208 Plan)'*, prepared by the Cape Cod Commission and dated June 2015 (short title: Cape Cod 208 Plan Update)

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- *'Community Housing Needs Assessment'*, prepared for the Truro Housing Authority by Development Cycles and dated September 2015 (short title: 2015 Community Housing Needs Assessment)
- '*TR-16 Guides for the Design of Wastewater Treatment Works'*, prepared by the New England Interstate Water Pollution Control Commission, revised 2016 (short title: TR-16)
- *'Massachusetts Estuaries Project Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Wellfleet Harbor Embayment System'*, prepared by the University of Massachusetts Dartmouth School of Marine Science and Technology and the Massachusetts DEP and dated March 2017 (short title: Wellfleet Harbor MEP Report)
- *'Watershed Report: Outer Cape Pamet River'*, prepared by the Cape Cod Commission and dated October 2017 (short title: Pamet River Watershed Report)
- *'Watershed Report: Outer Cape Provincetown Harbor'*, prepared by the Cape Cod Commission and dated October 2017 (short title: Provincetown Harbor Watershed Report)
- *'Watershed Report: Outer Cape Wellfleet Harbor'*, prepared by the Cape Cod Commission and dated October 2017 (short title: Wellfleet Harbor Watershed Report)
- *'Cape Cod Area Wide Water Quality Management Plan Update – 2017 Implementation Report'*, prepared by the Cape Cod Commission and dated n.d. (short title: 208 Plan Implementation Report)
- *'Truro Integrated Water Resources Management Plan Phase II Report for the Water Resources Oversite Committee'*, prepared by Weston & Sampson and dated February 2018 (short title: IWRMP Phase II)
- *'Massachusetts Water Conservation Standards'*, prepared by the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs and the Water Resources Commission and dated July 2018 (short title: Massachusetts Water Conservation Standards)
- *'Increasing Coastal Resiliency Through Intermunicipal Shoreline Management. Phase 1 Final Report Prepared for the Towns of Eastham, Wellfleet, Truro and Provincetown. Tech Rep: 20-CL-04'*, prepared by the Coastal Processes and Ecosystems Lab at the Center for Coastal Studies Provincetown Massachusetts and dated 2020 (short title: Coastal Resiliency IMA Phase 1)
- *'2021 Climate Action Plan Cape Cod'*, prepared by the Cape Cod Commission and dated July 2021 (short title: Climate Action Plan)
- *'Truro Conservation Regulations'*, prepared by the Town of Truro Health and Conservation Department and revised October 2021
- *'Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation: 2 Sand Pit Road and 9 Noons Drive, Truro, Massachusetts'*, prepared by Horsley Witten Group, Inc. and dated May 2023
- *'Final Massachusetts Integrated List of Waters for the Clean Water Act 2022 Reporting Cycle'*, prepared by the Massachusetts Executive Office of Energy and Environmental Affairs, Department of Environmental Protection, and Bureau of Water Resources and dated May 2023
- *'Groundwater Protection Priorities for the Walsh Property Master Plan to Sustain Long Term Drinking Water Availability and Quality'*, prepared by Thomas Cambareri, Sole Source Consulting and dated June 2023 (short title: Walsh Property Groundwater Protection Report)
- *'314 CMR 21.00 Watershed Permit Regulations'*, prepared by the Massachusetts Department of Environmental Protection and dated July 2023 (short title: Watershed Permit Regulations)
- *'Final Wellfleet Harbor Embayment System Total Maximum Daily Load for Total Nitrogen'*, prepared by the Commonwealth of Massachusetts Office of Energy and Environmental Affairs, Massachusetts DEP, and Bureau of Water Resources, and dated August 2023 (short title: Wellfleet Harbor TMDL Report)
- *'Town of Truro Local Comprehensive Plan'*, prepared by the Truro Local Comprehensive Plan Committee and dated October 2023 (short title: 2023 Truro Local Comprehensive Plan)
- *'2023 Annual Drinking Water Quality Report for the Provincetown Water Department'*, prepared by the Provincetown Water Department and dated 2023 (short title: 2023 Drinking Water Quality Report)

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- *'2023 New York State Greenhouse Gas Emissions Report: Waste Sector'*, prepared by the New York State Department of Environmental Conservation and dated December 2023 (short title: NYS Waste GHG Emissions Report)
- Truro Barn Inspection Data, prepared by the Truro Board of Health and dated 2023 (short title: Truro Barn Inspection Data)
- *'Reducing Wastewater Nitrogen Loading by > 90% with Carbon-Amended Septic Systems: A Field Demonstration in Barnstable (Cape Cod), Massachusetts'*, prepared by U.S. Environmental Protection Agency, Office of Research and Development; Massachusetts Alternative Septic System Test Center; U.S. Geological Survey, New England Water Science Center; Barnstable Clean Water Coalition; and Horsley Consulting and dated 2024 (short title: Shubael Pond Nitrogen-Reducing Septic System Study)
- *'University of Massachusetts Donohue Institute (UMDI) Massachusetts Population Projections'*, prepared by UMDI and updated 2024 (short title: UMDI Massachusetts Population Projections)
- *'Notice of Intent (NOI) to Apply for a Watershed Permit for Wellfleet Harbor Watershed'*, prepared by GHD and dated July 2024 (short title: NOI for Wellfleet Harbor)
- *'Truro Request to serve Walsh Property – Staff Recommendations for advancing request'*, prepared by Cody J. Salisbury, Water Superintendent of Provincetown and dated February 2025
- *'Cape Cod Commission Housing Profile: Truro'*, prepared by the Cape Cod Commission and dated April 2025 (short title: Truro Housing Profile)
- *'Truro Board of Health Regulations'*, prepared by the Town of Truro Board of Health and revised May 2025
- *'Town of Truro Housing Needs Assessment and Production Plan'*, prepared by JM Goldson LLC and dated June 2025 (short title: 2025 HPP)
- *'Cape Cod Towns Guide to Undertaking Comprehensive Wastewater Management Planning'*, prepared by the Cape Cod Commission and dated n.d. (short title: CCC Guide to Wastewater Management)
- *'Centers for Disease Control and Prevention – Harmful Algal Blooms: Contributing Factors and Impacts'*, prepared by the Centers for Disease Control and Prevention and dated n.d. (short title: CDC HAB Contributing Factors)

1.5.2 Previous Reports Prepared by GHD

- 'Draft Needs Assessment Report (NAR)', prepared by GHD and dated July 2024 (short title: Draft NAR)
- 'Draft Beach Point Wastewater Treatment Alternatives Technical Memorandum', prepared by GHD and dated July 2024 (short title: Draft Beach Point Memorandum)
- 'Draft Noons Property Evaluation Memorandum', prepared by GHD and dated May 2024 (short title: Noons Property Evaluation)

2. Summary of NAR Analyses

The *Draft Needs Assessment Report (NAR), prepared by GHD and dated July 2024*, utilized existing information and estimates of future land use, population projections, and water usage data to project future wastewater flows and nitrogen loadings for the planning period.

2.1 Current Water Quality Conditions

Current water quality conditions highlight the need for nitrogen management and strategic environmental planning within the Town of Truro. Both groundwater and surface water systems play a crucial role in determining overall water quality, as they interact and influence each other within the local watersheds. Concerns about groundwater contamination (i.e., nitrate concentrations in private wells) and surface water issues (i.e., nitrogen loading in coastal

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estuaries) highlight the need for a comprehensive approach to Truro's water quality assessment. Further information on existing water quality conditions can be found in Section 2.4 and Section 5 of the Draft NAR, which utilized existing data and projections for future land use, population, and water usage to estimate future wastewater flows, nitrogen loadings, and nitrogen reduction goals.

The Truro Health & Conservation Departments maintain a database of water quality data including nitrate concentration data from private wells. The water quality data is limited, as private well water quality sampling is typically only required prior to the sale of a property, submission of building permits and septic permits, or for a rental registration. Figure 2-1 shows areas of documented nitrate-nitrogen concentrations over 5 mg/L (based on available Town data).

Wellfleet Harbor has an established nitrogen TMDL. The TMDL quantifies the maximum nitrogen load (nitrogen threshold) that an estuary can receive while still maintaining water quality goals. The data from the Wellfleet Harbor TMDL Report was used to establish nitrogen management goals for this watershed.

Initial water quality evaluations by SMAST (as summarized in section 2.4 of the NAR, Appendix A), indicate signs of eutrophication in East Harbor and Pamet River. Documented impacts of excessive nitrogen inputs into coastal estuaries include aesthetic degradation from excessive algae blooms, disruption to benthic communities (animals living in the coastal pond sediments), and loss of native eelgrass beds.

The Center for Coastal Studies (CCS) is conducting an ongoing water quality monitoring program in Cape Cod Bay. A key component of the CCS program is tracking nitrogen loading, including sewage nitrogen. CCS uses monitoring sites to collect water samples and track environmental conditions. Many CCS monitoring sites are identified by the Massachusetts Estuaries Project (MEP) as sentinel stations. Sentinel stations are used by the MEP to determine nitrogen thresholds for an estuary. The MEP often identifies a key sentinel station which is used as the representative location where nutrient and water quality measurements are closely monitored.

As discussed with MassDEP in 2024, the Cape Cod Commission (CCC) 208 Plan recommends that nitrogen-impaired watersheds without MEP reports or TMDLs use an initial nitrogen management planning allowance of 25% to estimate nitrogen reduction goals. The CCC planning allowance was used to establish an initial nitrogen management goal for Pamet River and East Harbor. This initial planning allowance will need to be refined as scientific evaluations progress for both watersheds.

2.2 Estimated Watershed Nitrogen Sources

The MEP and TMDL reports estimate current nitrogen sources within a watershed. The following table summarizes the current (at the time of the MEP project) sources of nitrogen to the Herring River subembayment in the Wellfleet Harbor watershed (the only subembayment in the watershed that is within Truro), as presented in Figure IV-3b of the Wellfleet Harbor MEP Report.

Table 2.1 Wellfleet Harbor System Sources of Nitrogen Loads, by Percent

Nitrogen Source	Percent of Nitrogen Load[1]
Wastewater[2]	82%
Fertilizers	8%
Stormwater[3]	8%
Other[4]	2%

Notes:
1. Source: Wellfleet Harbor TMDL Report. Includes controllable sources.
2. Includes (unattenuated) nitrogen loads from septic systems and wastewater treatment facilities.
3. Also referred to as "Impervious Surfaces" in the TMDL Reports.
4. Includes (unattenuated) nitrogen loads from landfills and farm animals.

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The Cape Cod Commission watershed reports were used for the quantification of nitrogen sources for the watersheds without an MEP Report. The East Harbor and Pamet River nitrogen sources are summarized in Tables 2.2 and 2.3.

Table 2.2 East Harbor System Sources of Nitrogen Loads, by Percent

Nitrogen Source	Percent of Nitrogen Load[1]
Wastewater[2]	72%
Fertilizer[3]	7%
Stormwater	18%
Other[4]	3%
Notes: 1. Source: Cape Cod Commission Provincetown Harbor Watershed Report. 2. Includes (unattenuated) nitrogen loads from septic systems and wastewater treatment facilities. 3. Includes (unattenuated) nitrogen loads from lawns, cranberry bogs, and golf courses. 4. Includes (Unattenuated) nitrogen loads from landfills and atmospheric deposition to vacant land.	

Table 2.3 Pamet River System Source of Nitrogen Loads, by Percent

Nitrogen Source	Percent of Nitrogen Load[1]
Wastewater[2]	68%
Fertilizer[3]	6%
Stormwater	16%
Other[4]	10%
Notes: 1. Source: Cape Cod Commission Pamet River Watershed Report. 2. Includes (unattenuated) nitrogen loads from septic systems and wastewater treatment facilities. 3. Includes (unattenuated) nitrogen loads from lawns, cranberry bogs, and golf courses. 4. Includes nitrogen loads from landfills and atmospheric deposition to vacant land.	

The nitrogen load contribution sources presented in the tables above are based on the MEP, TMDL, and the CCC Watershed Reports. For planning purposes, a tiered approach is applied: if a TMDL exists for a watershed, it is used as the primary basis of the nitrogen management plan; if no TMDL is available, the MEP report is used, and if neither a TMDL nor an MEP report is available, the Cape Cod Commission Watershed Reports are used for planning-level nitrogen load estimates.

Cape Cod Commission Watershed Reports provide initial estimates for nitrogen reduction. The Town has identified agricultural operations as another potential source of nitrogen in the Truro. An initial analysis was conducted to evaluate potential agricultural loads. Farms in Truro were identified based on three data sets:

– Land use codes
– Truro Board of Health Barn Inspection Data (2023)
– IWRMP Phase I, Agricultural Lots and Parcels with Potential Large Home Gardens

Based on the agricultural operations in the Town, the use type and number of animals was quantified to estimate the associated animal and crop nitrogen loads. The following table summarizes the estimated percentage of the watersheds' total nitrogen loads that may be attributed to agricultural operations.

Table 2.4 Estimated Agricultural Operations Nitrogen Load

Watershed	Estimated Percent of Controllable Load Attributed to Agricultural Operations
Wellfleet Harbor	13%

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Watershed	Estimated Percent of Controllable Load Attributed to Agricultural Operations
East Harbor	Negligible
Pamet River	8%

While the above presented agricultural load estimates were not incorporated into the watershed nitrogen estimates—because the analyses relied on established loads from MEP, TMDL, and CCC—they provide a useful reference for future planning and for targeting high nitrogen-producing operations. The Wellfleet Harbor MEP Report and TMDL includes an estimated farm animals nitrogen load. While the CCC Watershed Reports for Pamet River and Provincetown Harbor do not explicitly break down farm animal loads, these loads may be carried with the fertilizer and/or stormwater loads. It is recommended that future evaluations are performed to refine the estimated nitrogen load contributions from agricultural operations.

2.3 Growth Projections

Under an agreement with the Massachusetts Secretary of the Commonwealth, the University of Massachusetts Donahue Institute (UMDI) has produced population projections for all Massachusetts municipalities at five-year intervals through the year 2050. UMDI projections are estimated based on trends in fertility, mortality, and net migration. The UMDI periodically updates predictions based on updated census data. UMDI projections obtained in 2024 during the development of the Needs Assessment Report (NAR) predicted a steep population decline in Truro, indicating an estimated 1,254 residents by 2050. However, more recent projections indicate a slower rate of decline. UMDI projections obtained in October 2025 estimate Truro's 2050 population to be 2,318. The 2025 HPP quoted a UMDI population projection of 1,269 in Truro by 2040. As demonstrated by the frequently changing population predictions, the 2023 Truro Local Comprehensive Plan stated that *'there are conflicting reports on population trends, including from reputable organizations such as CCC and Housing Assistance Corporation (HAC).'*

Population projections from UMDI acquired in October 2025 for the Town indicate a slight decline in population through 2050, decreasing by approximately 6% from 2,454 in 2020 to 2,318 in 2050. The projections are included in Table 2.5 below.[2]

Table 2.5 Truro Historic Population and Population Projections

Year	Population, US Census and UMDI[1]
1970	1,234
1980	1,486
1990	1,573
2000	2,087
2010	2,003
2020	2,454
2030	2,588
2040	2,490
2050	2,318

Notes:
1. Population data from 1970 – 2020 is from the US Census. Population projections from 2030 – 2050 are from UMDI and were obtained in October 2025.

During the development of this Alternatives Screening Analysis Report and Draft Recommended Plan, the Town of Truro adopted an updated Housing Needs Assessment and Production Plan (2025 HPP). The 2025 HPP states a

[2] UMDI Massachusetts Population Projections were retrieved July 2024 from: https://donahue.umass.edu/business-groups/economic-public-policy-research/massachusetts-population-estimates-program/population-projections

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housing goal of 260 new units by 2035. The Action Plan outlined in the 2025 HPP specifically mentions progress towards the Walsh Property, Cloverleaf Property, and 181 Route 6 developments. Table 2.6 outlines the anticipated developments discussed in the 2025 HPP.

Table 2.6 Summary of Housing Developments Outlined in 2025 Truro Housing Production Plan

Development Location	Number of Units[1]
Walsh Property (Walsh Way)	160[1]
Clover Leaf (22 Highland Road)	39[2]
181 Route 6	3[2]
Location TBD	58[3]
Total	**260[4]**

Notes:
1. Number of units for the Walsh Property is from the February 2025 Memorandum from Cody J. Salisbury, Provincetown's superintendent.
2. Number of units for the Clover Leaf Property and 181 Route 6 is from the 2025 Truro Housing Needs Assessment and Production Plan.
3. Value was calculated by subtracting the number of units proposed in the Walsh Property, Clover Leaf, and 181 Route 6, from the total units needed (260, as outlined in the 2025 HPP).
4. Source: 2025 HPP

While the plan outlines units through 2035, for the purpose of this assessment, the same goal is being carried for the duration of the planning period (development of 260 new housing units over a 20-year planning period). This approach, based on anticipated new housing units, was used to conservatively account for an increase in population, whereas UMDI projections (which share a similar planning horizon) indicate a decrease in population. Given the rapidly changing and inconsistent population projections in Truro, the progress of housing developments and updates in census data and population projections should be evaluated during design.

2.4 Summary of Watershed Nitrogen Loads

The following table provides a summary of Truro's current (at the time of the MEP, TMDL, and CCC Watershed Reports) and future (2047) nitrogen loads by watershed.

Table 2.7 Estimated Current and Future Watershed Nitrogen Loads

Watershed	Current Total Watershed Nitrogen Load (kg-N/yr)[1,2]	Watershed Threshold Load (kg-N/yr)	Truro's Portion: Current Watershed Nitrogen Load (kg-N/yr)[3,4]	Truro's Portion: Future (2047) Watershed Nitrogen Load (kg-N/yr)[3,4,5]	Truro's Portion: Watershed Threshold Load (kg-N/yr)
Wellfleet Harbor: Herring River / The Gut	10,118	9,902	4,249	4,249	4,159
East Harbor	16,544	4,136	1,158	1,186	869
Pamet River	4,502	3,377	4,502	4,518	3,377
Total	31,164	17,415	9,909	9,953	8,405

Notes:
1. Wellfleet Harbor current nitrogen load is from the Wellfleet Harbor TMDL Report.
2. East Harbor and Pamet River current nitrogen load is from the CCC Provincetown Harbor Watershed Report and the CCC Pamet River Watershed Report, respectively.
3. Truro's portion of the watershed load in Wellfleet Harbor was estimated based on land area.

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Watershed	Current Total Watershed Nitrogen Load (kg-N/yr)[1,2]	Watershed Threshold Load (kg-N/yr)	Truro's Portion: Current Watershed Nitrogen Load (kg-N/yr)[3,4]	Truro's Portion: Future (2047) Watershed Nitrogen Load (kg-N/yr)[3,4,5]	Truro's Portion: Watershed Threshold Load (kg-N/yr)

4. Truro's portion of the watershed load for East Harbor and Pamet River was calculated using the percent of the load in Truro according to the respective CCC Watershed Report.
5. Future septic nitrogen loads were estimated using the housing developments outlined in the 2025 HPP.

3. Estimate of Load Reduction to Meet Nitrogen Reduction Goals

Estimated nitrogen reduction goals for Truro's three watersheds, which were determined as part of the NAR, were established using one of two methodologies:

– MEP Report / Nitrogen TMDL Methodology
– A Cape Cod Commission 208 Plan Methodology

The MEP Report methodology is used to quantify the reduction goal for Wellfleet Harbor. The reduction ratio from the MEP report was used and applied to the portion of Wellfleet Harbor estimated to be within the Town of Truro.

The Cape Cod Commission 208 Plan interim planning allowance methodology is for coastal estuaries that require nitrogen reduction to restore water quality but have not yet completed the scientific evaluations to establish a nitrogen TMDL. The CCC 208 plan assumes a 25% reduction in existing nitrogen as an interim target reduction goal; this methodology was applied for the Pamet River and East Harbor watersheds as they have not yet completed the scientific evaluations to establish a nitrogen reduction threshold.

Estimated current and future nitrogen reduction goals are summarized in the following table.

Table 3.1 Watershed Current and Future Nitrogen Reduction Goals

Watershed	Current Nitrogen Reduction Goal (kg-N/yr)	Future Nitrogen Reduction Goal[4] (kg-N/yr)
Wellfleet Harbor Watershed[1]	90	90
East Harbor[2]	289	317
Pamet River Watershed[3]	1,125	1,141
Total	**1,504**	**1,548**

Notes:

1. Nitrogen reduction goal is based on Truro's contribution to the Wellfleet Harbor Watershed, in accordance with the MEP reduction goal and methodology. Loads for Wellfleet Harbor are attenuated, in accordance with MEP reports. Attenuation in Wellfleet Harbor is minor.
2. Nitrogen reduction goal is 25% of Truro's load within the Provincetown Harbor watershed. Truro accounts for 7% of the Provincetown Harbor watershed load according to CCC. Loads for East Harbor are unattenuated, as presented in the CCC Provincetown Harbor Watershed Report.
3. Nitrogen reduction goal is 25% of the watershed load. Loads for Pamet River are unattenuated, as presented in the CCC Pamet River Watershed Report.
4. Future reduction goals are estimated through the planning period (2047) using the established threshold loads and estimated future loads (which are based on the housing production plan).
5. For reference, an average single-family home with a Title 5 septic system is estimated to discharge approximately 4.7 kg-N/yr. (Source: Wellfleet Harbor MEP Report).

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4. Nitrogen Reduction Strategies Alternatives Analysis

4.1 Introduction

The MassDEP Watershed Permit Regulations, established under 314 CMR 21, provide a framework for managing nitrogen within coastal watersheds. Recent (July 2023) updates to the regulations require communities within nitrogen-impaired watersheds to either obtain a 20-year Watershed Permit that demonstrates progress towards meeting nitrogen reduction goals or convert all existing onsite Title 5 systems to Best Available Nitrogen Reducing Technology within five years. If a community within a Nitrogen Sensitive Area (NSA) elects to convert all systems to nitrogen-reducing systems, it must still demonstrate that the nitrogen threshold is met. If the threshold is not met, the community will be required to obtain a Watershed Permit and implement additional nitrogen management strategies. The Watershed Permit approach allows for more flexibility through a combination of nitrogen-reducing technologies to achieve the required nitrogen load reductions. The Watershed Permit regulations state that either at least 75% of the Necessary Nitrogen Load Reduction must be achieved within 20 years (or the first permit cycle), or the permit may include an alternative implementation schedule approved by MassDEP. This allows communities to meet the required reduction through multiple Watershed Permit cycles.

An Alternatives Screening Analysis was conducted and is summarized in this report. The purpose of the Alternatives Screening Analysis is to evaluate different combinations of nitrogen management strategies to meet the Town's nitrogen reduction goals in each of the three watersheds over the 20-year planning period. The alternatives analysis evaluated both conventional and alternative nitrogen management strategies.

The MassDEP Watershed Permit Regulations (314 CMR 21) define conventional control technologies as *'a combination of physical, chemical, and biological processes that provide primary, secondary, or tertiary treatment and have been proven to be consistently effective for treating wastewater or sewage to remove suspended solids, dissolved solids, biological decomposition of organic matter, pathogens, and nutrients from wastewater. Examples of Conventional Control Technology include but are not limited to sewage treatment plans and enhanced nutrient removal alternative septic systems that the Department accepts as conventional.*'

Those same regulations define alternative control technologies as *'a technology or approach that is not a conventional control approach or technology but can be effectively used to remove pollutants from a waterbody or prevent or reduce the introduction of pollutants into a waterbody.'*

Per 314 CMR 21, if a recommended plan includes Alternative Control Approaches and Technologies, a contingency plan that consists only of Conventional Control Technologies must be provided. This allows Town's to implement promising pilot technologies while also having a back-up plan in the event that alternative approaches do not function as predicted. For these reasons, both conventional and alternative technologies were evaluated as part of the alternatives analysis.

Adaptive management is a key component of the Watershed Permit, allowing the Town to implement Alternative Control Approaches, monitor performance over time, and adjust strategies as needed. Pilot strategies will be closely monitored for performance to confirm if nitrogen reduction targets are being met as intended. This approach provides flexibility to scale up successful alternatives while addressing any unforeseen challenges.

The conventional strategies evaluated in the alternatives screening analysis include General Use nitrogen-reducing onsite septic systems, cluster wastewater treatment systems, and centralized wastewater management strategies. The alternative strategies evaluated include Provisional Use nitrogen-reducing onsite septic systems, fertilizer management, stormwater best management practices, permeable reactive barriers, shellfish aquaculture, waste reducing toilets, and inlet/culvert widening. Sections 4.2 and 4.3 provide technology descriptions for each of the above-mentioned technologies and evaluate the technologies for use in Truro.

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4.2 Conventional Control Technologies

4.2.1 General Use Nitrogen-Reducing Onsite Septic Systems

4.2.1.1 Technology Description

Nitrogen-reducing onsite septic systems are typically evaluated in low-density areas where centralized wastewater treatment through sewering is not cost-effective. MassDEP uses four categories of approval for Innovative/Alternative (I/A) septic-system technologies. The term "I/A system" is used to define systems that differ from the conventional Title 5 system by using new technologies or configurations; many, but not all, I/A systems are nitrogen-reducing. Currently, MassDEP only considers nitrogen-reducing onsite septic systems with a General Use approval as a conventional technology for nitrogen management. The MassDEP Title 5 Regulations definition for each category of approval is outlined below:

- ***General Use*** *systems will provide a level of environmental protection at least equivalent to that of a conventional onsite system designed in accordance with Title 5.*
- ***Piloting*** *is intended to provide field testing and technical demonstrations to determine if the technology can or cannot function effectively.*
- ***Provisional Use*** *approval is intended for evaluation of alternative systems that appear technically capable of providing levels of protection at least equivalent to those of a standard onsite disposal system.*
- ***Remedial Use*** *systems improve existing conditions at a particular facility or facilities served by a failed, failing, or non-conforming system.*

4.2.1.2 Alternatives Analysis

The MEP Report for Wellfleet Harbor and the CCC Watershed Reports for Provincetown Harbor and Pamet River have demonstrated that conventional Title 5 systems are the largest controllable source of nitrogen to Truro's watersheds. The MEP and CCC assumes an average effluent total nitrogen concentration from a conventional Title 5 septic system of 26.25 mg/L.

To date, the lowest approved total nitrogen effluent concentration for a MassDEP General Use Innovative/Alternative (I/A) system is 19 mg/L. MassDEP maintains a list of Best Available Nitrogen Reducing Technologies, which can be accessed at the following link: https://www.mass.gov/info-details/approved-title-5-innovativealternative-technologies#best-available-nitrogen-reducing-technologies-

When implementing an onsite nitrogen-reducing I/A system program, certain site-specific vulnerabilities should be considered to ensure system effectiveness and protection of public and environmental health. Properties located in Velocity (VE) zones or within FEMA flood plains may be at risk of inundation, which can compromise system operation and effluent quality. High groundwater levels can reduce leach field performance and increase the potential for nitrogen migration to groundwater and surface waters. Other factors that may affect system performance include soil permeability, steep slopes, and proximity to sensitive environmental receptors such as wetlands or coastal estuaries. These vulnerabilities should be assessed during system siting and design to optimize nitrogen removal and reduce environmental risks. Systems should be designed and installed in accordance with MassDEP regulations and Truro Board of Health requirements to minimize environmental and public health risks.

The Truro CWMP is considering General Use nitrogen-reducing onsite septic systems for the contingency compliance approach in the Pamet River and Wellfleet Harbor watersheds.

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4.2.2 Cluster Wastewater Treatment Systems

4.2.2.1 Technology Description

Cluster wastewater treatment systems serve multiple properties within a defined area, typically ranging from a few households up to small communities or neighborhoods, without the need for a fully centralized municipal sewer. These systems collect wastewater from several individual sources and convey it, via a small-diameter collection network, to a shared treatment facility. Treatment processes can be similar to those used in larger centralized wastewater treatment plants—including primary, secondary, and sometimes tertiary treatment—but are appropriately scaled to fit the anticipated flow and site-specific requirements.

Cluster systems can incorporate advanced technologies to treat wastewater for nitrogen. Treated effluent can be discharged using a variety of methods depending on site conditions and environmental constraints. Groundwater discharge methods may include subsurface options such as leaching systems, drip dispersals, and wick wells, or surface discharge options such as sand beds, in compliance with regulatory standards. Cluster systems have the potential to be more cost-effective than individual nitrogen-reducing onsite systems in low density areas. The flexibility of cluster systems offers opportunities to phase in wastewater management improvements, tailor treatment to local conditions, and protect water quality with less disruption to existing infrastructure than large-scale centralized solutions.

4.2.2.2 Alternatives Analysis

Cluster systems are considered for areas in Truro with moderate residential density where individual connections to a centralized sewer system may be unfeasible or economically inefficient. Cluster systems enable the collective management of wastewater from multiple homes or businesses, allowing for shared investment in both infrastructure and ongoing maintenance. This approach frequently reduces per-household expenses relative to individual onsite solutions. Additionally, cluster systems (with advanced treatment) are capable of achieving effluent nitrogen concentrations below 3 mg/L and can be engineered to address other contaminants, including phosphorus and CECs.

Cluster wastewater treatment systems are considered and feasible in areas where there is a suitable parcel available for treatment and recharge. Ideally, this would be a town-owned parcel (or vacant parcel that the Town can purchase or obtain an easement over) that has no or minimal sensitive receptors such as wetlands and vernal pools, is located outside designated Zone II wellhead protection areas, and does not overlap with Natural Heritage & Endangered Species Program (NHESP) priority habitats. Selecting parcels that meet these criteria helps ensure environmental protection and regulatory compliance, while also supporting the long-term sustainability of wastewater management solutions.

4.2.3 Centralized Collection and Treatment Systems

4.2.3.1 Technology Description

4.2.3.1.1 Wastewater Treatment

Centralized collection and treatment involve collecting wastewater via a sewer system and transporting it to a common facility for treatment and discharge. Centralized treatment facilities can apply proven advanced treatment solutions capable of achieving stringent effluent total nitrogen limits as low as 3 mg/L. Centralized collection and treatment is generally most cost-effective in areas where development is dense. There are several main types of collection systems, treatment processes, and effluent discharge methods. An advantage of centralized collection systems and treatment is that treatment processes can be added to treat for other contaminants including phosphorous and CECs.

In May 2024, GHD prepared the ‘Draft Noons Property Evaluation Memorandum’, (Appendix B) to assess the potential for the Noons Property to serve as a possible future wastewater treatment facility and effluent discharge site. The Noons Property, located at 2 Sand Pit Road, was identified by the Town as a possible acquisition for a new greenfield wastewater treatment facility. The findings of the evaluation concluded that additional evaluations would need to be

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conducted to ensure the site conditions are conducive to wastewater treatment and effluent recharge. It was recommended that a groundwater model be performed to assess the site's potential for recharge. The groundwater model would predict groundwater mounding at the site and characterize anticipated effluent migration to groundwater surface bodies. The Noons Property Memorandum also recommended that a phosphorous attenuation evaluation be conducted to assess potential phosphorous impacts to the down-gradient freshwater bodies. Additional considerations identified for the Noons Property included grading and site access due to the sites varying topography. In May 2023, a Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation report assessed the subsurface conditions at the site and identified PFAS in the groundwater and a reportable release of oil and/or hazardous materials (OHM). The presence of OHMs and PFAS could present permitting challenges. To date, no further evaluations have been performed on the Noons Property and the Town has not acquired the parcel. For these reasons, the Noons Property is not considered as a potential site for centralized treatment in Truro at this time.

As part of this Alternatives Analysis, centralized treatment was not considered as a Town-wide nitrogen management approach, but it was considered for a small portion of Truro known as Beach Point. For Beach Point, no evaluation of treatment processes and effluent discharge methods was conducted as this area would be connected to the existing Provincetown WWTF, which has allocated capacity for 150,000 gpd of potential flow from Truro as part of its planning.

4.2.3.1.2 Gravity Sewers and Pump Stations

The most prevalent type of collection system is a gravity sewer. This type of system involves the installation of sewers at a constant downhill gradient. The sewer pipe is designed at a slope sufficient to maintain a velocity within the system that ensures that solids stay suspended within the waste stream. The minimum diameter of a typical sanitary sewer main is 8-inches. The design criteria requires pipe sizing that increases proportionally with the expected wastewater flow. The sewer is installed at a constant slope until its depth becomes so great that a sewage pump station is needed to lift the flow to a wastewater treatment plant or to another gravity sewer.

In most situations, homes along a gravity sewer connect to the system with gravity service connections from the building to the collector sewer. Houses that are below the street elevation may require the use of small pumps and a small diameter force main (1 to 2 inches) for discharging to the collector sewer.

The installation cost and ease of construction of a gravity sewer depends upon the topography within a particular area and on specific soil types. In areas where topography is consistently increasing or decreasing, the sewers can be installed close to minimum depth (which is typically 4-feet in New England to account for the anticipated frost depth), however, when considering other utilities, gravity sewers can be greater than 8-feet below grade. In flat terrain, several pump stations may be required before the flow is pumped to a treatment facility. In very hilly areas, deep sewers and/or pump stations may be required. This can significantly increase construction costs when compared with other alternatives.

Three types of pump stations can be typically found with gravity sewers—wet well/dry well, submersible, and suction lift.

Wet Well/Dry Well Pump Stations

Wet well/dry well pump stations are typically used for large flow collected from several smaller areas. There are several styles and options, including packaged units. Their primary feature is that the pumps are in an accessible location separate from the wastewater so they can be maintained easier. However, this requires the pumps to be located in a structure below grade which must be designed to allow operator safe access. Wet well/dry well pump stations are typically the most expensive pump station style of the three considered in this report.

Submersible Pump Stations

Submersible pump stations are typically used for smaller flows and are relatively simple in design. The pumps with the motors are mounted in the bottom of the wet well and are accessed by slide rail. Submersible pumps are typically sized up to 25 horsepower before the size of the pump and motor becomes too heavy for operators to easily access with the slide rail system.

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Suction Lift Pump Stations

Suction lift pump stations are popular for handling small to intermediate flows because the pumps are located above-ground and are accessible for repairs and maintenance. The pumps are not submerged in raw wastewater and therefore do not require the hoisting or cleaning involved with submersible stations, resulting in reduced maintenance. They are often smaller in size than a comparable wet well/dry well configuration and come as skid mounted equipment, simplifying construction. TR-16 Guides for the Design of Wastewater Treatment Works, prepared by the New England Interstate Water Pollution Control Commission, provides design considerations specifically for suction lift pump stations, such as suction piping length being limited to 25 feet. Often the pumps are limited to applications of less than 100 feet total dynamic head (TDH).

The following table summarizes the advantages and challenges of gravity sewers/pumping stations.

Table 4.1 Advantages and Challenges of Gravity Sewers

Advantages	Challenges
– A properly designed and installed gravity sewer requires little maintenance. – A gravity system can be easily expanded to serve additional areas. Additional capacity can be provided to accept future flow without affecting performance. – The potential for odors in a properly designed gravity sewer is low. – A gravity system is reliable since it is not dependent upon electrical power for operation. When pump stations are used on collector sewers, electrical generators are provided to supply power during a power outage. – Less space is required on the customers' lots as the gravity sewer does not require a grinder pump station or vacuum valve vault (as required for the other two types of collection systems).	– Gravity sewers are installed at a constant slope and thus can require deep excavations as the topography changes. Construction with trenchless technologies is generally difficult as constant grades are required. Construction is generally disruptive to traffic patterns and surface infrastructure, as they are often located within the paved roadway to avoid conflicts with water and gas utilities that are typically located closer to the shoulder(s) of the road. – Pump stations are required to transport the sewage out of low points in topography. – Feasibility may be limited by availability of appropriate/available pump station locations. – Capital and operation and maintenance costs increase with each pump station required. – Pump stations tend to increase the potential for odor emissions. – Improper installation techniques could result in infiltration (clean water entering the collection system) and exfiltration (raw wastewater leaving the collection system).

4.2.3.1.3 Low-Pressure Sewers

A low-pressure sewer system requires the installation of a grinder pump to serve each building. Wastewater from each property flows by gravity into a pump chamber, where the sewage is shredded and pumped into a pressure sewer, eventually discharging to a gravity main or directly to a pump station or treatment facility. This type of technology has become more widely used over the past 20 years and is particularly suited to areas where there is a need to minimize excavation depths.

The typical pressure in this type of system is five to 40 pounds per square inch (psi). Typically, systems can be expanded to serve additional homes; however, there are design limitations, and the overall expansion capability tends to be less than that of a gravity sewer.

When connecting pressure sewer lines to a gravity line or directly to a pump station, odor control for larger systems may be required at the discharge point to mitigate odors created in the pressure sewer pipe. Also, manholes at the discharge point should be protected from corrosion resulting from high hydrogen sulfide concentrations.

The following table summarizes advantages and challenges of low-pressure sewers.

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Table 4.2 Advantages and Challenges of Low-Pressure Sewers

Advantages	Challenges
– The collection main is installed at a relatively shallow depth and is independent of grade changes. This allows shallower excavation, lower piping installation costs, and less overall disruption to the area due to a shorter construction period. – A pressure sewer can serve areas of hilly terrain or marginal slope. – The pressure sewer piping (beyond the pumping chamber) is not susceptible to infiltration, unlike gravity sewers. – The shredding action of the pump eliminates the need for a larger size collection system piping. Pressure sewers tend to be much smaller diameter than a typical sanitary sewer, ranging from 1-1/4 inch to 6 inches, depending upon the expected design flow. – The pressure sewer mains (at shallower depths than gravity) are easier to locate in road shoulders to minimize construction in roads where space is available. – Some portion of pressure sewers could be installed with trenchless technologies, thus reducing general disruptions experienced during construction. – Homes with generators can maintain operation of their pumps as long as their home electrical system is set up to accommodate the load (this is becoming more common with the larger number of power outages in recent years).	– Each building in the system would have to be equipped with a pump unit, which increases operation and maintenance requirements. Towns that operate their own systems typically have to maintain an inventory of pumps/parts for these units to minimize disruption of services; otherwise, it becomes the homeowner's responsibility to have their system maintained. – Each pump unit is dependent upon electrical power for proper operation; since the pumps are located at individual homes, municipal backup electrical power is typically not provided. Storage capacity is typically built into each pump chamber (capacity depends on manufacturer). However, in a prolonged power outage, it would be possible for the wastewater flow to exceed this capacity and back up into the structures. This can be mitigated by providing electrical connections on each pump unit to allow a service crew to connect a portable generator and pump out each unit during prolonged power outage. Another option is to install a larger capacity unit or a dual tank system, thus providing more storage. – This system is more sensitive to seasonal flow conditions than a gravity sewer. In areas with extreme seasonal fluctuations, minimum flow conditions must be carefully quantified to be sure the sewage flow can properly travel through the system. If inadequate flow exists, solids can harden within the sewer and cause blockages. This concern can be mitigated through proper design. – Some customers may need to upgrade their electrical system, which might not have the capacity for the additional load. – Training would be required to familiarize operating staff with maintenance of the pumps and pressure sewers. – Ownership considerations need to be clearly defined early in the selection and design process. Costs for systems will depend on who owns, operates, and maintains the grinder pump. Easements may also be required to address maintenance and emergency power issues. – Odors can be released at the point of discharge into a gravity sewer or pump station, especially during low flow periods. – Grinder pumps take up space on the customer's property and in the case of Beach Point, many of the properties are relatively small.

A major decision with grinder pumps is who purchases and owns the grinders pumps—the customer or municipal sewer system. A hybrid approach can also be used where the municipality purchases the initial pump and then the customer takes ownership including any repairs or replacements.

4.2.3.1.4 Vacuum Sewers

A typical vacuum sewer system consists of a central vacuum station, valve pits, and the sewer piping. Each customer would have a vacuum valve pit, which consists of the storage sump, the vacuum valve, and associated piping. The valves are operated on pressure differentials and do not require a power source.

Typically, a vacuum sewer system is designed with a maximum static loss of 13 feet and a maximum friction loss of 5 feet in any single flow path to a vacuum pump station.

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Most problems affecting vacuum sewers are loss of vacuum. This results in failure of the valves to open/close. When the valve fails to open, this may result in the accumulation of wastewater in the collection chamber and potential backup into the building and vacuum loss in the main. Each customer's valve pit also requires an air intake pipe that typically extends 2-feet above ground level, this vent is essential in making sure when the vacuum valve opens, that the vacuum in the main does not draw out plumbing traps in the house creating odor issues, and also allows for air to enter the main to act as the mechanism that moves the wastewater down the system.

The following table summarizes advantages and challenges of vacuum sewers.

Table 4.3 Advantages and Challenges of Vacuum Sewers

Advantages	Challenges
– Vacuum sewers can operate at shallow depths, reducing excavation and installation costs. – Work well in flat or low-lying areas, where gravity sewers are impractical and costly. – Piping is small diameter and resistant to infiltration and inflow. – Can be installed in areas with high groundwater or soft soils, minimizing soil disruption. – Each customer only needs a vacuum valve pit, which does not require electricity (unlike grinder pumps). – Some portion of pressure sewers could be installed with trenchless technologies, thus reducing general disruptions experienced during construction.	– Requires a central vacuum station and associated maintenance. – Central station power dependency; if the vacuum station loses power, service to all connected homes is interrupted. – Odors can occur at the central vacuum station or connection points if venting is inadequate. – In the case of prolonged vacuum station downtime, wastewater may backup due to limited storage in valve pits. – Requires trained staff to operate and maintain the vacuum station and network. – Location of system infrastructure, such as the central vacuum station, may require an easement if a public parcel is not available.

4.2.3.2 Alternatives Analysis

Given the relatively low density pattern of development in portions of Truro, where homes are spread out and sewer connections may be impractical or cost-prohibitive, the only area identified by the Town as a candidate for sewering is Beach Point (see Draft Beach Point Memorandum, Appendix C). This flow would be treated at the Provincetown Wastewater Treatment Facility and discharged in Provincetown (discussions with Provincetown regarding this alternative are ongoing). Thus, only the collection system technology alternatives need to be further analyzed for application in this one area. Because flows that may be treated via a centralized collection system would be sent to an existing treatment facility, a treatment and recharge technologies analysis is not applicable.

For Beach Point, low-pressure sewer systems are considered the most feasible and cost-effective option due to the shallow topography, relatively short pipe runs, and small-diameter piping. Gravity and vacuum sewers were reviewed (Draft Beach Point Memorandum, Appendix C) but are less suitable: gravity sewers would require multiple pump stations and deep excavation below the water table and vacuum sewers would require a central vacuum station and parallel force mains.

The low-pressure force main in Beach Point would be approximately 1½-inches at the southeast end increasing to approximately 4-inches closer to the Provincetown boundary. The pipe material would typically be HDPE tubing. Sizing and material would be refined during detailed design. Given Truro's topography, a low-pressure sewer system would likely be the most feasible and cost-effective collection system alternative.

As mentioned above, the Noons property was identified as a potential future site for wastewater treatment. If further evaluations are performed to determine the site's feasibility and if the site is obtained by the Town, additional centralized sewering may be considered in other densely developed portions of Truro.

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4.3 Alternative Control Technologies

4.3.1 Provisional Use Nitrogen-Reducing Onsite Septic Systems

4.3.1.1 Technology Description

As described in Section 4.2.1, MassDEP categorizes onsite I/A septic systems into several categories based on approval for certain applications. As there are currently no General Use septic systems approved that have a permit approval lower than a treated nitrogen effluent concentration of 19 mg/L, the focus of this section will be on two Provisional Use technologies. The two nitrogen-reducing onsite I/A systems that are currently in the Provisional Use stage are: the NITREX™ system (which has a provisional effluent total nitrogen approval of 10 mg/L) and the NitROE® system (which has a provisional effluent total nitrogen approval of 11 mg/L).

Provisional systems must have at least 50 installations operating for three years prior to applying for a General Use approval. To advance to General Use, the technology manufacturer must submit an application to MassDEP, including system performance data collected during the 3-year period. This data is evaluated by MassDEP as part of the General Use approval process.

While Provisional Use systems cannot be used in a contingency nitrogen management plan at this time, preliminary data indicates these systems have the potential to achieve low level nitrogen effluent concentrations with proper operation and maintenance. A 2024 study published by researchers associated with the Massachusetts Alternative Septic System Test Center (MASSTC), US Geological Survey, and United States Environmental Protection Agency (USEPA) monitored NitROE® and MASSTC non-proprietary nitrogen-reducing septic systems near Shubael Pond in Barnstable for 25 months. The study found that the systems achieved a median total nitrogen effluent concentration of 6.2 mg/L. When more monitoring data becomes available, these technologies may apply for General Use approval. It is GHD's understanding that both of the below described systems intend to apply for General Use approval.

NitROE® System: This system is installed in series between a Title 5 system septic tank and a soil absorption system constructed to and operating in accordance with state regulations to accommodate design flows of less than 2,000 gpd. The system is comprised of two-unit processes which are sequentially performed in two different chambers. The first chamber is aerated, via an external air pump and airline header/hose arrangement, to achieve both organic carbon reduction along with the biological conversion of ammonia-N to nitrate-N. From the aeration chamber, the wastewater then flows by gravity into a denitrification chamber where, in the presence of natural organics from wood chips, bacteria facilitate the conversion of nitrate-N to inert N gas that exits to the atmosphere via the Title 5 system vent piping. Depending on design flow and space constraints, the sequential aeration and denitrification process steps can be performed in the same single tank, which is NitROE® 2KS WWTS, or each process could be performed in its own separate tank with the overall NitROE® WWTS comprised of multiple tank combinations, which is NitROE® 2KM WWTS. Gravity moves wastewater through the tanks so that the only piece of mechanical equipment is an air pump.

NITREX™ System: This system uses patented nitrate-reactive media that converts nitrate to inert nitrogen gas (denitrification). The NITREX™ reactive media is contained in a buried concrete tank. Raw wastewater is gravitationally fed through the treatment module. For septic tank applications, an oxidative pre-treatment step is required to convert ammonium to nitrate before the NITREX™ filter can perform the reductive denitrification step. This pre-treatment is similar to that for the NitROE® system which uses an aeration chamber. The low nitrate effluent from the NITREX™ filter is then discharged to the leach field or adsorption bed.

A Provisional Use nitrogen-reducing onsite septic system must be inspected regularly, per the schedule outlined in the Provisional Use Approval. Both the NitROE® and NITREX™ systems require quarterly inspection and sampling for year-round facilities, and twice a year inspection and sampling for seasonal properties. The frequent sampling and inspection requirements stand to ensure systems are performing properly. MassDEP or the local Board of Health can require more frequent inspections than those outlined in the approval. More frequent inspections may also be required for a period of time immediately following installation. Inspection and testing requirements are outlined by MassDEP in the approvals for each type of technology.

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System owners must have a maintenance contract with a Massachusetts Certified Wastewater Operator in place for the life of the system. Plans for operation and maintenance, monitoring, and testing must be submitted to the local Board of Health (and in some cases to MassDEP) for approval prior to start-up of the system. Inspection and sampling must be performed in accordance with the technology or system approval issued by the local Board of Health or MassDEP, and inspection data must be submitted to these entities.

4.3.1.2 Alternatives Analysis

As mentioned above, there are two approved onsite nitrogen-reducing systems for Provisional Use with nitrogen effluent concentrations less than 11 mg/L. MassDEP maintains a list of Approved for Provisional Use Nitrogen-Reducing Technologies, which can be accessed at the following link: https://www.mass.gov/info-details/approved-title-5-innovativealternative-technologies#approved-for-provisional-use

When implementing an onsite nitrogen-reducing system program, certain site-specific vulnerabilities should be considered to ensure system effectiveness and protection of public and environmental health. Properties located in Velocity (VE) zones or within FEMA flood plains may be at risk of inundation, which can compromise system operation and effluent quality. High groundwater levels can reduce leach field performance and increase the potential for nitrogen migration to groundwater and surface waters. Other factors that may affect system performance include soil permeability, steep slopes, and proximity to sensitive environmental receptors such as wetlands or coastal estuaries. These vulnerabilities should be assessed during system siting and design to optimize nitrogen removal and reduce environmental risks. Systems should be designed and installed in accordance with MassDEP regulations and Truro Board of Health requirements to minimize environmental and public health risks.

The Truro CWMP considers Provisional Use nitrogen-reducing onsite septic systems as one of the recommended nitrogen management compliance approaches in the Pamet River and Provincetown Harbor watersheds. Implementing Provisional Use systems instead of General Use systems reduces the overall number of installations required to achieve targeted nitrogen reduction goals. Although initial data indicates these systems are capable of treating to a low level treated effluent nitrogen (less than 11 mg/L), MassDEP mandates the development of a Contingency Plan that incorporates traditional nitrogen management strategies in the case that Provisional Use systems do not perform as expected.

4.3.2 Fertilizer Management

4.3.2.1 Technology Description

Fertilizer nitrogen loads originate from lawns, golf courses, recreational fields, and agricultural properties where nitrogen-rich fertilizers are applied to support plant and grass growth. When more nitrogen is applied than plants can absorb, excess nitrogen can leach through the soil to groundwater or be carried with stormwater runoff into nearby surface waters. Managing fertilizer use is a key component of managing controllable nitrogen sources. The technology description below is an excerpt from the Cape Cod Commission 208 Plan Update regarding fertilizer management:

'This approach relies on managing fertilizer application rates to lawns, golf courses, athletic facilities, and cranberry bogs. Residential lawn loading rates could be reduced on existing developed parcels through an intensive public education / outreach program. This could include a "Cape Cod Lawn" branding program, replacing some turf areas with native vegetation, establishing naturally vegetated buffer strips on waterfront lots, and reducing application rates.

Fertilizer loading rates for new development could be accomplished by reducing lot sizes (cluster development), by restricting lawn sizes and/or by incorporating more naturally-vegetated open space areas. Municipalities could directly reduce fertilizer applications on athletic fields and other properties. Golf courses can significantly reduce nitrogen loading rates by using slow-release fertilizers and reducing application rates in rough areas. Cranberry bog fertilizer exports from the bogs can be reduced using tail water recovery systems. Site-specific assessments are needed to estimate load reductions.'

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Additionally, fertigation wells, commonly used at golf courses, and potentially for residential properties, can recycle treated groundwater. This method reuses nitrogen-enriched groundwater back onto lawns and turfs, thereby reducing the amount of nitrogen leaving the site and entering coastal estuaries.

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

Table 4.4 Fertilizer Management - CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Enhances habitat/wildlife/biodiversity.	– Resulting nutrient removal rates are highly dependent on homeowner/landowner behavior and participation in the program. – Site-specific assessments are needed to estimate load reductions.

Notes:
1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, dated June 2015.

4.3.2.2 Alternatives Analysis

As reported by the MEP reports and Cape Cod Commission Watershed Management Plans and stated in Section 2.4, the approximate controllable fertilizer load in the Truro watersheds ranges from 6% to 7%. To mitigate this controllable load, Truro can employ a combination of education, licensure requirements, regulations of practice, and enforcement.

The Truro Conservation Regulations (dated 2021) define special conditions for particular projects that stipulate that fertilizers shall not be used within 100 feet of wetlands, within the riverfront area, and within bordering land subject to flooding. The Conservation Regulations also present a model Order of Conditions for coastal erosion control projects that restricts fertilizer use for beach plantings.

It is recommended that the Town consider adopting a fertilizer bylaw that includes restrictions on the time of year that fertilizer can be applied and mandates maximum loading rates for applications.

MassDEP has indicated that a 25% nitrogen removal credit (of the overall lawn fertilizer load to the watershed) can be assumed in a TMDL Compliance Plan for communities with a promulgated fertilizer regulation. This nitrogen-removal credit is consistent with the methodology used in the Cape Cod Commission 208 Plan Update.

The Truro CWMP anticipates that a 25% fertilizer nitrogen load reduction will be possible with the implementation of fertilizer bylaws.

4.3.3 Stormwater Management

4.3.3.1 Technology Description

Stormwater nitrogen loads originate from runoff that carries nitrogen-rich materials from impervious and developed surfaces such as roads, driveways, and rooftops into nearby waterbodies. Rainfall or snowmelt that flows over impervious surfaces can collect fertilizers, pet waste, organic debris, and other nitrogen-rich pollutants before flowing into streams, ponds, and ultimately Truro's coastal estuaries.

Much of Truro's impervious road area can be attributed to Massachusetts Department of Transportation (DOT) roads. The following table summarizes the percentage of Truro's roads that are DOT owned.

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Table 4.5 Truro Road Ownership Summary

Watershed	Percent of Road Area Owned by MassDOT
Wellfleet Harbor	18%
Provincetown Harbor	53%
Pamet River	15%
Townwide	**20%**

Stormwater Best Management Practices (BMPs) consist of both structural controls, such as catch basins and vegetated swales, and non-structural controls, including measures like street sweeping and public outreach. According to MassDEP, communities that implement non-structural stormwater BMPs may assume a 25% nitrogen-removal credit (based on the overall impervious load to the watershed) in their TMDL Compliance Plans. The 2015 CCC 208 Plan Update lists the following examples of non-structural BMPs:

– Street sweeping
– Maintenance of stormwater utilities
– Education and public outreach programs
– Land use planning
– Impervious cover reduction and control

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

Table 4.6 Stormwater BMPs - CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Enhances habitat/wildlife/biodiversity. – Promotes green space/conservation/recreation. – Improves management of flooding/extreme events.	– Requires the creation and enforcement of stormwater regulations and policies.
Notes: 1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, June 2015.	

4.3.3.2 Alternatives Analysis

The Town of Truro is not a regulated municipal separate storm sewer system (MS4) community, meaning that it is not subject to the minimum control measures (MCMs) outlined in The Massachusetts Stormwater Handbook Volume 1 Chapter 1. In August 2023, the Town proposed adding Chapter IX: Stormwater Management by Drainage, Erosion, and Sediment Control to its General Bylaws.

The purpose of the proposed Chapter IX is to establish minimum standards for managing stormwater runoff, erosion, and sediment to protect public health, groundwater, and surface water, and prevent flooding. It applies to existing development, new development, and redevelopment projects. It stipulates that all runoff from impervious surfaces on a lot shall be recharged on that lot and prevented from impacting wetlands, and that appropriate erosion control measures must be in place prior to any construction. Projects in areas sensitive to nutrient loading must follow Massachusetts Stormwater Handbook's Best Management Practices, and relevant Wetlands (310 CMR 10.00) and Water Quality (314 CMR 9.00) regulations. The Building Commissioner, Health/Conservation Agent, and/or the DPW Director may enforce the regulations.

The Town may also consider additional stormwater BMPs and enforcement mechanisms. Descriptions of additional control measures for consideration are presented in the following table.

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Table 4.7 Enhanced Stormwater Best Management Practices[1]

Practice	Description
Land Use Planning	Where and how communities grow impacts water quality. Factors embedded in a community's land use codes and policies that dictate the location, quantity or density, and design of development can drive the creation of unnecessary impervious cover and other land cover conditions that produce excessive runoff. Common land use development regulations, codes, and policies that can be reviewed for consistency with stormwater goals include zoning ordinances, subdivision codes, street standards or road guidelines, parking requirements, minimum setback requirements, site coverage limits, and building height limitations.
Impervious Cover Reduction	Impervious surfaces associated with urbanization including roads, parking lots, rooftops, driveways/sidewalks, and compacted soils all reduce stormwater infiltration and increase surface runoff. Low impact development techniques to reduce the amount of impervious surface for new construction and redevelopment projects include encouraging projects be located within areas where services and infrastructure already exist; reducing the length/width of driveways, size of parking spaces, and other pavements; developing designs to share parking areas, driveways and other impervious facilities; and clustering components such as houses together to reduce the amount of paved surfaces needed.
Green Infrastructure	Green infrastructure uses vegetation, soils, and natural processes that mimic nature to soak up and store water. Example technologies include green roofs, permeable pavement, bioswales, biofiltration strips, and constructed wetlands.

Note:

1. Adapted from Massachusetts Department of Environmental Protection (MassDEP). (2008, updated 2016). *Massachusetts Stormwater Handbook, Volumes 1–3.* Boston, MA: Executive Office of Energy and Environmental Affairs. *(Content adapted from Vol. 1 and Vol. 2 discussions on low impact development, impervious cover reduction, and green infrastructure.)* **https://www.mass.gov/info-details/massachusetts-stormwater-handbook**

As reported by the MEP reports and Cape Cod Commission Watershed Management Plans and stated in Section 2.4, the approximate controllable stormwater load in the Truro watersheds ranges from 8% to 18%. To mitigate this controllable load, Truro can employ a combination of the BMPs and stormwater management regulations outlined above. The Truro CWMP anticipates that a 25% stormwater nitrogen load reduction will be possible with the implementation of stormwater BMPs.

4.3.4 Permeable Reactive Barriers

4.3.4.1 Technology Description

The technology description below is an excerpt from the Cape Cod 208 Plan Update:

'A permeable reactive barrier (PRB) is an in-situ (installed within the aquifer) treatment zone designed to intercept nitrogen enriched groundwater. Through use of a carbon source, microbes in the groundwater uptake the nitrogen, denitrifying the groundwater.

An injection well PRB system typically uses a series of injection wells to introduce the carbon source (medium) into the groundwater. The injection wells can be installed to depth greater than the PRB trench method. The injection well PRB method can be used in combination with the PRB trenching method described previously. As groundwater flows through the medium, microbes naturally occurring in the groundwater consume the carbon source, as well as oxygen, developing an anaerobic environment. This process releases nitrogen gas to the atmosphere, reducing the groundwater nitrogen load before reaching the estuary.

The trench method PRB uses large trenching equipment to install a mixture of coarse sand, wood chips, compost and/or other materials (medium) in the trench created by the trencher. The vertical wall can be installed to a depth of 40 feet with a width of 1.5 to 3 feet. PRBs can also be installed in large diameter columns. As groundwater flows through the wall, the medium provides a carbon source for microbes living in the groundwater. The microbes consume

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the carbon source as well as oxygen, developing an anaerobic environment which releases nitrogen gas to the atmosphere, reducing the groundwater nitrogen load before reaching the estuary.'

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

Table 4.8 Permeable Reactive Barrier – CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Improves energy savings/nutrient recovery/recycling. – Improves management of flooding/extreme events.	– Siting can be limited by wetlands, public utilities, and abutter concerns. – Detailed knowledge of local groundwater hydrology is needed. – Large projects may require a hydrogeologic investigation and groundwater modeling to estimate effectiveness of PRB. – Permitting requirements may be extensive and time-consuming. – Projects may require extensive groundwater monitoring early in the project to quantify nitrogen load reduction. – Projects may require groundwater monitoring near or in embayments as well as monitoring of vegetation and benthic monitoring where groundwater surfaces in the receiving estuary.

Notes:
1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, dated June 2015.

4.3.4.2 Alternatives Analysis

PRBs are most applicable in areas where groundwater carrying elevated nitrogen concentrations discharges to downgradient surface waters, such as estuaries, salt marshes, and rivers. By targeting nitrogen at the point of groundwater discharge, PRBs can provide a cost-effective, passive treatment option that requires minimal energy input and has relatively low operation and maintenance requirements once installed.

As part of the alternatives analysis, GHD identified large nitrogen contributors within the Town of Truro to identify potential opportunities for PRB applications. Agricultural operations, particularly farms, were identified as significant sources of nitrogen loading due to fertilizer use and manure management practices. To address this load, a PRB is recommended within the central-eastern portion of the Pamet River watershed, strategically sited to reduce nitrogen concentrations before discharge to the Pamet River.

The Town should conduct further evaluations on the potential to site a PRB at the identified location, and to identify additional PRB sites. The Town should develop an understanding of groundwater conditions to evaluate the sites' potential for PRB siting; groundwater characterization for planning a PRB includes:

– Depth to groundwater
– Groundwater flow direction
– Sediment type and groundwater flow velocity
– Vertical nitrogen concentration profile
– General groundwater chemistry

4.3.5 Shellfish Aquaculture

4.3.5.1 Technology Description

The technology description below is an excerpt from the Cape Cod 208 Plan Update:

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'Shellfish, specifically oysters, remove nitrogen from their environment. The growing and removal of the mature oysters can remove nitrogen from an estuary, reducing the estuary's nitrogen load. Aquaculture can become a dual-purpose project where shellfish are harvested for market while there will be a local reduction in nitrogen in the overlying water column during the growth and maturation of the oysters added.

Shellfish may be cultivated above or within the estuary bed. The "in-estuary bed" method cultivates the shellfish in the benthic soils of the estuary. Shellfish may also be cultivated above the estuary bed in containers. With either approach, harvesting a portion of the oysters is required to remove nitrogen. Shellfish cultivation may be used in combination with other types of aquaculture (e.g., mariculture), as well as floating constructed wetlands designed for brackish water.'

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

Table 4.9 Aquaculture Shellfish – CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Enhances habitat/wildlife/biodiversity. – Promotes green space/conservation/recreation. – Improves energy savings/nutrient recovery/recycling. – Improves management of flooding/extreme events.	– Growing conditions, aesthetics, or navigation may limit applicability. – Seasonal nitrogen uptake coincident with natural cycle and algal blooms. – Requires removal of shellfish in order to take credit for nitrogen removal. – Nitrogen uptake subject to possible disruption due to disease or population crash. – Population monitoring is important to maintain persistence of the benefit. – Large concentrations of shellfish can generate waste products, reduce dissolved oxygen levels, and possibly generate ammonia. – Shellfish will undergo rapid growth to a marketable size after which they must be harvested. – Can require large areas to gain significant nitrogen removal. – If the waterbody is closed for shellfishing, management will be required to prevent the shellfish from getting into the food supply.

Notes:
1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, dated June 2015

4.3.5.2 Alternatives Analysis

Regional communities have successfully implemented shellfish aquaculture programs as part of their nitrogen management plan. At this time, no proposed sites were identified for a shellfish aquaculture program in Truro. There may be potential to implement these strategies in the future, in combination with floating constructed wetlands in brackish systems like East Harbor or Pamet River. If sites are identified in the future and the Town desires to pilot and implement this technology, it could be incorporated into nitrogen management approaches as part of the Town's Adaptive Management Program.

4.3.6 Waste Reducing Toilets

4.3.6.1 Technology Description

The technology description below is an excerpt from the Cape Cod 208 Plan Update:

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'A waste reduction toilet is a system which separates human waste from shower, sink and other household water uses. These systems use no or minimal amounts of water. Waste reduction toilets require installation of a separate toilet(s). Household water uses (i.e., sink and shower uses) continue to flow to the septic system. The four main categories of waste reducing toilets include: composting, incinerating, packaging, and urine diverting. Composting toilets capture human waste in a container in the basement where it is decomposed and turned into compost. Incinerating toilets rely on electric power or natural or propane gas to incinerate human waste to sterile, clean ash/ Packaging toilets encapsulate human waste in a durable material, stored beneath the toilet, for removal from the site when full. Urine diverting toilets divert urine to a holding tank where it is periodically collected by a servicing company; remaining human waste continues on to the septic system.'

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

Table 4.10 Waste Reducing Toilets – CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Improves energy savings, nutrient recovery, recycling.	– Resulting nutrient removal rates are highly dependent on homeowner/landowner. – Requires a significant number of citizens to participate to be effective.
Notes: 1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, dated June 2015.	

4.3.6.2 Alternatives Analysis

Cape Cod communities have attempted to implement waste reduction toilet programs and to offer incentives for their adoption with limited success. The regulatory pathway in Massachusetts for installing certain types of waste reduction toilets (such as urine diverting toilets) poses challenges for widespread implementation in a watershed plan. Due to the limited adoption of the technology in other Cape Cod towns, waste reduction toilets are currently not included in Truro's nitrogen management plan. If the Town desires to pilot and implement waste reduction toilets, it could be incorporated into the CWMP as part of the Town's Adaptive Management Program. Several organizations, such as the Rich Earth Institute in Brattleboro, Vermont and MASSTC are leading research on waste reduction toilets and nutrient reclamation and may be available for technical assistance should the Town decide to explore this technology.

4.3.7 Inlet/Culvert Widening

4.3.7.1 Technology Description

The technology description below is an excerpt from the Cape Cod 208 Plan Update:

'This approach considers re-engineering and reconstruction of bridge or culvert openings to increase the tidal flux through the culvert or inlet. In the right settings, increasing the tidal flux can decrease the nitrogen residence time, lowering the nutrient concentration in the estuary and / or tidal marsh upstream of the widened inlet or culvert.'

Eco-benefits and performance challenges for this technology (as listed in the 2015 CCC 208 Plan Update) are summarized in the following table.

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Table 4.11 Inlet/Culvert Widening – CCC 208 Plan Update List of Eco-Benefits and Performance Challenges[1]

Eco-Benefits	Performance Challenges
– Enhances habitat/wildlife/biodiversity. – Promotes green space/conservation/recreation. – Improves energy savings/nutrient recovery/recycling. – Improves management of flooding/extreme events.	– Widening a tidal culvert or bridge could increase the depth of flooding during high tides and storm surges in flood-prone areas and upstream of the structure. – Disruption of coastal processes must be considered. – Can have significant construction impacts. – Permitting requirements may be extensive and time-consuming. – Modeling is required to accurately predict the upstream tidal and coastal process impacts of the culvert/bridge modifications. – Will only return an estuary to a more natural hydrologic regime if the original opening has been restricted.

Notes:
1. Source: 208 Plan – Cape Cod Area Wide Water Quality Management Plan Update, prepared by the Cape Cod Commission, dated June 2015.

4.3.7.2 Alternatives Analysis

The Town is currently advancing several culvert projects in the Pamet River system – including Mill Pond, Eagle Neck Creek, and Little Pamet. Another opportunity for a culvert project exists in East Harbor. Currently, East Harbor experiences tidal flushing through a culvert into Cape Cod Bay. Recent monitoring of East Harbor conducted by the Cape Cod National Seashore suggests that it may be thermally impaired and that increased tidal flushing may improve water quality. GHD recommends that the sizing of the culvert is evaluated. Based on the findings of the sizing evaluation, culvert widening can be included in Truro's Adaptive Management Plan to assist in tidal flushing of the East Harbor Lagoon.

4.4 Nitrogen Management Alternatives By Watershed

Scenarios with various combinations of nitrogen management strategies were developed for each of Truro's watersheds. The following factors were considered when selecting strategies:

– Nitrogen reduction goal
– Parcel density
– Availability of land to support potential treatment sites for cluster facilities

The following table outlines all the approaches considered for each of Truro's Watersheds.

Table 4.12 Evaluated Nitrogen Management Strategies by Watershed

Watershed	Nitrogen Management Approach	Findings of Evaluation
Wellfleet Harbor	Fertilizer Bylaw	Strategy included in recommended nitrogen management plan.
	Stormwater Best Management Practices	Strategy included in recommended nitrogen management plan.
	General Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 19 mg/L)	Strategy included in contingency nitrogen management plan.
	Provisional Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 11 mg/L)	Strategy not required for the recommended nitrogen management plan, as initial estimates indicate the reduction goal can be met with stormwater and fertilizer controls alone.

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Watershed	Nitrogen Management Approach	Findings of Evaluation
	Cluster Systems	Cluster systems were evaluated as part of the contingency nitrogen management plan. No potential sites were identified through this evaluation, and they are not currently included as a nitrogen-reducing strategy for the watershed. If a potential site is identified, a cluster system can be incorporated into the Plan through adaptive management.
East Harbor	Fertilizer Bylaw	Strategy included in Alternative 1 nitrogen management plan.
	Stormwater Best Management Practices	Strategy included in Alternative 1 nitrogen management plan.
	General Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 19 mg/L)	Strategy was evaluated as part of the Alternative 2 nitrogen management plan. Analysis indicates that converting all existing Title 5 septic systems to general use nitrogen-reducing septic systems would not meet the nitrogen reduction goal and would require supplementary approaches. Because other decentralized approaches are not feasible in the watershed, as described in this Table, this strategy was not included in the nitrogen management plan.
	Provisional Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 11 mg/L)	Strategy included in Alternative 1 nitrogen management plan.
	Cluster Systems	Cluster systems were evaluated as part of the Alternative 2 nitrogen management plan. No potential sites were identified through this evaluation, and they are not currently included as a nitrogen-reducing strategy for the watershed. If a potential site is identified, a cluster system can be incorporated into the Plan through adaptive management.
	Sewering	The sewering approach would rely on sending Truro's flow to Provincetown. Discussions regarding this strategy are in progress, and Provincetown has allocated capacity for Truro to send 150,000 gpd of flow. This strategy is included in the Alternative 2 nitrogen management plan.
Pamet River	Fertilizer Bylaw	Strategy included in recommended nitrogen management plan.
	Stormwater Best Management Practices	Strategy included in recommended nitrogen management plan.
	General Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 19 mg/L)	Strategy is included in the contingency nitrogen management plan. Converting all existing Title 5 septic systems to general use nitrogen-reducing septic systems is not enough to meet the nitrogen reduction goal and would require supplementary approaches. Therefore, additional strategies are also recommended as part of the contingency nitrogen management plan.
	Provisional Use Nitrogen-Reducing Onsite Septic Systems (effluent nitrogen concentration = 11 mg/L)	Strategy included in recommended nitrogen management plan.
	Cluster Systems	Strategy included in recommended and contingency nitrogen management plan.
	PRB	Strategy included in recommended nitrogen management plan.

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4.5 Nitrogen Management Plans

This section provides a summary of the estimated nitrogen removals (as presented in the NAR, Appendix A), nitrogen management plans for Truro's three coastal estuaries, as well as a No Action Alternative. Estimated nitrogen reduction goals were calculated using one of two methods:

– For watersheds with an established nitrogen TMDL, the TMDL with the incorporation of growth projections was used as the basis of the calculation.
– For watersheds that do not yet have an established nitrogen TMDL, loads presented in the Cape Cod Commission Watershed Reports, with the incorporation of growth projections, were used. As mentioned in Section 3, the CCC 208 Plan recommends an initial nitrogen management planning allowance for nitrogen-impaired watersheds without MEP reports or TMDLs to use a 25% nitrogen reduction.

For each watershed, two Nitrogen Management Plans (in addition to the No Action Alternative presented in Section 4.5.1) are presented:

– The Recommended Nitrogen Management Plan (also referred to as the Recommended Plan).
– The Contingency Nitrogen Management Plan (also referred to as the Contingency Plan).

In all the watersheds, the Recommended Plan includes at least two alternative approaches. As discussed in Section 4.1, per 314 CMR 21, if a recommended plan includes Alternative Control Approaches and Technologies, a contingency plan that consists only of conventional control technologies must be provided. For this reason, the watershed nitrogen management plans presented in Sections 4.5.2 through 4.5.4 include contingency plans that solely consist of conventional control technologies.

4.5.1 No Action Alternative

This section summarizes the potential impacts if the Town were to proceed without implementing any recommended improvements to address its nitrogen reduction needs.

The impact of excessive nitrogen on coastal waters and other natural resources is well documented. Without addressing these needs, as identified in the Wellfleet Harbor MEP report and SMAST Water Quality monitoring results from the Pamet River and East Harbor, Truro could continue to lose natural and economic resources including declines in shellfish habitats, decline in property value, continued algal blooms in coastal embayments, beach closures, and potential declines in tourism as the aesthetic impacts of excessive nitrogen loading continue to impair the Town's water resources.

In 2023, MassDEP promulgated amendments to 310 CMR 15.00 (Septic System Title 5 regulations) and new watershed regulations (314 CMR 21.00). These regulations require all onsite septic systems in a Nitrogen Sensitive Area (NSA) to be upgraded to the Best Available Nitrogen Reducing Technology within five years of a Nitrogen Sensitive Area designation or implement a 20-year watershed permit. If a Town chooses to upgrade all systems in a NSA and designated watersheds still do not meet their TMDL goals, MassDEP may still issue a Consent Order to achieve TMDL compliance.

Wellfleet Harbor is currently designated as a Nitrogen Sensitive Area. Under the No Action Alternative, all properties within Wellfleet Harbor would be required to upgrade to a Best Available Nitrogen Reducing Technology system within five years of September 29, 2023, the date of the NSA designation. The Town of Truro has filed a Notice of Intent (NOI) to apply for a watershed permit for the Wellfleet Harbor watershed. The filing of the NOI prevents commencement of the five-year time period in which Title 5 system upgrades would otherwise be required.

Given the water quality within the Pamet River and Provincetown Harbor watersheds, it is expected that, following the establishment of a nitrogen TMDL and completion of a public review process, these areas may also receive designation as Nitrogen Sensitive Areas.

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Financial impacts (beyond the impacts on the environment) of the No Action Alternative may include:

– Reduced property values and revenues.
– Noncompliance with Clean Water Act associated fines.
– MassDEP issuance of Consent Order to achieve the TMDLs and associated fines for not doing so in a timely manner. Issuance of a nutrient-related Consent Order would result in the Town being ineligible for nitrogen-mitigation zero-percent financing offered through the State Revolving Fund program (see Section 5.5).
– Reduced commercial shellfish income.
– Potential litigation.
– Potential reduced income to local businesses due to the reduced attractiveness of the Town to tourists and seasonal residents and retirees with accompanying loss of jobs.

4.5.2 Wellfleet Harbor

The Wellfleet Harbor watershed (Figure 4-1) is shared between Truro, Wellfleet, and Eastham, with a majority of the watershed within the Town of Wellfleet. The watershed has seven sub-embayments, with only a portion of one (Herring River/The Gut) in Truro. The following table summarizes the quantity of nitrogen that needs to be removed from the watershed to meet TMDL targets.

Table 4.13 Wellfleet Harbor: Herring River / The Gut – Nitrogen Load Reduction Goal

Subembayment	Truro's Current Nitrogen Removal Goal (kg-N/yr)	Truro's Future Nitrogen Removal Goal (kg-N/yr)
Herring River / The Gut	90	90

Most of the land area in Truro's portion of the watershed is located within the boundaries of the Cape Cod National Seashore and is undeveloped. The 92 developed parcels in the area are clustered near Ryder Pond and the Bound Brook areas, with most parcels greater than 1 acre in size, characterizing these areas as relatively low density (Figure 4-1). Thus, a decentralized approach is recommended for the Wellfleet Harbor watershed because it would be more cost-effective.

Various nitrogen strategies were considered to meet Truro's portion of the Wellfleet Harbor reduction goal, as presented in Section 4.4. After evaluating each of these approaches, a Recommended Plan and Contingency Plan were developed, as presented in the following table.

Table 4.14 Wellfleet Harbor Nitrogen Management Plan

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Recommended Plan	Contingency Plan
Stormwater Best Management Practices	54	-
Fertilizer Bylaw	51	-
Conversion of Existing Title 5 Systems to General Use Nitrogen-Reducing Systems – Single and Multi-Family Residential Properties[1]	-	92
Estimated Nitrogen Removed through Nitrogen Management Plan	**105**	**92**
Nitrogen Reduction Goal to Meet TMDL - Truro (Current)	**90**	**90**
Nitrogen Reduction Goal to Meet TMDL - Truro (2047)	**90**	**90**

Notes:
1. General Use Nitrogen-Reducing systems are approved for residential use.

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4.5.3 East Harbor

The Provincetown Harbor Watershed (Figure 4-2) is shared between Truro and Provincetown, with a majority of the watershed within Provincetown. The portion of the watershed within Truro primarily drains to East Harbor. The following table summarizes the Cape Cod Commission Provincetown Harbor Watershed Report estimated nitrogen loads to the watershed. The CCC Provincetown Harbor Watershed Report did not establish a removal goal utilizing the 25% removal placeholder because there is an existing treatment facility in Provincetown that collects and treats wastewater from the majority of the densely developed areas in the watershed. However, because the treatment facility does not treat any flows in the Town of Truro, the 25% nitrogen reduction allowance was applied to estimate Truro's portion of nitrogen load for remove. The future removal required was estimated by applying a conservative future growth factor of 4.5% over the 20-year planning period; this is consistent with the growth factor that Provincetown is carrying for Truro's flows, based on Truro's indication that Beach Point is anticipated to see minimal growth over the planning period, which was developed in coordination with the Town of Truro.

Table 4.15 East Harbor – Nitrogen Load

Watershed	Truro's Current Nitrogen Removal Goal (kg-N/yr)	Truro's Future Nitrogen Removal Goal (kg-N/yr)
East Harbor	289	317

The East Harbor watershed within Truro consists of a narrow band of residential development. The area includes a mix of single-family homes, motels, and condominiums on very small lots. This dense area, known as Beach Point, includes the section of Shore Road from Knowles Heights Road to the Town line with Provincetown. Pilgrim Heights, a neighborhood within the Cape Cod National Seashore bordering East Harbor, consists largely of conservation land, with low development density.

As stated in Section 4.4, discussions with Provincetown regarding a sewering strategy in Beach Point are in progress. It is recommended that the Town of Truro continue discussions with Provincetown to determine if the sewering option is the preferred approach. The Town should also evaluate whether the existing culvert between East Harbor and Cape Cod Bay is negatively impacting water quality in East Harbor by restricting tidal flushing.

Given Beach Point's vulnerable location along the shoreline, the Town should conduct vulnerability evaluations for both proposed on site systems and a centralized system prior to implementing structural nitrogen management strategies. Structural nitrogen management strategies should consider flood hazard exposure and long-term resilience.

With consideration given to Beach Point's vulnerable coastal location, various nitrogen strategies were considered to meet the East Harbor reduction goal, as presented in Section 4.4. After evaluating each of these approaches, two alternatives were developed, as presented in the following table.

Table 4.16 East Harbor Watershed Nitrogen Management Plan Alternatives

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Alternative 1	Alternative 2
Stormwater Best Management Practices	51	-
Fertilizer Bylaw	21	-
Conversion of Existing Title 5 Systems to Provisional Use Nitrogen-Reducing Systems[1]	246	-
Sewering[2]	-	989
Estimated Nitrogen Removed through Nitrogen Management Plan	**318**	**989**
Nitrogen Reduction Goal - Truro (Current)	**288**	**288**

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Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Alternative 1	Alternative 2
Nitrogen Reduction Goal - Truro (2047)	**318**	**318**

Notes:

1. Provisional Use Nitrogen-Reducing systems are approved for residential and commercial use.
2. Alternative 2 sewering load is the estimated nitrogen load reduction removed by connecting a portion of Beach Point to the Provincetown Wastewater Treatment Facility. The portion selected during discussions with the Town of Truro includes parcels between 361 Shore Drive - 563 Shore Drive.

Prior to the implementation of the above outlined strategies, Truro should complete the site-specific evaluations outlined above, including the culvert sizing evaluation, a vulnerability assessment, and continued discussions with Provincetown regarding centralized sewering.

4.5.4 Pamet River Watershed

The Pamet River watershed (Figure 4-3) is entirely within the Town of Truro. The following table summarizes the Cape Cod Commission Pamet River Watershed Report estimated nitrogen loads to the watershed. Because the watershed does not yet have an MEP Report or TMDL, the Cape Cod Commission estimated a watershed threshold load utilizing a 25% removal allowance.

Table 4.17 Pamet River Watershed – Nitrogen Loads

Subembayment	Truro's Current Nitrogen Removal Goal (kg-N/yr)	Truro's Future Nitrogen Removal Goal (kg-N/yr)
Pamet River	1,125	1,141

The Pamet River watershed covers a large portion of central Truro, stretching from the Cape Cod Bay shoreline inland through a mix of salt marshes, tidal flats, freshwater wetlands, forested uplands, and residential neighborhoods. The lower reaches near the harbor mouth and along key road corridors are more densely settled, with clusters of small parcels and seasonal homes, while other areas, primarily in the southeast, remain largely natural and protected within the Cape Cod National Seashore.

Various nitrogen strategies were considered to meet the estimated Pamet River reduction goal, as presented in Section 4.4. After evaluating each of these approaches, a Recommended Plan and Contingency Plan were developed, as presented in the following table.

Table 4.18 Pamet River Watershed Nitrogen Management Plan

Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Recommended Plan	Contingency Plan
Stormwater Best Management Practices	186	-
Fertilizer Bylaw	66	-
Permeable Reactive Barrier	112	-
Cluster System – Pamet River East	220	303
Cluster System – Pamet River West	-	227
Conversion of Existing Title 5 Systems to Provisional Use Nitrogen-Reducing Systems[1]	561	-

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Nitrogen Management Strategy	Estimated Nitrogen Reduction (kg-N/yr)	
	Recommended Plan	Contingency Plan
Conversion of Existing Title 5 Systems to General Use Nitrogen-Reducing Systems – Single and Multi-Family Residential Properties[2]	-	614
Estimated Nitrogen Removed through Nitrogen Management Plan	**1,145**	**1,144**
Nitrogen Reduction Goal - Truro (Current)	**1,125**	**1,125**
Nitrogen Reduction Goal - Truro (2047)	**1,141**	**1,141**

Notes:

1. Provisional Use Nitrogen-Reducing systems are approved for residential and commercial use.
2. General Use Nitrogen-Reducing systems are approved for residential use.

5. Comprehensive Watershed Management Plan

The purpose of this section is to present the Recommended and Contingency Nitrogen Management Plans to meet future (2047) reduction goals for Truro's three watersheds based on the alternatives analysis evaluations presented in Section 4 of this report. Estimated future required nitrogen reductions by watershed are summarized in Table 5.1.

Table 5.1 Estimated Nitrogen Reduction Goals by Watershed

Watershed	2047 Estimated Nitrogen Reduction Goal (kg-N/yr)
Wellfleet Harbor	90
East Harbor	317
Pamet River	1,141
Total	1,548

Notes:

1. Estimated nitrogen reduction goals were established as part of the NAR, see Appendix A.
2. Wellfleet Harbor estimated reduction goal is based on the TMDL Report, with a land area factor applied to estimate Truro's portion. Methodology is further described in Section 6 of the NAR.
3. Estimated reduction goals for East Harbor and Pamet River are based on the CCC estimated nitrogen load, with a 25% nitrogen removal target applied to Truro's portion of the load. Methodology is further described in Section 6 of the NAR.
4. For reference, an average single-family home with a Title 5 septic system is estimated to discharge approximately 4.7 kg-N/yr. (Source: Wellfleet Harbor MEP Report).

The nitrogen management approaches presented in the following sections were developed for anticipated growth through the planning period (2027 – 2047).

5.1 Nitrogen Management Plan

Based on the Nitrogen Reduction Strategies Alternatives Analysis discussed in Section 4, nitrogen management plans were developed for each watershed. The Draft Comprehensive Watershed Management Plan outlines the various nitrogen management strategies for the Recommended Nitrogen Management Plan (Recommended Plan) and the Contingency Nitrogen Management Plan (Contingency Plan) to meet the Town's nitrogen reduction goals outlined

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above. These nitrogen management strategies proposed for the Town's CWMP are summarized in Sections 5.1.1 and 5.1.2.

The Recommended Plan provides a comprehensive strategy for wastewater and nitrogen management for Truro's coastal estuaries. The Recommended Plan integrates multiple nitrogen management strategies for each watershed including a nitrogen-reducing onsite septic system program (utilizing Best Available Nitrogen-Reducing onsite septic system technologies currently in Provisional Use status), permeable reactive barriers, cluster systems, stormwater management, and fertilizer management.

The Contingency Plan provides a conservative estimate of additional onsite nitrogen-reducing septic systems (utilizing Best Available Nitrogen-Reducing onsite septic system Technologies in General Use status), cluster systems, and centralized sewering that would be required if pilot projects in the Recommended Plan did not perform as anticipated.

For the alternative strategies recommended in the following sections, a pilot project monitoring program, in accordance with the monitoring requirements outlined in the Watershed Permit Regulations, will need to be developed and initiated to monitor pilot project(s) performance through the Town's adaptive management program. The Town will adjust its Nitrogen Management Plan, as needed, based on the findings of the adaptive management program, through a Watershed Management Plan Update.

5.1.1 Decentralized Nitrogen Management Strategies

Based on the alternatives analysis and Truro's size, density, and cost considerations, the Recommended Plan consists primarily of decentralized infrastructure. Sections 5.1.1 and 5.1.2 outline the recommended nitrogen management strategies for the Town of Truro and its watersheds.

5.1.1.1 Fertilizer Management

The Truro Conservation Regulations (revised October 2021) define special conditions for particular projects that stipulate that fertilizers shall not be used within 100 feet of the wetlands, within the riverfront area, and within bordering land subject to flooding. To expand on the Town's fertilizer management policies, it is recommended that these regulations be expanded to all developed properties. Additionally, the Town should consider implementing restrictions on the time of year that fertilizer can be applied and mandating maximum loading rates for applications. The Town's fertilizer management program should aim to reduce the quantity of nitrogen and phosphorous entering the Town's water resources through a combination of education, licensure requirements, regulations of practice, and enforcement.

5.1.1.2 Stormwater Best Management Practices

The Town of Truro should implement non-structural stormwater BMPs through regulations. Additionally, the Town should evaluate the potential to implement structural stormwater BMPs. Regulations could require the implementation of stormwater BMPs in new development and redevelopment projects within the Town.

Non-structural BMPs can include street sweeping, maintenance of stormwater utilities, education and public outreach programs, land use planning, and impervious cover reduction control. These measures are a cost-effective strategy that allows for long-term nitrogen management planning.

Infrastructure BMPs can include stormwater bioretention soil media filters, constructed wetlands, and inlet protection, among others. It is recommended that the next step includes a screening evaluation to determine the feasibility of implementing structural BMPs within the Town. If determined feasible, the Town should proceed with site selection and preliminary design evaluation for structural stormwater BMPs. Truro should implement a maintenance plan to monitor performance of both structural and non-structural BMPs. Structural measures will require regular inspection and upkeep to maximize nitrogen removal efficiency.

5.1.1.3 Nitrogen Reducing Onsite Septic Systems

Table 5.2 outlines the Comprehensive Watershed Management Plan Nitrogen-Reducing Onsite Septic System Program. The Recommended Plan is based on the installation of nitrogen-reducing onsite septic systems which are

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currently permitted for a treated effluent total nitrogen concentration of 11 mg/L or less (Provisional Use). By comparison, the Contingency Plan is based on installation of systems which are currently permitted for a treated effluent total nitrogen concentration of 19 mg/L or less (General Use).

Table 5.2 Recommended and Contingency Nitrogen-Reducing Onsite Septic System Program

	Approximate Number of Properties[1]	
Watershed	**Recommended Plan[2]**	**Contingency Plan[3]**
Wellfleet Harbor	0[4]	61
East Harbor	33[5]	0[6]
Pamet River	98	412
Total	**130**	**473**

Notes:

1. The approximate number of parcels was calculated using water use data. For parcels with no available water use data, water use was estimated based on the Massachusetts Estuaries Project average water uses. As summarized in Section 6.2.3 of the NAR, single family residential parcels were assigned a water use of 145 gpd, multi-family residential parcels were assigned a water use of 290 gpd, commercial properties were assigned a water use of 200 gpd / 1,000 SF of building area, and industrial properties were assigned a water use of 49 gpd / 1,000 SF of building area.
2. The number of parcels for the recommended plan includes residential and commercial parcels. The approximate number of parcels was estimated based on an effluent TN concentration of 11 mg/L.
3. The number of parcels for the contingency plan includes only residential parcels. The approximate number of parcels was estimated based on an effluent TN concentration of 19 mg/L.
4. There are no systems currently included as part of the Wellfleet Harbor recommended plan because initial estimates indicate the removal goal can be met through fertilizer management and stormwater best management practices.
5. This scenario represents the nitrogen-reducing onsite septic program proposed under Alternative 1 for Provincetown Harbor. As outlined in Section 4.5.3, additional evaluations are recommended to establish the Recommended and Contingency Plan for this watershed.
6. This scenario represents Alternative 2 for Provincetown Harbor. Alternative 2 does not include onsite septic systems because converting all properties to general use systems would not meet the removal goal, therefore sewering is the basis of Alternative 2. As outlined in Section 4.5.3, additional evaluations are recommended to establish the Recommended and Contingency Plan for this watershed.

The Town's current Board of Health regulations (revised May 2025) include the following triggers for the conversion of Title 5 systems to nitrogen-reducing onsite systems (that treat to an effluent nitrogen concentration of 19 mg/L or less):

– Flows greater than 600 gpd.
– Nitrogen credit applications (only allowed for ADUs without a variance).
– Certain non-conforming systems, as determined by the Board of Health.
– Previously approved systems that exceed a nitrogen loading rate of 110 gpd / 10,000 SF of lot area.
– Certain cases where a variance is required and a nitrogen-reducing system will mitigate environmental impacts of the proposed system, as determined by the Board of Health.

The Town of Truro is considering revising its Board of Health regulations to include additional triggers for the installation of nitrogen-reducing onsite systems, including:

– Property sale/transfer.
– Failed septic systems.
– Systems within a specific distance of any wetland or within a floodplain.
– New construction.
– Re-development / expansions.
– Properties in priority watersheds.

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Other strategies for implementing nitrogen-reducing systems could include a geographic or phased schedule. This method could phase the required upgrade to nitrogen-reducing systems based on proximity to surface waters, wellhead protection zones and / or established geographic areas.

Existing BOH triggers and new BOH triggers would require the installation of nitrogen-reducing systems that treat to an effluent nitrogen concentration of 11 mg/L or less.

The Watershed Permit would outline the Town's strategies to implement the installation of nitrogen-reducing onsite systems that treat to an effluent concentration of no more than 11 mg/L. The permit will include a monitoring program to track system performance and provide the basis for quantifying nitrogen removal credits. As part of the Adaptive Management framework, triggers and strategies could be modified through the milestone reports (Watershed Management Plan updates) if implementation progress is lagging or adjustments are needed to meet nitrogen reduction goals.

5.1.1.4 Permeable Reactive Barrier (PRB)

The Recommended Plan includes the installation of a PRB directly down-gradient of a high-nitrogen producing agricultural property in the Pamet River watershed. It is estimated that the PRB can remove approximately 112 kg N/yr based on an estimate of the nitrogen load at the agricultural property. This estimate assumes 70% of the agricultural property's nitrogen load is removed through the PRB; this is an initial approach based on the Cape Cod Commission 208 Plan estimate that a PRB achieves 75% to 95% nitrogen removal which will need to be refined through groundwater characterization and piloting. This estimate does not account for additional properties upgradient of the proposed PRB location. To accurately quantify the additional nitrogen load of upgradient properties that would be captured by the PRB, the Town should perform a flow direction analysis and develop groundwater contour maps. The Town should also characterize the anticipated depth to groundwater, sediment type and groundwater flow velocity, vertical nitrogen concentration profile, and the depth of the highest groundwater nitrogen concentrations. These analyses would be used to determine the total nitrogen load that is anticipated to be intercepted and treated by the PRB. The Town should initiate coordination with the property owner of the identified PRB site. As part of the Adaptive Management Plan, the nitrogen load reduction credit for the PRB could be adjusted if additional upgradient sources are confirmed to be treated by the PRB, or on the contrary, if the nitrogen load treated is not as high as anticipated.

5.1.1.5 Cluster Systems

One potential cluster system location has been identified in the Pamet River as part of the Recommended Plan, with an additional potential cluster system identified for the Contingency Plan. Table 5.3 outlines a preliminary estimate on the number of properties that could be connected to the potential cluster system as part of the Recommended Plan and Contingency Plan.

Table 5.3 Recommended Plan and Contingency Plan – Anticipated Cluster Systems Connections

	Approximate Number of Properties	
Watershed and System	**Recommended Plan**	**Contingency Plan**
Pamet River East	34	51
Pamet River West	0	57

5.1.2 Traditional Nitrogen Management Strategies

The Recommended Plan outlined in this report relies on alternative nitrogen management strategies, however, sewering is recommended for the Contingency Plan in East Harbor. This approach would utilize the existing wastewater treatment facility in Provincetown. The anticipated number of connections in the Contingency Plan is summarized in Table 5.4.

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Table 5.4 Contingency Plan – Anticipated Sewer Connections

	Approximate Number of Properties	
Watershed	Recommended Plan	Contingency Plan
East Harbor	0	91

Notes:

1. This scenario represents Alternative 2 for East Harbor. As outlined in Section 4.5.3, additional evaluations are recommended to establish the Recommended and Contingency Plan for this watershed.

5.2 Adaptive Management Plan

The Recommended Plan includes the implementation of an adaptive management process to incorporate cost-effective pilot technologies into the plan once they demonstrate feasibility. The adaptive management process will involve ongoing water quality monitoring to monitor and respond to the results of the implementation. Adaptive management will be implemented through five-year Watershed Management Plan Update Reports, which will evaluate progress and guide any necessary adjustments to strategies. The Watershed Management Plan Update Reports will serve as the five-year milestone reports for the Watershed Permit.

This adaptive management approach will enable the Recommended Plan to be adjusted based on the monitoring results of the environmental and economic impacts associated with the implementation of fertilizer bylaws, stormwater best management practices, nitrogen-reducing onsite septic systems, and cluster systems in Truro. Coordination with MassDEP will be conducted throughout this process. The Contingency Plan will then only require implementation through this Adaptive Management Program, in whole or in part, based on the performance of the Recommended Plan.

5.3 Responsible Management Entity

A Responsible Management Entity (RME) will need to be established to implement the nitrogen-reducing onsite septic system program outlined in the Recommended Plan. The RME is anticipated to oversee the monitoring of the program as part of the Town's adaptive management program. RME responsibilities could be fulfilled through a Town department or subcontracted.

5.4 Planning Level Capital Cost Estimates and Implementation Schedule

Planning level capital cost estimates were developed for the Recommended and Contingency Plans. Planning level capital cost estimates for infrastructure recommended as part of a multi-year planning project are typically developed at this time. As the project progresses to implementation, it is critical that these initial estimates are updated and refined at each stage of the planning and design process to accurately reflect items that may affect the cost estimates. These may include, but are not limited to:

– Changes in bidding climate and tariffs.
– State and Federal funding changes.
– Design changes resulting from future law, regulation, or code changes.
– Design changes results from industry or manufacturer advances, updates, or changes.
– Design changes based on Owner requests or other decision-making processes.
– Unknown conditions discovered through field investigations during design (borings, surveys, etc.).
– Design decisions regarding proprietary equipment/sole sourcing of equipment.

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It is recommended that the planning level capital cost estimates presented in this report continue to be refined and updated at each major stage of program implementation, including during the design process and prior to construction financing.

The following assumptions were used to develop the planning level cost estimates for the nitrogen management strategies included in the Recommended Plan and Contingency Plan:

Permeable Reactive Barrier (PRB) Planning Level Estimate

- Planning level PRB construction cost estimates are initially based on the estimated removal cost outlined in the Cape Cod Commission 208 Plan.
- Because of the conceptual nature of this evaluation, a 30% construction contingency is carried as no detailed design has been performed and no groundwater characterization or survey has been performed. During final design, a reduced contingency will be carried for variability in the bidding climate, project changes before bidding, easements, residential property restoration, and changes due to unforeseen conditions. Project costs are presented in 2025 dollars. Once the construction timeframe has been finalized, project costs should be adjusted to the mid-point of construction. The capital cost estimates also include a 10% design allowance, 15% construction phase services allowance, 1% legal/fiscal allowance, and 4% survey and soil borings allowance.

Nitrogen Reducing Onsite System Program

- General Use I/A System costs were developed based on the planning values outlined in the 'Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod – Guidance to Cape Cod Towns Undertaking Comprehensive Wastewater Management Planning,' prepared by the Barnstable County Wastewater Cost Task Force – April 2010, updated by AECOM (updated April 2014). Costs were escalated to 2025 dollars.
- Provisional I/A System costs are based on an average of cost data provided in 2025 by KleanTu for the NitROE® system and recent construction bids from Cape Cod towns for NitROE® system installations. The cost estimates include estimated costs for full system upgrade. Cost estimates are included for full systems. Cost savings may be recognized on a per parcel basis, if a property is able to convert its existing Title 5 system to a nitrogen-reducing system and does not require a full septic system replacement.
- The capital cost estimates include a 30% contingency.
- Project costs are presented in 2025 dollars. Once the construction timeframe has been finalized, project costs should be adjusted to the mid-point of construction.

Centralized Sewer Connections and Cluster Systems

- Regional construction bids from Cape Cod projects, dated 2023, were used to develop an estimated construction cost for the collection system.
- Anticipated costs to acquire any privately-owned land for pump stations were not included in the planning level cost estimates.
- The construction cost estimate includes estimated costs for linear infrastructure within the right-of-way only, not on private property.
- The construction cost estimate includes estimate for full width mill and overlay pavement restoration.
- Procurement and installation of grinder pumps required for a low-pressure system are not included in the cost estimate.
- Estimated costs assume that no hazardous materials or other materials that require special handling are encountered.
- Estimated project costs do not include utility relocation.
- Estimated project costs do not include archaeological monitoring.
- Allowances are carried for Truro's contribution to Provincetown infrastructure and capacity costs.

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– Because of the conceptual nature of this evaluation, a 30% construction contingency is carried as no detailed design has been performed, and no survey has been performed. During final design, a reduced contingency will be carried for variability in the bidding climate, project changes before bidding, easements, residential property restoration, and changes due to unforeseen conditions. Project costs are presented in 2025 dollars. Once the construction timeframe has been finalized, project costs should be adjusted to the mid-point of construction. The capital cost estimates also include a 10% design allowance, 15% construction allowance, 1% legal/fiscal allowance, 8% police detail allowance, and a 4% survey and soil borings allowance.

Planning level capital costs for the Recommended Plan and Contingency Plan are summarized in Table 5.5. The implementation schedule for the Recommended Plan is outlined in Table 5.6.

Table 5.5 Truro Recommended Plan – Planning Level Capital Costs

Strategy	Recommended Plan – Full Estimated Capital Costs (2025 $)	Contingency Plan – Full Estimated Capital Costs (2025 $)
Fertilizer Management Allowance[1,2]	$-	$-
Stormwater Best Management Practices Allowance[2]	$8.66 M	$-
Permeable Reactive Barrier Allowance[2]	$1.38 M	$-
Nitrogen Reducing Onsite Septic System Program[3,4]	$9.06 M	$32.82 M
Centralized Sewering (Treated at Provincetown WWTF)[5,6]	$-	$14.78 M
Cluster System – Pamet River East[7]	$4.46 M	$5.94 M
Cluster System – Pamet River West[7]	$-	$6.31 M
Total Capital Costs (2025 $)	**$23.56 M**	**$59.86 M**

Notes:

1. No capital cost is carried for a fertilizer management allowance because this strategy does not involve any construction projects. All implementation measures are regulatory actions.
2. Stormwater best management practices, and permeable reactive barrier costs were based on planning level costs from the Cape Cod Commission 208 Plan 2015 Update. Stormwater BMP cost includes budget for implementation of non-structural strategies, including street sweeping, maintenance of stormwater utilities, education and public outreach programs, land use planning, and impervious cover reduction and control.
3. General Use nitrogen-reducing system costs were developed based on the planning values outlined in the 'Comparison of Costs for Wastewater Management Systems Applicable to Cape Cod – Guidance to Cape Cod Towns Undertaking Comprehensive Wastewater Management Planning,' prepared by the Barnstable County wastewater Cost Task Force – April 2010, updated by AECOM (updated April 2014).
4. Provisional nitrogen-reducing system costs are based on recent (2023) construction bids from other Cape Cod towns.
5. Recent regional construction bids from Chatham, Barnstable, and Falmouth were used to develop an average per parcel construction cost for the collection system. The sewering cost includes allowances for Truro's contribution to Provincetown for capacity and infrastructure costs.
6. Centralized sewering cost includes an allowance for contributions to Provincetown for infrastructure and capacity costs which were established through discussions between Truro and Provincetown.
7. Cluster system cost estimates were based on vendor quotes obtained in 2025.
8. Planning level project costs are presented in 2025 dollars (ENR January 2025 = 13731.6). Once a construction timeframe is finalized for each project, project costs should be adjusted to the anticipated mid-point of construction. Planning level capital cost estimates for infrastructure recommended as part of a multi-year planning project are typically developed as part of the planning process. As the project progresses, it is critical that these initial estimates are updated and refined at each stage of the planning and design process and prior to construction financing to accurately reflect items that may affect the cost estimates.

The following table provides an overview of the proposed Recommended Plan implementation schedule in five-year increments. While the schedule includes implementation in all three of Truro's watersheds, only Wellfleet Harbor is

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currently subject to a regulatory timeframe established through the Watershed Permitting process. Once TMDLs are established and Notices of Intent (NOIs) are filed for the Pamet River and Provincetown Harbor watersheds, they will also be subject to regulatory timelines.

Table 5.6 Truro Recommended Plan – Implementation Schedule Summary

Strategy	2027-2031	2032-2036	2037-2041	2042-2046
Fertilizer Management				
Stormwater Best Management Practices				
PRB				
Nitrogen-Reducing Onsite Program				
Cluster System – Pamet River East				

Table 5.7 provides a more detailed breakdown of the CWMP targeted milestone implementation schedule, including anticipated nitrogen reductions targets for each program.

Table 5.7 Truro Comprehensive Watershed Management Plan – Targeted Milestone Implementation Schedule

Phase	Years		Activity	Nitrogen Reduction (kg/yr)
	Up to 2027		Develop methodology to implement nitrogen-reducing onsite septic system program (i.e. BOH triggers or phased approach)	
1	1 to 5	2027 - 2031	Obtain Watershed Permit for Wellfleet Harbor (by 2030)	
			Enact Fertilizer Reduction Bylaw	138
			Implement Non-Structural Stormwater Best Management Practices and Regulations	291
			Initiate installation of Nitrogen-Reducing Onsite Septic Systems	202[1]
			Initiate recommended evaluations including: Pamet River: PRB location groundwater characterization and piloting, Little Pamet delineation and evaluation East Harbor: discussions with Provincetown, vulnerability assessment, culvert sizing evaluation Structural stormwater BMPs: site evaluation Cluster systems: conceptual layout development, coordination with property owners, development of design and construction milestones	
1st Watershed Management Plan Update Report Goals: 1. Evaluate monitoring data 2. Outline any changes in Recommended Plans identified through the Adaptive Management Program				
2	6 to 10	2032 - 2036	Install Permeable Reactive Barrier in Pamet River watershed	112
			Install Pamet River East cluster system	220
			Install Nitrogen-Reducing Onsite Septic Systems	202[1]
2nd Watershed Management Plan Update Report Goals: Goals to be established in the 1st Watershed Management Plan Update.				

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Phase	Years		Activity	Nitrogen Reduction (kg/yr)
3	11 to 15	2037-2041	Install Nitrogen-Reducing Onsite Septic Systems	202[1]
3rd Watershed Management Plan Update Report Goals: Goals to be established in the 2nd Watershed Management Plan Update.				
4	16 to 20	2042-2046	Install Nitrogen-Reducing Onsite Septic Systems	202[1]
4th Watershed Management Plan Update Report Goals: Goals to be established in the 3rd Watershed Management Plan Update.				
Notes: 1. For planning purposes, it is assumed that the nitrogen-reducing onsite septic system program achieves 25% of its total estimated reduction in each implementation phase.				

At each five-year milestone report, as required by the Watershed Permit Regulations, the Town will need to evaluate the performance of the implemented nitrogen strategies to assess progress toward watershed nitrogen reduction goals and document nitrogen removal credits. Monitoring data and updated load estimates should be used to determine whether the implementation schedule and/or selected management approaches should be adjusted. This adaptive management process will ensure that the plan remains effective and responsive to observed environmental conditions and community needs.

5.5 Technical and Financial Assistance

For conventional infrastructure such as cluster systems, centralized sewering, and stormwater improvements, it is recommended that the Town pursue financial assistance through the Clean Water State Revolving Fund (CWSRF) program. Nutrient management projects, which meet established criteria, are eligible to apply for 0% financing through this program. The criteria for 0% financing are:

1. The project is primarily intended to remediate or prevent nutrient enrichment of surface waters or water supply sources in order to meet a NPDES permit or an EPA-approved TMDL.
2. The applicant is not currently in violation of a MassDEP enforcement order, administrative consent order or unilateral administrative order or enforcement action by the United States Environmental Protection Agency due a violation of a nutrient-related total maximum daily load standard or other nutrient based standard.
3. The CWMP is approved by MassDEP and EOEEA (as demonstrated by an approval letter and/or certificate).
4. The project is consistent with the regional water resources management plan (as demonstrated by a certificate or letter of consistency from the regional planning agency).
5. The applicant has adopted flow neutral land use controls as provided in 314 CMR 44.04(3).

SRF-eligible projects may also access the Cape and Islands Water Protection Fund (CCIWPF), which is a dedicated fund within the State's Clean Water Trust established to benefit communities on Cape Cod, Martha's Vineyard, and Nantucket. The CCIWPF subsidizes a portion of the SRF loan principal for qualified projects.

Individual homeowners may seek financial assistance for septic system upgrades and municipal sewer connections through the Cape Cod Aquifund. The Aquifund provides betterment loans for nitrogen-reducing septic system installation or municipal sewer connections.

The State also provides a tax credit to assist with the costs of septic upgrades at primary residences.

The goal of the CWMP is to meet nitrogen reduction targets in the most cost-effective and equitable manner possible. Given that nitrogen management Town results in Town-wide benefits, the Town is proactively evaluating other financing strategies to equitably distribute program costs between properties that are included in different nitrogen management programs.

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5.6 Next Steps

Based on the Recommended Nitrogen Management Plan presented, this section identifies next steps the Town should take to facilitate implementation.

Stormwater Management

In addition to implementing non-structural stormwater best management practices, the Town should identify locations for potential structural stormwater improvements such as leaching galleys, raingardens, bioretention systems, and constructed wetlands. It is recommended that Truro identify Town owned parcels; vacant portions of developed Town owned parcels should be considered for stormwater improvements. Infrastructure should be selected based on available land area and site topography. The Town should consider discussions with MassDOT to potentially target stormwater discharges from Route 6, a large contributor of impervious area in Truro's watersheds, as presented in Section 4.3.3. Regarding non-structural BMPs, the Town should establish public education programs and maintenance programs for street sweeping and catch basin maintenance to facilitate long-term performance.

Fertilizer Management

The Town should implement and enforce fertilizer bylaws. Implementation should include a public outreach program to promote nitrogen-conscious practices.

Permeable Reactive Barrier

To successfully implement a PRB in the Pamet River watershed, the Town should advance the conceptual design of the PRB to confirm feasibility. The Town should conduct groundwater characterization, which includes: flow direction analysis, depth to groundwater, sediment type and flow velocity, vertical nitrogen concentration profile, and the depth of the highest groundwater nitrogen concentration. These analyses, along with nitrogen load assessments will allow the Town to refine the location, design, design parameters (depth and length), and estimated captured area of potential upgradient nitrogen loads. The Town should initiate coordination with the property owner of the identified PRB site and begin piloting efforts.

East Harbor Culvert Assessment

It is recommended that a hydrodynamic evaluation be conducted to assess tidal flushing conditions at the existing culvert. Based on the findings of this analysis, culvert widening may be included in Truro's Adaptive Management Plan.

Responsible Management Entity

The Town needs to identify a Responsible Management Entity to oversee installation, operation, and maintenance of the individual nitrogen-reducing onsite septic system program which proposed as part of the Recommended Plan. Identification of an RME should include clearly defined management roles, permitting responsibilities, and reporting requirements to ensure system compliance. The Massachusetts Alternative Septic System Test Center (MASSTC) is in the process of developing a septic utility program (SUP) that could potentially serve as an RME. The Town may explore collaboration with MASSTC as a potential option for identifying an RME.

Climate Resiliency

The Town should evaluate various climate resiliency strategies such as resilient infrastructure siting and solar photovoltaic systems. These climate resiliency measures are described in Section 6.

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Financing

The Town should pursue available financing opportunities through the various funding agencies defined in Section 5.5.

6. Climate Change/Greenhouse Gas Evaluation for the Recommended Plan

The Town of Truro is a low-lying community bounded to the west by Cape Cod Bay and to the east by the Atlantic Ocean, making it vulnerable to coastal flooding from storm surges, coastal erosion, and impacts of future sea level rise. The Town of Truro is proactively evaluating and implementing climate adaptation strategies through its Climate Action Committee.

In June 2025, the Massachusetts Department of Energy Resources declared Truro to be one of the 19 "climate leader communities" in the State. Truro achieved this designation through establishment of a Climate Action Committee and an Energy Committee, development of a decarbonization plan which outlines a policy to eliminate fossil fuel use by 2050, development of a zero emissions policy for new Town vehicles, and adopting the State's specialized stretch energy code.

As the Town continues to evaluate and implement climate change adaptation strategies for its proposed nitrogen management plan, the following design strategies are recommended to increase the coastal resilience of vulnerable infrastructure:

- Establish a planning horizon through the end of infrastructure design life.
- Consider alternative locations for any proposed infrastructure within the planning horizon floodplain.
- For infrastructure that needs to be located within the planning horizon floodplain, establish a design flood elevation for design and construction which incorporates Federal Emergency Management Agency (FEMA) flood elevations, industry freeboard requirements, and allowances for anticipated sea level rise through the end of the project planning horizon.
- Assess impacts of future precipitation events, as measured by the 24-hour rainfall volumes provided by the MA Resilience Design Tool during design of wastewater and stormwater facilities.

Each of the recommended strategies will be further evaluated during the design stage of the project to determine feasibility.

6.1 Climate Change – Adaption and Resiliency

6.1.1 Climate Resilience Design Standards Tool

The Resilient Mass Action Team's (RMAT) Climate Resilience Design Standards Tool, developed by the Commonwealth of Massachusetts, was used to better understand and evaluate the climate risks and resilience strategies associated with the Recommended Plan. The tool is an interactive resource that supports climate adaptation and resilience planning by providing risk assessments for a variety of climate hazards. Based on a project's inputs, the tool evaluates exposure to flooding, sea level rise, and extreme heat. RMAT assigns a low, moderate, or high-risk score to each asset or area. Scores are based on projected climate conditions, sensitivity, and project locations.

An analysis was run for each watershed: Wellfleet Harbor, Provincetown Harbor (East Harbor), and Pamet River. For the Pamet River watershed, two analyses were conducted, one for the western side, and one for the eastern side (due to size restrictions within the tool). After selecting a project area in the tool for each watershed, the tool identified specific prompts to be addressed relative to the following inputs:

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– Core project information.
– Project ecosystem services benefit.
– Project climate exposure.
– Project assets.

Outputs provided the following:

1. Preliminary climate exposure and risk ratings.
2. Recommended climate resilience design standards and guidance.

The RMAT Climate Resilience Design Standards Tool outputs are included in Appendix D and are summarized below.

6.1.1.1 Wellfleet Harbor

The Wellfleet Harbor Recommended Plan assets includes stormwater best management practices. Based on the project inputs, the project score is moderate. The following table provides the overall exposure scores for the watershed.

Table 6.1 Wellfleet Harbor Project Exposure Score

Exposure	Score
Sea Level Rise / Storm Surge	Moderate Exposure
Extreme Participation – Stormwater Flooding	Moderate Exposure
Extreme Precipitation – Riverine Flooding	High Exposure
Extreme Heat	Low Exposure

Based on the exposure scores above, climate risk ratings were developed for the proposed assets and are summarized in Table 6.2.

Table 6.2 Wellfleet Asset Preliminary Climate Risk Rating Summary

Asset	Sea Level Rise / Storm Surge	Extreme Participation – Stormwater Flooding	Extreme Participation – Riverine Flooding	Extreme Heat
Stormwater BMPs	Moderate Risk	Moderate Risk	High Risk	Low Risk

6.1.1.2 Provincetown Harbor: East Harbor

The East Harbor Recommended Plan assets includes stormwater best management practices and provisional use nitrogen-reducing onsite septic systems. Based on the project inputs, the project score is moderate. The following table provides the overall exposure scores for the watershed.

Table 6.3 Provincetown Harbor Project Exposure Score

Exposure	Score
Sea Level Rise / Storm Surge	High Exposure
Extreme Participation – Stormwater Flooding	Moderate Exposure
Extreme Precipitation – Riverine Flooding	High Exposure
Extreme Heat	High Exposure

Based on the exposure scores above, climate risk ratings were developed for the proposed assets and are summarized in the following table.

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Table 6.4 East Harbor Asset Preliminary Climate Risk Rating Summary

Asset	Sea Level Rise / Storm Surge	Extreme Participation – Stormwater Floding	Extreme Participation – Riverine Floding	Extreme Heat
Provisional Use Nitrogen Reducing Onsite Systems	High Risk	Moderate Risk	High Risk	High Risk
Stormwater BMPs	High Risk	Moderate Risk	High Risk	High Risk

6.1.1.3 Pamet River

The Pamet River Recommended Plan assets include stormwater best management practices and provisional use nitrogen-reducing onsite septic systems, a PRB, and a cluster system. As stated before, two analyses were run for this watershed. Based on the project inputs, the project score both times is moderate. The following table provides the overall exposure scores for the watershed.

Table 6.5 Pamet River Project Exposure Score.

Exposure	Pamet River East Score	Pamet River West Score
Sea Level Rise / Storm Surge	High Exposure	High Exposure
Extreme Participation – Stormwater Floding	Moderate Exposure	Moderate Exposure
Extreme Precipitation – Riverine Flooding	High Exposure	High Exposure
Extreme Heat	Moderate Exposure	Moderate Exposure

Based on the exposure scores above, climate risk ratings were developed for the proposed assets and are summarized in the following table.

Table 6.6 Pamet River Asset Preliminary Climate Risk Rating Summary

Asset	Sea Level Rise / Storm Surge	Extreme Participation – Stormwater Floding	Extreme Participation – Riverine Floding	Extreme Heat
Provisional Use Nitrogen Reducing Onsite Systems	High Risk	Moderate Risk	High Risk	Moderate Risk
Stormwater BMPs	High Risk	Moderate Risk	High Risk	Moderate Risk
PRB	High Risk	Moderate Risk	High Risk	Moderate Risk
Cluster System	High Risk	Moderate Risk	High Risk	Moderate Risk

6.1.1.4 Summary

Overall, the RMAT Climate Resilience Design Standards Tool results indicate that the Recommended Plan assets across all three of Truro's watersheds are subject to moderate to high exposure to climate-related stressors, particularly flooding and sea level rise. These scores are primarily influenced by the selected project area boundaries, which were conservatively selected as the entire extent of the Town's watersheds. High sea level rise scores were generally assigned due to the watersheds being exposed to coastal flooding events and within the predicted mean high-water shoreline by 2030. Flooding scores were influenced by the mapped FEMA floodplains and the annual daily rainfall within the watersheds. The results highlight the importance of resilient infrastructure siting and design. As projects advance into design, siting considerations will include strategies to mitigate environmental impacts, enhance flood resilience, and protect natural resources.

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6.2 Base Case and Recommended Plan Greenhouse Gas Evaluation

In accordance with the MEPA Greenhouse Gas Emissions Policy and Protocol, a Base Case (existing onsite septic systems) and Recommended Case (Recommended Plan) Greenhouse Gas (GHG) evaluation was conducted. Because existing software used to calculate GHG emissions and energy consumption, such as the USEPA Energy Star tool, uses building area to calculate emissions, an alternative approach was developed for this largely decentralized plan.

The GHG evaluation uses septic system and centralized system CO_2 emissions estimates developed by the Intergovernmental Panel on Climate Change (IPCC), following methodology outlined in the 2023 New York State Greenhouse Gas Emissions Sectoral Report #4.

The IPCC estimates that centralized systems emit 108.9 kg of CO_2 equivalent per capita per year, and individual onsite septic systems generate 353.3 kg CO_2 equivalent per capita per year. Methane is generated by microorganisms decomposing organic material in wastewater under the largely anaerobic conditions in a septic system. A wastewater treatment facility relies more on aerobic treatment methods and uses methane capture mitigate the amount of emissions produced. According to the 2025 Truro Housing profile prepared by the Cape Cod Commission, there are approximately 1,675 year-round residents in 1,053 households, making the average household size 1.6 people. This data was used to estimate CO_2 emissions for the Base Case (wherein all residents are served by septic systems) and The Recommended Case (wherein a variety of technologies are implemented in accordance with the Recommended Plan described in Section 5). Tables 6.7 and 6.8 summarize the findings of the analysis.

Table 6.7 Base Case GHG Emissions Estimate

Base Case Infrastructure	Population Served	Estimated Emissions (tons CO_2 per year)
Traditional Onsite Septic Systems	1,675 (all residents)	652
Total	**1675**	**652**

Table 6.8 Recommended Case GHG Emissions Estimate –Wastewater Management Strategies

Recommended Case Components	Year Round Population Served (Wastewater Infrastructure)	Estimated Emissions (tons CO_2 per year)
Traditional or Nitrogen-Reducing Septic Systems[1]	1,625 (all residents)	631
Cluster System (34 properties)[2]	54	7
Total	**1675**	**638**

Notes:

1. It is anticipated that major generation sources are similar for both conventional and nitrogen-reducing system types. Should more data become available, GHG emissions analyses can be updated in Watershed Management Plan Updates.
2. The proposed cluster system is classified as a centralized system.

6.3 Opportunities for Energy Generation and Recovery

6.3.1 Solar Photovoltaic (PV) Systems

Solar PV arrays can be used by facilities with adequate space to produce renewable energy onsite. Arrays can by ground-mounted or roof-mounted depending on the orientation of the facility's building and available roof space. South facing roofs with minimal shadow interference provide the most ideal conditions for a roof-mounted solar array. A

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shade analysis would need to be conducted at a potential site to determine the feasibility of a solar installation. On average, Massachusetts experiences 4.5 sun hours per day of solar energy. In comparison, Phoenix, Arizona experiences 6.4 sun hours per day. For an equivalent amount of power output from a PV panel in Massachusetts, the module area would be designed to be approximately 40% larger than in Phoenix.

A solar system can be used in a wastewater treatment facility to provide energy for the treatment process and reduce the plant's dependence on fossil fuels.

The Town should consider conducting a feasibility analysis of installing a solar array system at the proposed cluster system facilities to estimate the amount of energy that could be produced versus the amount of energy expected to be consumed. Initial capital cost, operational and maintenance cost, and replacement costs associated with the solar system will need to be compared to the amount of energy the solar system could produce to determine the feasibility of installing a solar system.

6.4 Water Conservation Considerations

The Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) and Water Resources Commission developed the *Massachusetts Water Conservation Standards* (last updated in 2018) to set State-wide goals for water conservation and water-use efficiency. The document highlights the environmental benefits and potential financial savings of water conservation through reduced operation, maintenance and wastewater treatment costs, increased plant capacity, and savings from avoiding the development of new water sources. Key water conservation efforts that can reduce wastewater flows and loads are as follows.

6.4.1 Reduced Flow Plumbing

Reduced flow plumbing should be considered in design whenever possible and permitted by the local plumbing code. Devices that can be installed in the facility to reduce water consumption include water saving toilets, reduced flush devices, and restricted flow shower heads. Opportunities to implement reduced flow plumbing will be evaluated during the design of the proposed cluster system facilities. Low flow fixtures would not reduce pollutant loads as pollutants would simply be concentrated in the reduced flow.

6.4.2 Inflow and Infiltration Reduction

Locating and repairing sources of inflow and infiltration (I/I) in a gravity collection system helps to minimize the quantity of water that needs to be pumped and treated. Excessive I/I can exhibit negative effects on the wastewater treatment system by diluting pollutant concentrations in the wastewater and washing out microbes needed for biological treatment. As the Town currently does not have any existing collection systems, this would only be performed following the construction and operation of any proposed collection systems for cluster treatment or following connection to the Provincetown collection system if that contingency is implemented with a gravity system.

6.4.3 Reclaimed Water Reuse

The New England Interstate Water Pollution Control Commission (NEIWPCC) Technical Report 16: Guides for the Design of Wastewater Treatment Works (TR-16) recommends conducting an assessment to determine if there are any economic effluent reuse opportunities at a facility in order to minimize the use of potable water. Increasing treated wastewater recharge and reuse is one of the 10 major recommendations of the 2004 Massachusetts Water Policy issued by the EOEEA. Opportunities to increase reclaimed wastewater for non-potable uses will be evaluated during design of proposed infrastructure systems.

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7. Environmental Impact Analysis

This section analyzes the potential environmental impacts of the infrastructure projects outlined in the Truro CWMP for the Recommended Plan and No Action Alternatives. Effects are analyzed in accordance with the criteria outlined in 301 CMR 11.00.

7.1 Topography, Geology, and Soils

7.1.1 Recommended Plan

Construction of individual nitrogen-reducing onsite septic systems and the cluster wastewater treatment systems outlined in the Recommended Plan will involve land disturbance. A cluster treatment system may require construction of one or more small buildings to house process and electrical equipment. It will also require an effluent recharge system and sewer lines to collect wastewater and convey it to the treatment site. The majority of the sewer lines will be installed beneath roads, which is considered previously disturbed land.

Installation of nitrogen-reducing septic systems will also require land disturbance for the installation of new tanks and any upgrades to the existing systems to support the new treatment technologies needed. This may also require upgrade to the leaching facilities depending on the age of the existing system. New systems will require land disturbance for all components for an onsite septic system and the associated house drain piping.

Installation of a PRB will require land disturbance, though this is dependent on the PRB method chosen. Injection type systems are anticipated to require a smaller land disturbance footprint than open cut systems where a trench is required to install the PRB media.

Installation of structural stormwater BMPs may require land disturbance. Stormwater BMPs are often installed in the road right-of-way, on land considered previously disturbed, however nitrogen-reducing BMPs require larger land areas and may also result in creation of constructed wetlands or other drainage systems requiring larger land areas.

7.1.2 No Action Alternative

The No Action Alternative is not anticipated to increase the level of soil disturbance in the Planning Area.

7.2 Surface and Groundwater Hydrology and Quality

7.2.1 Recommended Plan

The Recommended Plan will benefit the waterbodies, estuaries, and coastal surface water bodies in Truro by reducing excess nitrogen migration through groundwater from septic systems.

Wastewater treatment via nitrogen-reducing onsite septic systems and cluster wastewater treatment systems will produce a higher quality effluent than achievable with traditional onsite septic systems. The PRB, stormwater, and fertilizer management strategies will also reduce nitrogen loading to groundwater and surface waters.

The Recommended Plan does not involve water withdrawal, so it will not exceed MEPA thresholds for water withdrawal.

7.2.2 No Action Alternative

The No Action Alternative would negatively impact the environment in terms of groundwater, surface water hydrology, and quality. Nitrogen would continue to flow from traditional septic systems through groundwater to coastal waterbodies, worsening existing impairments.

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7.3 Air Quality, GHG Emissions, and Noise

7.3.1 Recommended Plan

During any construction, dust is often generated onsite. Emissions generated by construction equipment also have negative impacts on air quality. Proper pollution control measures will be employed during construction of the CWMP-related projects to limit these effects and provide a positive means to prevent airborne dust and reduce vehicle emissions. For Town projects, contractors will be required to follow the Massachusetts Diesel Retrofit Program for all diesel-powered non-road construction equipment and vehicles greater than 50 break horsepower.

Odors generated during operations at the cluster treatment system can be limited by including odor control units, tank covers, or installing process tanks underground. Similarly, onsite systems can also contribute to localized odor emissions, particularly during septic tank pumping, sludge removal, or system maintenance events. These odors are typically short-term but should be managed through proper maintenance and best management practices. Onsite systems may also generate odors in the case of system failures. Odor control will be evaluated for the cluster treatment system during final design.

The cluster treatment system will use electricity, the generation of which emits greenhouse gases. In addition, wastewater treatment releases greenhouse gases (though septic systems also release greenhouse gases). GHG emissions from onsite systems primarily results from anaerobic biological activity and periodic pumping operations. Energy efficiency measures will be incorporated into the design of the cluster treatment system; for example, variable frequency drives will be used on equipment as appropriate to reduce energy use.

The majority of noise impacts are generated during the construction phase of any project. The larger the extent of construction, the more noise associated with that work. In Truro, noise impacts from collection system construction will be greatest in areas where buildings and houses are in close proximity to the site. The Town has a local noise ordinance and will restrict contractor work to within acceptable construction times to minimize impacts.

The cluster treatment system will be engineered to minimize noise from pumps and blowers by designing the building accordingly or by locating equipment underground. If pump stations are required, options to mitigate generator noise by locating them in buildings and/or within sound-reducing enclosures will be evaluated during final design.

7.3.2 No Action Alternative

This alternative would not decrease the air quality or increase noise due to the actual construction of the project. However, this alternative may decrease air quality if continued nutrient pollution causes eutrophication in surface waters. According to the U.S. Centers for Disease Control and Prevention, some harmful algae blooms can become airborne and damage local air quality and human respiratory health.[3]

7.4 Plant and Animal Species and Habitats

7.4.1 Recommended Plan

Figure 7-1 outlines NHESP Estimated Habitats of Rare Wildlife and NHESP Priority Habitats of Rare Species in Truro. The map shows that there are NHESP habitats mapped within the project area.

As shown in Figure 7-2, various areas within Truro's watersheds are near mapped MassDEP wetlands. Wetland Protection Act Request for Determination of Applicability and/or Notices of Intent will be submitted to the Town of Truro Conservation Commission for any areas within Wetland Protection Act jurisdiction during final design of projects outlined in the Recommended Plan. The Recommended Plan is not anticipated to exceed MEPA thresholds for alteration of bordering vegetated wetland (less than 1 acre in accordance with 301 CMR 11.03.3.a.1.a) or other

[3] Centers for Disease Control and Prevention. (2024, April 18). *Harmful algal blooms: Contributing factors and impacts*. U.S. Department of Health and Human Services. **https://www.cdc.gov/harmful-algal-blooms/about/harmful-algal-blooms-contributing-factors-and-impacts.html**

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wetland alteration (less than 10 acres in accordance with 301 CMR 11.03.3.a.1.b).The health of the coastal and inland wetland resources in Truro are anticipated to benefit from this alternative with decreased nutrient loading to the waterways and estuaries.

7.4.2 No Action Alternative

This alternative would continue to increase the nutrient loading to the Town's coastal waterbodies. The increase in nitrogen would lead to significant—and potentially irreversible—adverse effects on the marine plant and animal species, including shellfish species.

7.5 Traffic, Transit, and Pedestrian and Bicycle Transportation

7.5.1 Recommended Plan

This alternative is expected to have limited short-term negative impacts on traffic and transit, and minimal short-term effects on pedestrian and bicycle transportation. This alternative is likely to increase construction traffic during various phases of the construction project. However, with regulated traffic control measures and effective management of the traffic, the public burden will be decreased. The project would have no long-term traffic impacts. The Recommended Plan will not exceed MEPA thresholds for vehicles trips per day (less than 1,000 in accordance with 301 CMR 11.03.66.b.xiv) or new parking spaces (less than 300 in accordance with 301 CMR 11.03.6.b.xv).

7.5.2 No Action Alternative

This alternative would not have effects on the traffic, transit, and pedestrian and bicycle transportation aspects of the existing environment.

7.6 Scenic Qualities, Open Space, and Recreational Resources

7.6.1 Recommended Plan

With this alternative, it is unlikely that protected open space will be negatively disturbed. The implementation of this alternative would decrease overall negative environmental impacts to the protected open spaces in the Town, specifically to recreational water bodies and beaches. Open Space is shown in Figure 7-3.

7.6.2 No Action Alternative

With this alternative, no disturbance to protected open space is anticipated. However, by allowing the elevated nutrient loadings to Truro's costal waterbodies to continue, the No Action Alternative will adversely impact the environment in the long-term. Recreational resources and scenic qualities will be affected by the decreasing environmental health of Truro's waterbodies.

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7.7 Historic Structures of Districts and Archaeological Sites

7.7.1 Recommended Plan

With this alternative, it is unlikely that historic structures, historic districts, or archaeological sites located within the Planning Area will be adversely affected by collection system installation. Historic and cultural resources are shown in Figure 7-4. An archaeological sensitivity analysis and archaeological survey (if required) will be conducted in archeologically sensitive areas as project design plans are finalized and specific areas are slated for ground disturbance and/or construction activities. If necessary, onsite monitoring will be provided during construction.

7.7.2 No Action Alternative

With this alternative, it is unlikely that historic structures, historic districts, or archeological sites will be adversely impacted.

7.8 The Built Environment and Human Use of the Project Site

7.8.1 Recommended Plan

Improved wastewater treatment could increase growth in the Planning Area if regulations are not in place to manage growth. Unregulated growth due to a sewer area is considered a negative impact unless an area has been identified as a growth incentive zone. It is recommended that the Town adopt Land Use Controls (as a regulation or a bylaw) to mitigate growth impacts of the Recommended Plan. The Recommended Plan does not include development of any new housing units, and is not anticipated to exceed MEPA thresholds for acres of land altered (less than 25 acres in accordance with 301 CRM 11.03.1.b.1) or acres of new impervious area (less than 5 acres in accordance with 301 CMR 11.03.1.b.2).

7.8.2 No Action Alternative

Under the No Action Alternative, development will continue in the Town's coastal watersheds without coordinated nitrogen management, further impacting estuary water quality and habitat value.

7.9 Rare or Unique Features

7.9.1 Recommended Plan

The Recommended Plan is not expected to impose negative impacts on the unique features of the Town of Truro. As shown in Figure 7-5, the Wellfleet Harbor Area of Critical Environmental Concern (ACEC) extends to southern Truro. The Recommended Plan is anticipated to restore the health of Truro coastal waters through the reduction of nitrogen inputs.

7.9.2 No Action Alternative

The No Action Alternative is not expected to impose any direct negative impact on the unique features of the Town of Truro. However, the continued input of nitrogen into the Town's estuaries is expected to further degrade the environmental quality of coastal waters.

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7.10 Publicly Available Data on the Public Health Conditions in the Immediate Vicinity of the Project Site

7.10.1 Recommended Plan

The Recommended Plan is not anticipated to negatively increase public health conditions in the immediate vicinity of the Project Site. The centralized treatment strategies proposed in the Recommended Plan may help reduce contaminants of emerging concern (CECs) in groundwater in the future by providing advanced treatment that is not possible with onsite septic systems.

7.10.2 No Action Alternative

The No Action Alternative may negatively increase public health conditions in the immediate vicinity of the Project Site, as pollutants (including CECs) will continue to migrate into groundwater from traditional onsite septic systems.

7.11 Tidelands

7.11.1 Recommended Plan

The Waterways regulations, 310 CMR 9.02, define tidelands as “present and former submerged lands and tidal flats lying between the present or historical highwater mark, whichever is farther landward, and the seaward limit of state jurisdiction”. Anticipated construction for the infrastructure projects outlined in the Recommended Plan are expected to be outside of tideland areas. The Recommended Plan is not anticipated to exceed MEPA thresholds for alteration of a tideland.

7.11.2 No Action Alternative

The No Action Alternative is not anticipated to result in alterations of tidelands.

8. Environmental Justice Analysis

The *“MEPA Public Involvement Protocol for Environmental Justice Populations”* (Effective January 1, 2022) requires ENFs to identify Environmental Justice (EJ) Populations near the project site, describe the likely impacts of the project on those populations, and establish a plan for public outreach.

8.1 Identifying Characteristics of EJ Populations

8.1.1 Project Location

The EEA Environmental Justice Maps Viewer was used to identify EJ populations near the project site. Census tracts meeting EJ criteria as defined in 310 CMR 11.02 within five miles of the project site are shown in Figure 8-1 in accordance with 301 CMR 11.05(7).

The following EJ populations are within five miles of the project site:

– Block Group 1, Census Tract 102.08, Barnstable County, Massachusetts (within project site)
  - Criteria: Income.

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- Minority population: 8%.
- Median household income: $47,554 (56% of MA median household income).
- Households with language isolation: 0%.
- Total population: 892 individuals in 297 households.

Since the project does not exceed MEPA air quality review thresholds under 301 CMR 11.03(8)(a)-(b) or generate 150 or more new ADT (average daily traffic) of diesel vehicle traffic, the 'designated geographic area' (DGA) requiring further analysis is one mile radius around the project area. (If the project was expected to exceed the above thresholds, a 5-mile radius DGA would be required for further analysis).

8.1.2 Languages

According to the U.S. Census Bureau's American Community Survey, there are no census tracts within five miles of the project area wherein more than 5% of the population reports speaking English "not very well".

8.2 Potential Effects on EJ Populations

The primary adverse effect of this project on EJ populations in the DGA is temporary disturbance during the construction phase. The Town and Contractor will enact comprehensive mitigation measures to ensure public safety and minimize the impact of noise, dust, and traffic congestion on abutters. Mitigation is discussed in Section 9.

The primary benefit of this project is improved water quality through improved nitrogen management. This will benefit the entire community by enhancing environmental health and supporting a stronger local economy. The project will increase access to clean natural resources—including estuarine, freshwater, and groundwater systems—thereby promoting greater use and enjoyment of recreational areas such as waterways, freshwater ponds, and public bathing beaches.

8.3 Public Involvement Activities

An advance notice will be made to EJ communities prior to submission of the CWMP to Environmental Monitor. The Environmental Justice Screening Form is included in Appendix E. The EJ distribution list will be maintained throughout the development of the project to engage with relevant stakeholders and inform them of project updates. Other interested parties will be added to the distribution list upon request. Additional community meetings will also be held upon request prior to submission of the Environmental Impact Report. A meeting request can be made through the Town of Truro's Department of Health.

9. MEPA Draft Section 61 Findings and Mitigation Measures

9.1 Introduction

This chapter identifies and presents proposed mitigation measures and Draft Section 61 Findings for each permit or other approval anticipated to be issued by State Agencies, as required by the Massachusetts Environmental Policy Act (MEPA) regulation 301 CMR 11.07. Mitigation measures associated with municipal infrastructure and programs is anticipated to be funded and implemented by the Town of Truro, its agents, representatives, and/or contractors in addition to any required State agency actions.

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9.2 MEPA Mandatory Review Thresholds

The Recommended Plan is not anticipated to exceed any MEPA Mandatory Review Thresholds. Any variances from the Wetlands Protection Act that may be required for upgrading individual septic systems will be coordinated with the appropriate agencies as necessary.

Should strategies outlined in the contingency plan be pursued in the future through adaptive management, the MEPA review thresholds will be reevaluated.

9.3 Draft Section 61 Findings for State Agency Actions

Anticipated State agency permits and actions for the CWMP are summarized in Table 9.1. Permits anticipated as part of the Truro Recommended Plan are indicated in **bold text.**

Table 9.1 Draft Section 61 Findings for State Agency Actions

Agency	Agency Permits / Actions
Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA)	**CWMP approval.**
Massachusetts Department of Environmental Protection (MassDEP)	WP68: Treatment Works Approval for New/Modified Facility associated with Groundwater Discharge Non-Industrial or Reclaimed Water Use Permits – for new pump stations proposed for the project and connection to Provincetown collection system and WWTF. **Notice of Intent (NOI) Wetlands Protection Act (WPA) Form 3 (as applicable) and Truro Conservation Commission approvals (as applicable for work within the 100-foot buffer to a wetland (310 CMR 10.00).** **Emergency Engine and Emergency Turbine Compliance – required for all new emergency or standby engines with a rated power output equal to or greater than 37 kW or emergency turbine with a rated power output less than one megawatt constructed, substantially reconstructed, or altered after March 23, 2006.** **Underground Injection Control (UIC) permit for the Permeable Reactive Barrier.** **WP 83: Hydrogeologic Evaluation Report** **WP 79: Individual Groundwater Discharge Permit** **WP 95: Watershed Permit Application**
Massachusetts Office of Coastal Zone Management (CZM)	**Federal Consistency Review.**
Massachusetts Division of Fisheries & Wildlife	**Natural Heritage & Endangered Species Program (NHESP), MES (321 CMR 10.00) and/or WP (310 CMR 10.00) for work below the mean high-water line, in a fish run, or in a priority or estimated habitat.**
Massachusetts Historical Commission (MHC)	**Consultation/review for any collection system components and pump stations to be constructed outside of road right-of-way.**
Cape Cod Commission	**Section 208 Plan Update Consistency Approval**
Town of Truro	**Building permits for the construction of structures recommended in the CWMP.** **Wastewater Department sewer connection permitting.** **Chapter 277 Stormwater Management Rules and Regulations.** **Article III. Construction and Post-Construction Stormwater Management.** **Conservation Commission Approvals** **Planning Board Approvals** **Zoning Board Approvals**

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9.4 Planned Mitigation Measures

The following mitigation measures have been identified to limit negative environmental impacts and/or create positive environmental impacts during construction and operation of the Recommended Plan.

9.4.1 General Construction Measures

During construction, the site(s) shall be secured to prevent unauthorized entry to the construction site, and to protect existing and adjacent facilities and properties. Supplemental lighting, signs, railings and constructions barriers shall be used as necessary to provide safety to employees, construction workers, visitors, and the general public during the construction process in accordance with Occupational Safety and Health Administration (OSHA) and other applicable regulations.

Water used during the construction process, and that generated from runoff on the site, will be controlled by proper site grading and by providing temporary berms, drains, and other means to prevent soil erosion and done so in accordance with the Stormwater Pollution Prevention Plan (SWPPP), if required. These means will also be used to reduce puddling and runoff on the site. Existing and new catch basins will be protected from siltation using hay bales, siltation fence, and catch basin inserts. At no time will the pumping of silt-laden water to surface waters, stream corridors, or wetlands be allowed. Pollution controls will also be provided to prevent the contamination of soils, water, and the atmosphere from the discharge of noxious, toxic substances, and pollutants during the construction process.

Erosion control measures including hay bales, siltation fencing, and erosion control fabric will be used to provide sedimentation barriers where required. Temporary seeding and mulching may also be used to minimize soil erosion and provide soil stabilization on slopes. Diversion trenches may also be used on the uphill side of disturbed areas to divert surface runoff. Land disturbances will be kept to a minimum to reduce impacts and erosion. All erosion and stormwater control methods shall be in accordance with the USEPA National Pollution Discharge Elimination System (NPDES) General Permit requirements, Commonwealth of Massachusetts regulations, and the Town of Truro regulations.

The site will be maintained free of waste materials, debris, and trash following each day of work. Waste and other debris will be collected and disposed of off-site periodically. At no time during construction will the dumping of spoil material, waste, trees, brush, or other debris be allowed into any stream corridor, any wetland, any surface waters, or any unspecified location. The permanent or unspecified alteration of stream flow lines is not allowed during construction. Recycling of waste and construction debris will likely be mandated as well and should always be considered during construction.

Construction noise from heavy equipment will normally be limited to within normal operating hours of 7:00 a.m. to 5:00 p.m. Dust controls, including the use of street sweepers and/or watering trucks, will be used to minimize air-borne dust as necessary.

All general construction measures will be implemented by the Contractor during construction. Contractor will be required to follow the Massachusetts Diesel Retrofit Program for any and all diesel-powered non-road construction equipment and vehicles greater than 50 brake horsepower. Anticipated costs for the general construction measures are included in the overall project costs for the Recommended Alternative.

9.4.2 Planned Mitigation Measures: Adaptive Management and Monitoring

Adaptive management provides a significant mitigation measure mechanism for the Recommended Plan. The Recommended Plan includes the implementation of an Adaptive Management process, in which the Town will monitor the results of implementation over time and adjust next steps/future implementation accordingly. The Town will monitor the coastal estuaries surface water quality to observe the timeframe and scale of improvement accomplished by the implementation of the Recommended Plan, and to evaluate the need for additional future implementation. The Town will continue to monitor performance of the demonstration/pilot projects and may expand or contract the role of

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various non-traditional methods into the plan as they demonstrate feasibility and effectiveness. This Adaptive Management approach will enable the Recommended Plan to be adjusted based on the monitoring results of the environmental and economic impacts associated with implementation of the Recommended Plan. Coordination with MassDEP will occur through the Adaptive Management process.

9.4.3 Planned Mitigation Measures: Environmental Justice

The Recommended Plan intersects several EJ parcels as noted in Section 8. Temporary negative impacts from construction may affect EJ communities, and construction impact mitigation measures will be implemented to minimize impacts to EJ populations and the rest of the community. Table 9.2 summarizes the mitigation measures anticipated during implementation of the Recommended Plan.

Table 9.2 Mitigation Measures Summary Table

Category	Proposed Mitigation Measure	Implementation	Preliminary Schedule
General Construction – Site Access/Public Safety Impact	The site(s) shall be secured to prevent unauthorized entry to the construction site, and to protect existing and adjacent facilities and properties. Supplemental lighting, signs, railings, and construction barriers shall be used as necessary to provide safety to employees, construction workers, visitors, and the general public during the construction process in accordance with OSHA and other applicable regulations. Police details and detours will be implemented in accordance with Traffic Control Plans included with the Project Contract Documents.	Contractor	During Construction
General Construction – Stormwater	Provisions for stormwater management and erosion control shall be managed in accordance with the approved SWPPP and NPDES General Permit, which may be required for cluster system construction.	Contractor	During construction
General Construction – Construction Debris	The site(s) will be maintained free of waste materials, debris, and trash following each day of work. Waste and other debris will be collected and disposed of off-site periodically. At no time during construction will the dumping of spoil material, waste, trees, brush, or other debris be allowed into any stream corridor, any wetland, any surface waters, or any unspecified location. The permanent or unspecified alteration of stream flow lines is not allowed during construction. Recycling of waste and construction debris will likely be mandated as well and should always be considered during construction.	Contractor	During Construction
General Construction – Noise and Dust Control	Normal construction hours will be between 7 a.m. and 5 p.m. during normal business days. No work will be allowed on Holidays, and the Contractor will be required to provide adequate dust control measures during construction.	Contractor	During construction
Wastewater Facilities Construction Mitigation – Resource Areas	As necessary, appropriate Notice of Intent documents and Request for Determinations will be filed relative to work proposed with buffer areas or resource areas. Orders of Conditions, as received, will be incorporated into the Construction Documents.	Town / Contractor	Permitting prior to construction; mitigation during construction through compliance with Order of Conditions.

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Category	Proposed Mitigation Measure	Implementation	Preliminary Schedule
Wastewater Facilities Construction Mitigation – Flooding	To the extent practicable, facilities will be located out of flood hazard zones. Because pump stations are typically located in low lying areas to maximize gravity sewer service, additional provisions for coastal resiliency and flood protection will need to be made to mitigate impacts. During construction, management of dewatering and protection from storms will be required.	Town / Contractor	During design and construction
Wastewater Facilities Construction Mitigation – Aesthetics	New pump stations with superstructures will compliment and be consistent with neighborhood aesthetics as appropriate. Vegetative screens will be employed, if determined necessary, for aesthetic reasons.	Town / Contractor	During design and implemented during construction
Wastewater Facilities Construction Mitigation – Archaeological	Development of a Post Discoveries Review Plan (if necessary). Work will be halted if archaeological resources are uncovered during construction.	Town / Contractor	Plan development prior to bidding; implementation during construction
Wastewater Facilities Construction Mitigation – General	A Resident Representative will be employed to ensure that the project area is kept clean and that mitigation measures are met.	Town	During construction
Adaptive Management – TMDL Compliance	Implementation of an Adaptive Management process which will consider the performance of the demonstration projects and incorporate cost-effective non-traditional methods into the plan once they demonstrate feasibility. A Quality Assurance Project Plan (QAPP) will be developed for monitoring programs associated with each strategy. Milestone reports will be developed to summarize ongoing water quality monitoring results, and the Plan will be adjusted accordingly.	Town	Pre- and post-construction/ implementation

Funding of these projects and mitigation measures is all anticipated to come from Town Funding and to be supported by various grant and loan opportunities including Natural Resources Conservation Service (NRCS), the Massachusetts State Revolving Fund (SRF) program, Southeast New England Program (SNEP) Grants, Cape and Islands Water Protection Trust, Coastal Zone Management (CZM) grants, and additional funding sources. Mitigation measure costs for the outlined mitigations measures have been incorporated into the project cost estimates outlined in Section 5.

10. Scope and Limitations

This report has been prepared by GHD for Town of Truro and may only be used and relied on by Town of Truro for the purpose agreed between GHD and Town of Truro as set out in section of this report.

GHD otherwise disclaims responsibility to any person other than Town of Truro arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

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The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

In the CWMP, GHD has prepared the Engineer's Opinion of Probable Construction Cost and other cost estimates ("Cost Estimate") set out in the executive summary and in Section 5 of this report using information reasonably available to the GHD employee(s) who prepared this report; and based on assumptions and judgments made by GHD.

The Cost Estimate has been prepared for the purpose of planning and must not be used for any other purpose.

The Cost Estimate is a preliminary estimate only. Actual prices, costs and other variables may be different to those used to prepare the Cost Estimate and may change. Unless as otherwise specified in this report, no detailed quotation has been obtained for actions identified in this report. GHD does not represent, warrant or guarantee that the project can or will be undertaken at a cost which is the same or less than the Cost Estimate.

Where estimates of potential costs are provided with an indicated level of confidence, notwithstanding the conservatism of the level of confidence selected as the planning level, there remains a chance that the cost will be greater than the planning estimate, and any funding would not be adequate. The confidence level considered to be most appropriate for planning purposes will vary depending on the conservatism of the user and the nature of the project. The user should therefore select appropriate confidence levels to suit their particular risk profile.

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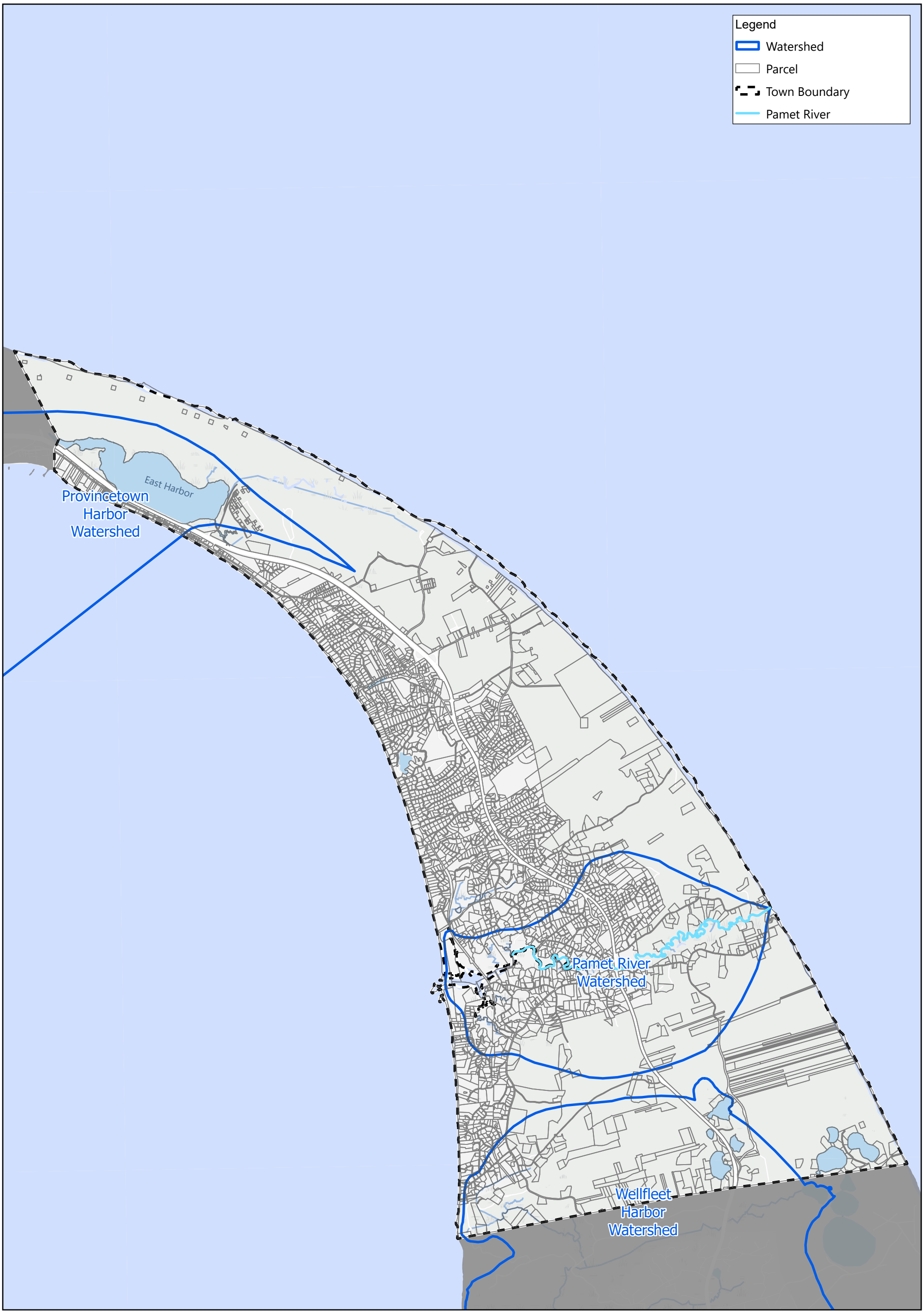
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Figures



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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

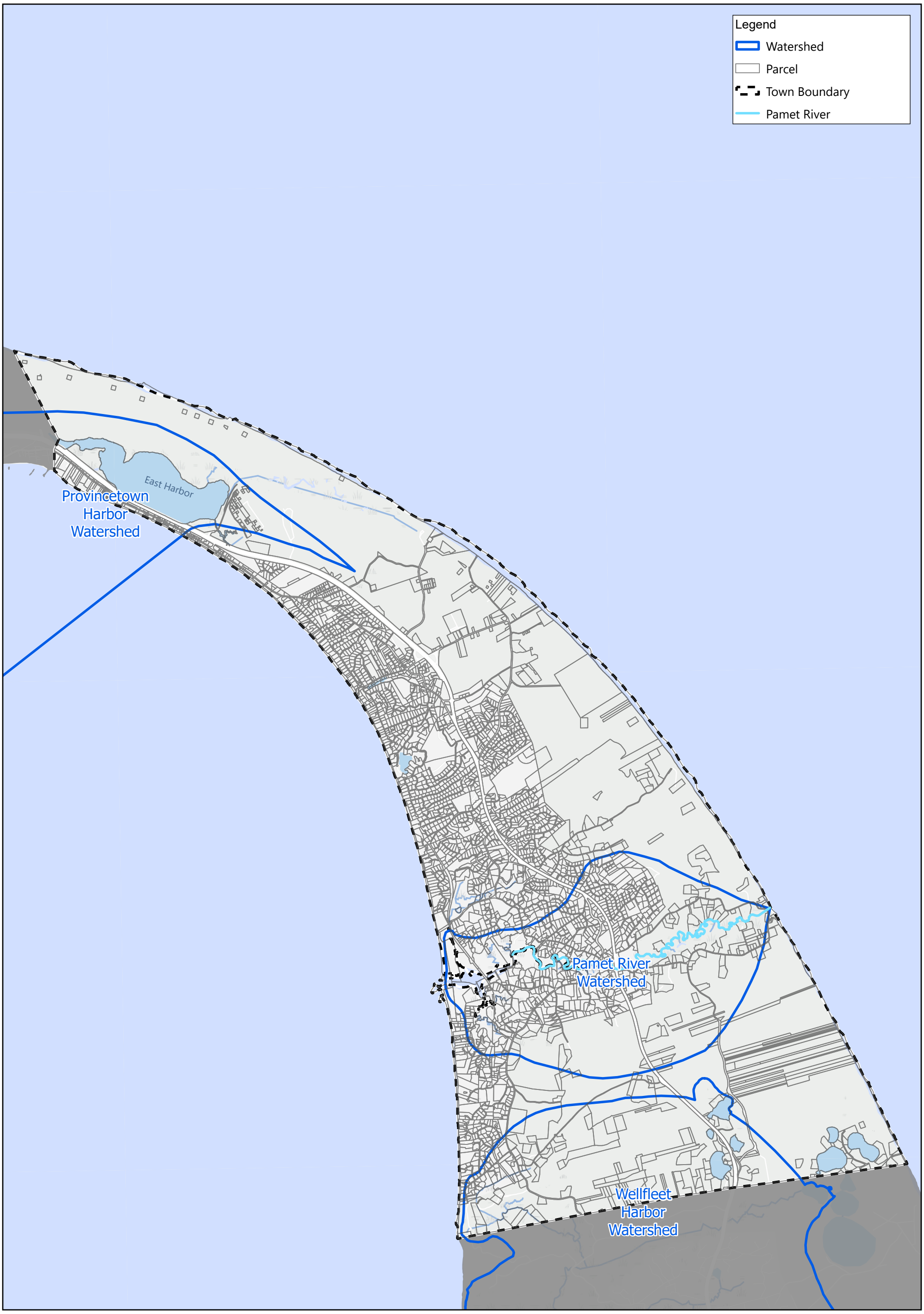
PLANNING AREA

Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

FIGURE ES-1

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
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PLANNING AREA

Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

FIGURE 1-1

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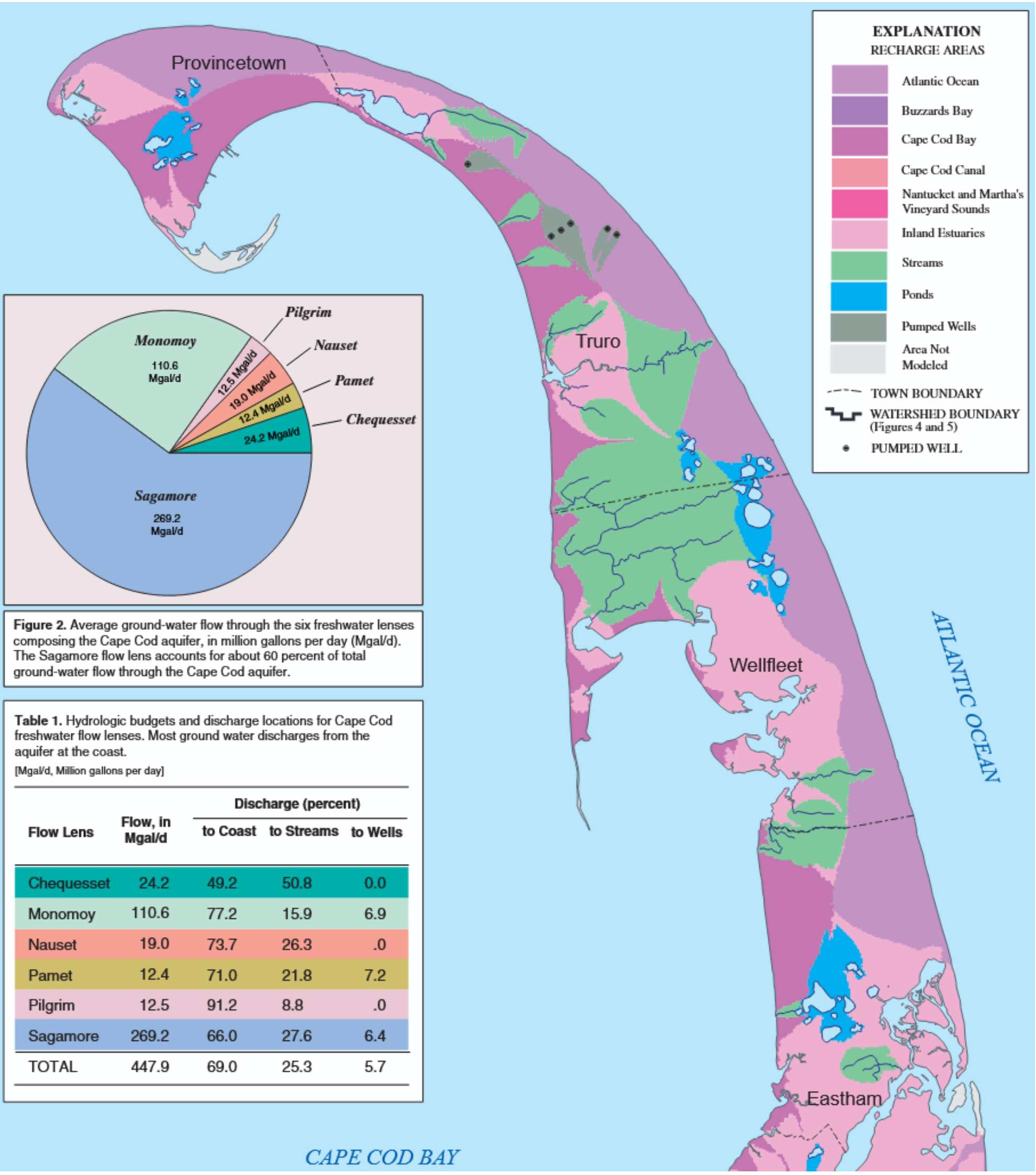


Figure 2. Average ground-water flow through the six freshwater lenses composing the Cape Cod aquifer, in million gallons per day (Mgal/d). The Sagamore flow lens accounts for about 60 percent of total ground-water flow through the Cape Cod aquifer.

Table 1. Hydrologic budgets and discharge locations for Cape Cod freshwater flow lenses. Most ground water discharges from the aquifer at the coast.

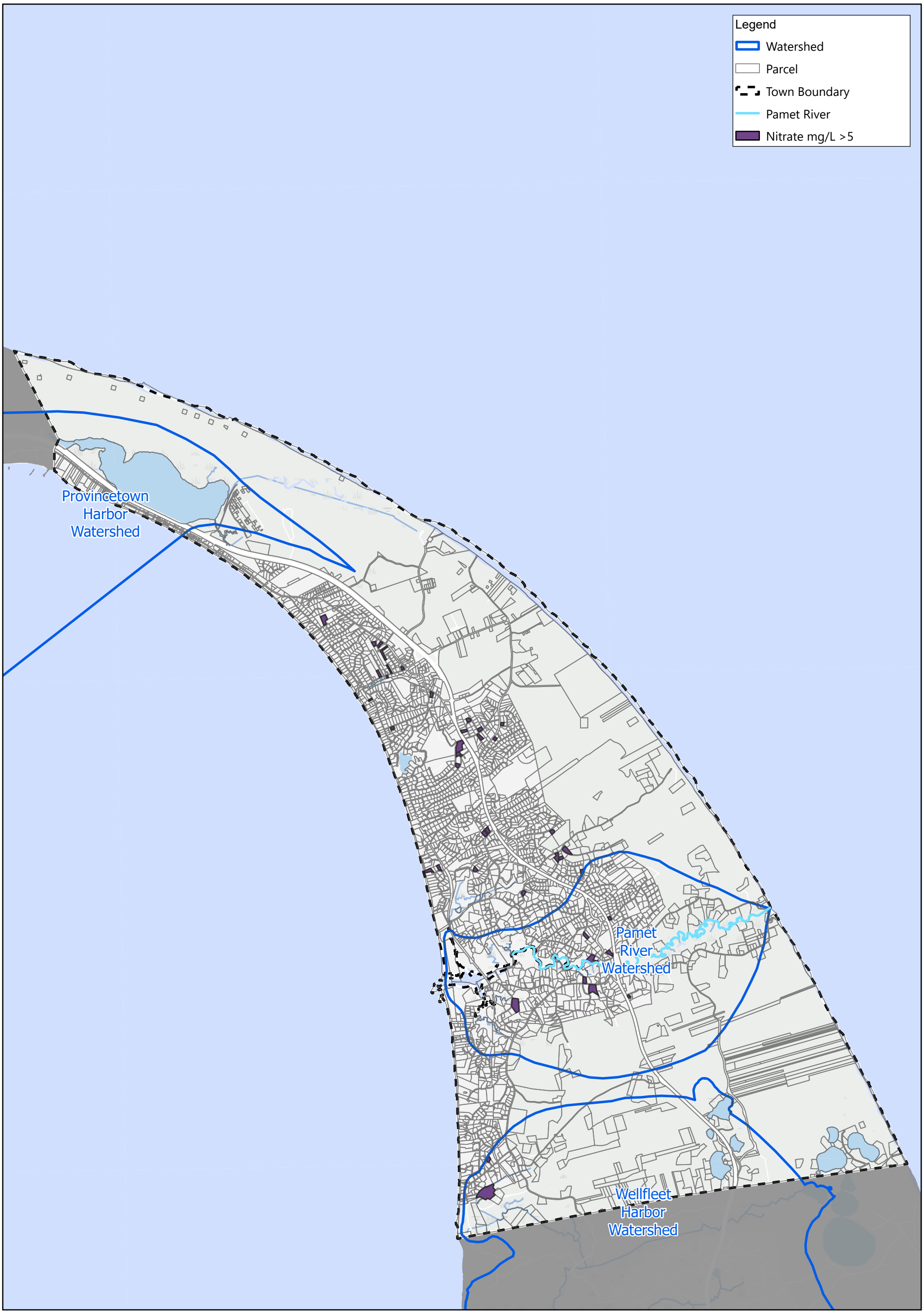
[Mgal/d, Million gallons per day]

Flow Lens	Flow, in Mgal/d	Discharge (percent)		
		to Coast	to Streams	to Wells
Chequesset	24.2	49.2	50.8	0.0
Monomoy	110.6	77.2	15.9	6.9
Nauset	19.0	73.7	26.3	.0
Pamet	12.4	71.0	21.8	7.2
Pilgrim	12.5	91.2	8.8	.0
Sagamore	269.2	66.0	27.6	6.4
TOTAL	447.9	69.0	25.3	5.7

USGS LITTLE PAMET RIVER DELINEATION

FIGURE 1.2

Adapted from Walter, D.A., Masterson, J.P., and Hess, K.M., 2004, Ground-Water Recharge Areas and Traveltimes to Pumped Wells, Ponds, Streams, and Coastal Water Bodies, Cape Cod, Massachusetts, Scientific Investigations Map I-2857, 1 sheet.



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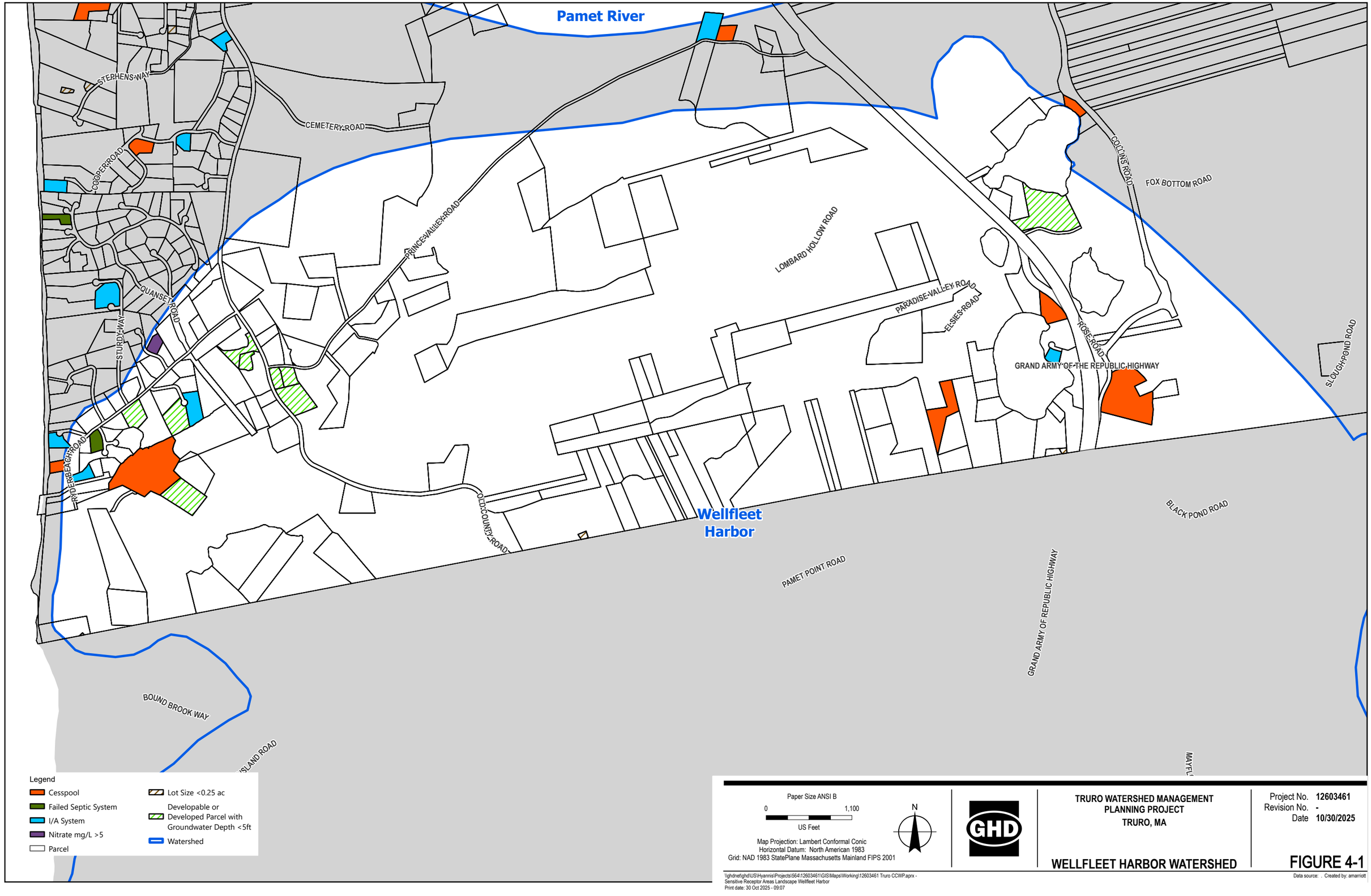
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Revision No. **-**
Date **10/2/2025**

HIGH NITRATES

FIGURE 2-1

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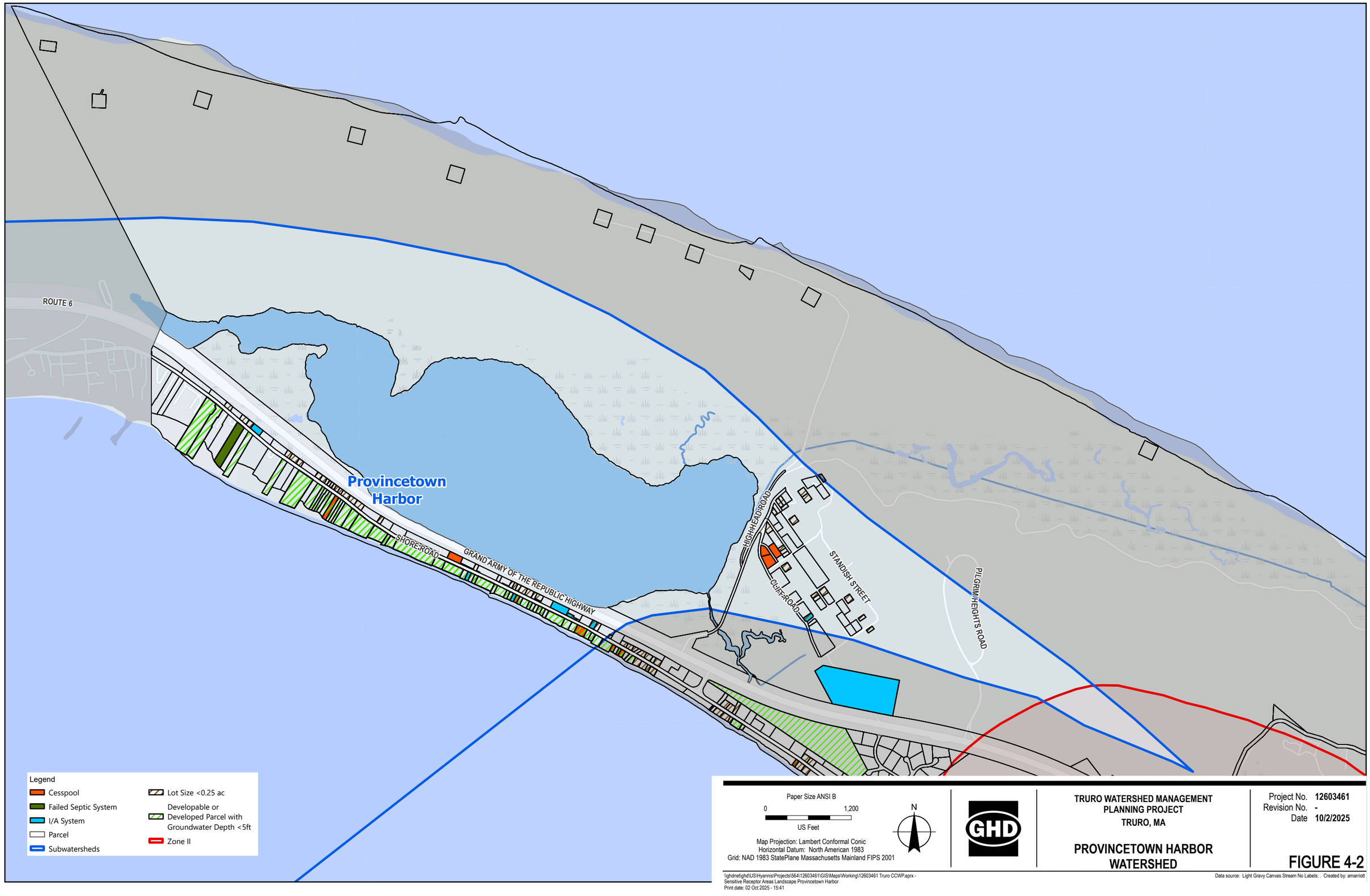
WELLFLEET HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **10/30/2025**

FIGURE 4-1

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Map Projection: Lambert Conformal Conic
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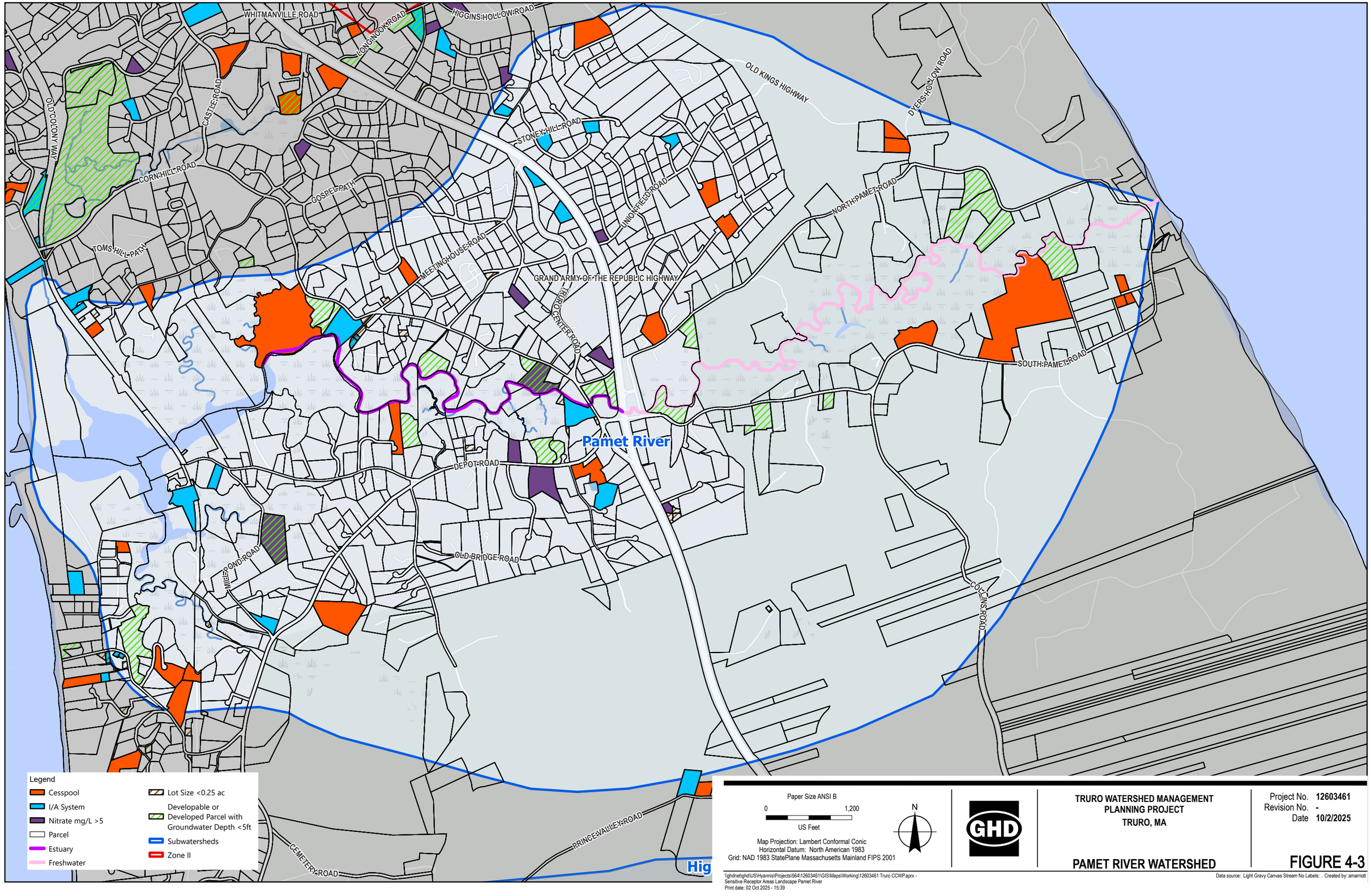
PROVINCETOWN HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

FIGURE 4-2

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Map Projection: Lambert Conformal Conic
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TRURO, MA

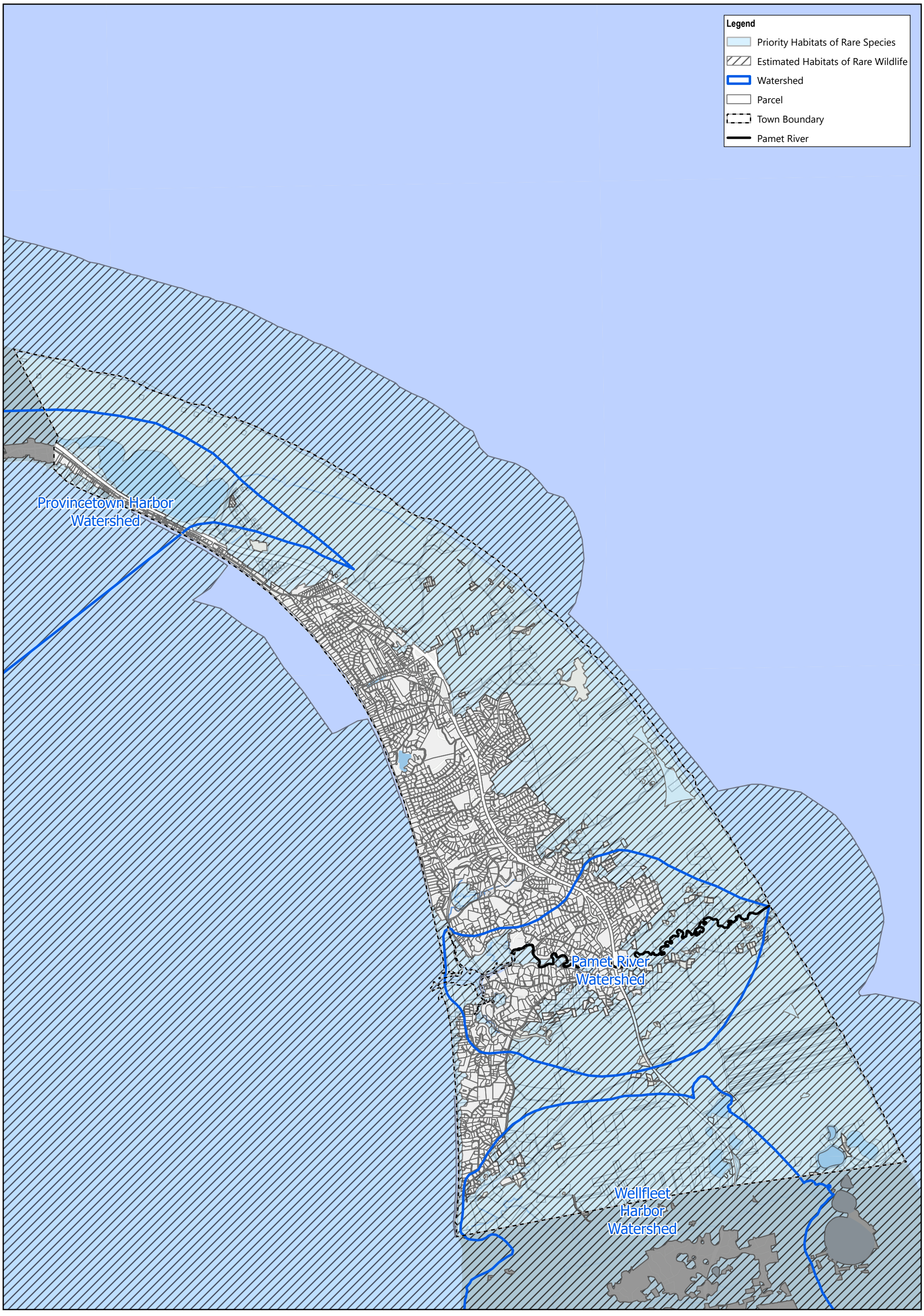
Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

PAMET RIVER WATERSHED

FIGURE 4-3

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Map Projection: Lambert Conformal Conic
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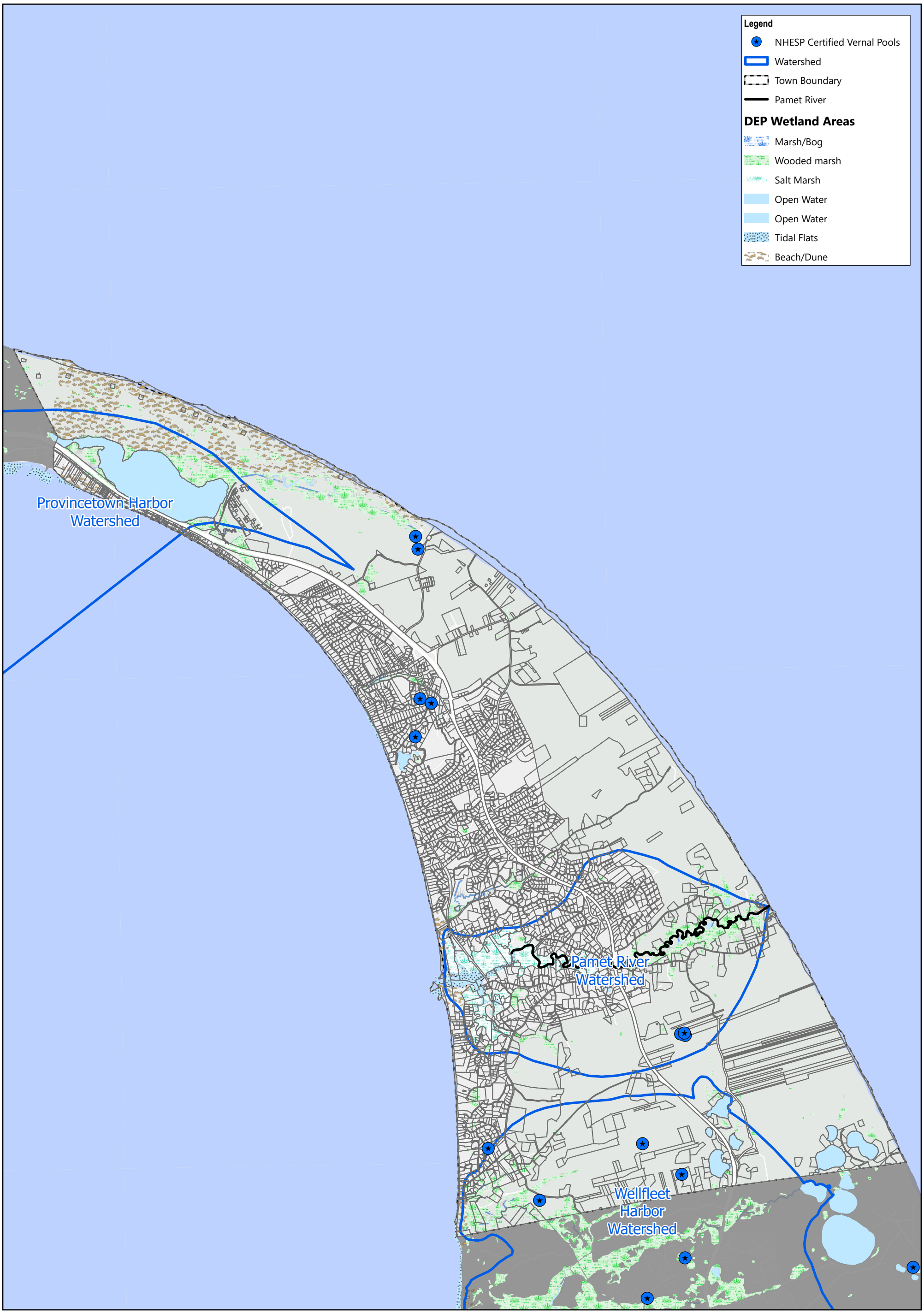
NATIONAL HERITAGE ENDANGERED SPECIES HABITATS

Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

FIGURE 7-1

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TRURO, MA

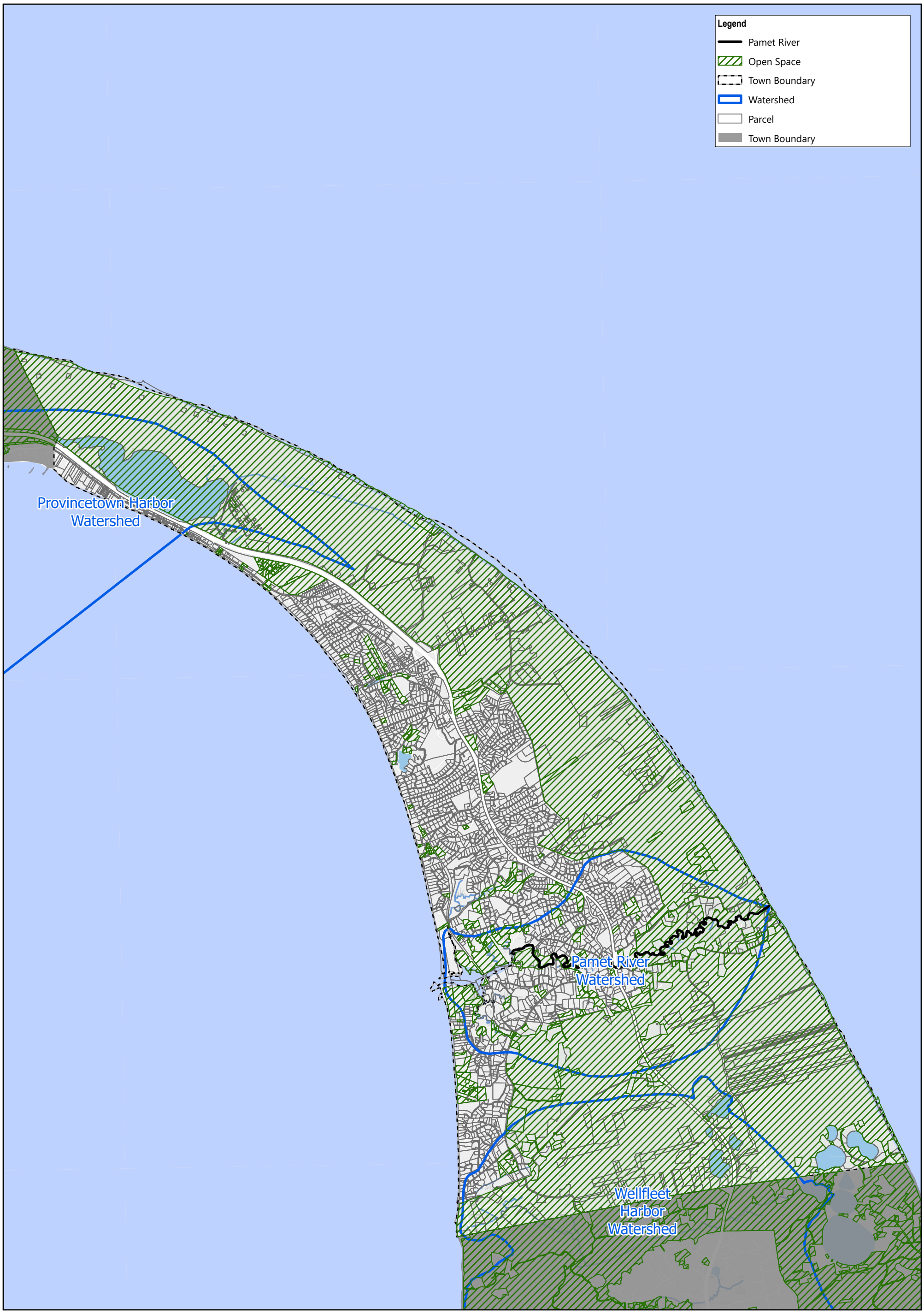
Project No. **12603461**
Revision No. **-**
Date **10/2/2025**

DEP WETLANDS AND VERNAL POOLS

FIGURE 7-2

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-3 DEP Wetlands and Vernal Pools
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Map Projection: Lambert Conformal Conic
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TRURO, MA

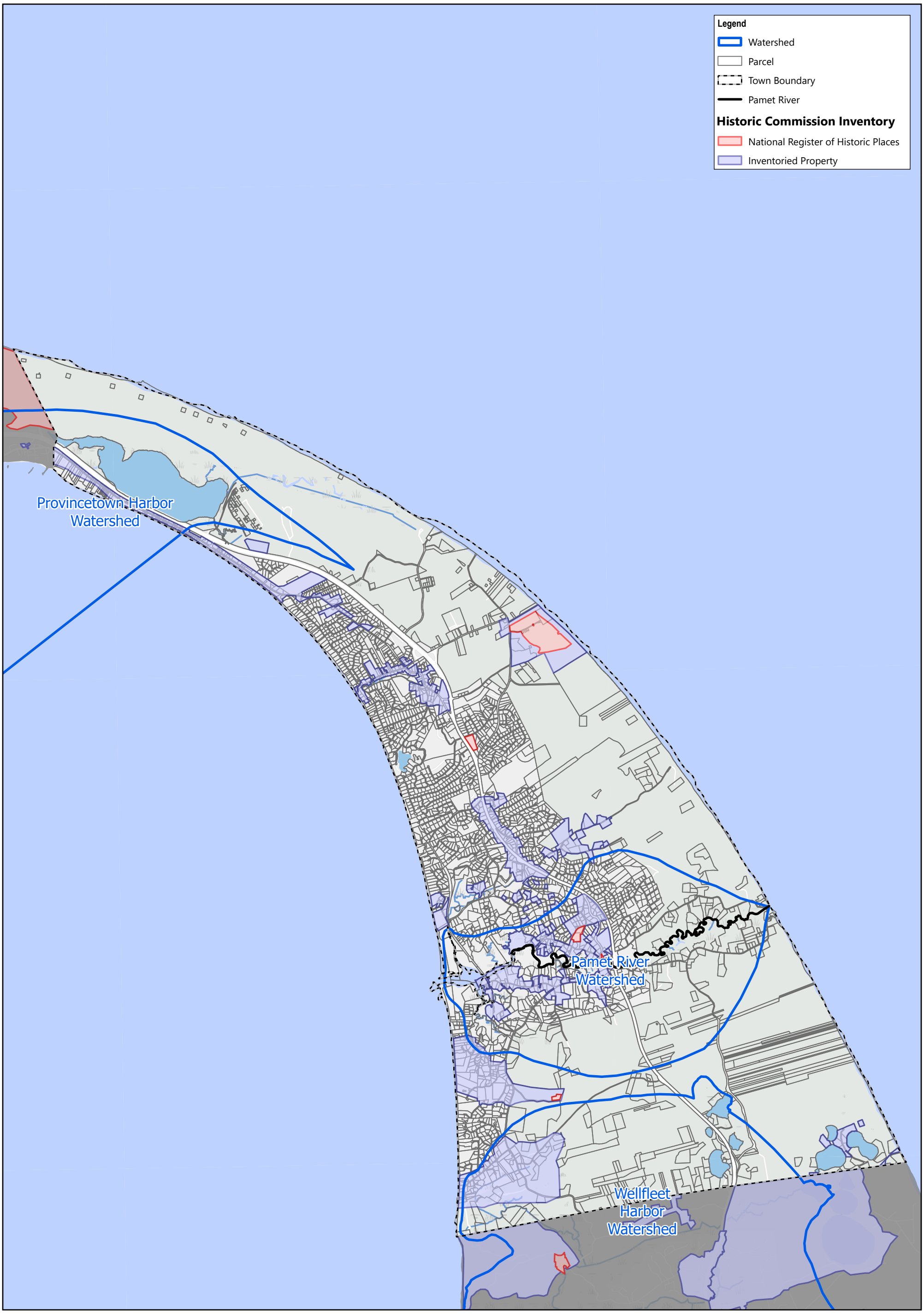
Project No. **12603461**
Revision No. **-**
Date **10/23/2025**

OPEN SPACE

FIGURE 7-3

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TRURO, MA

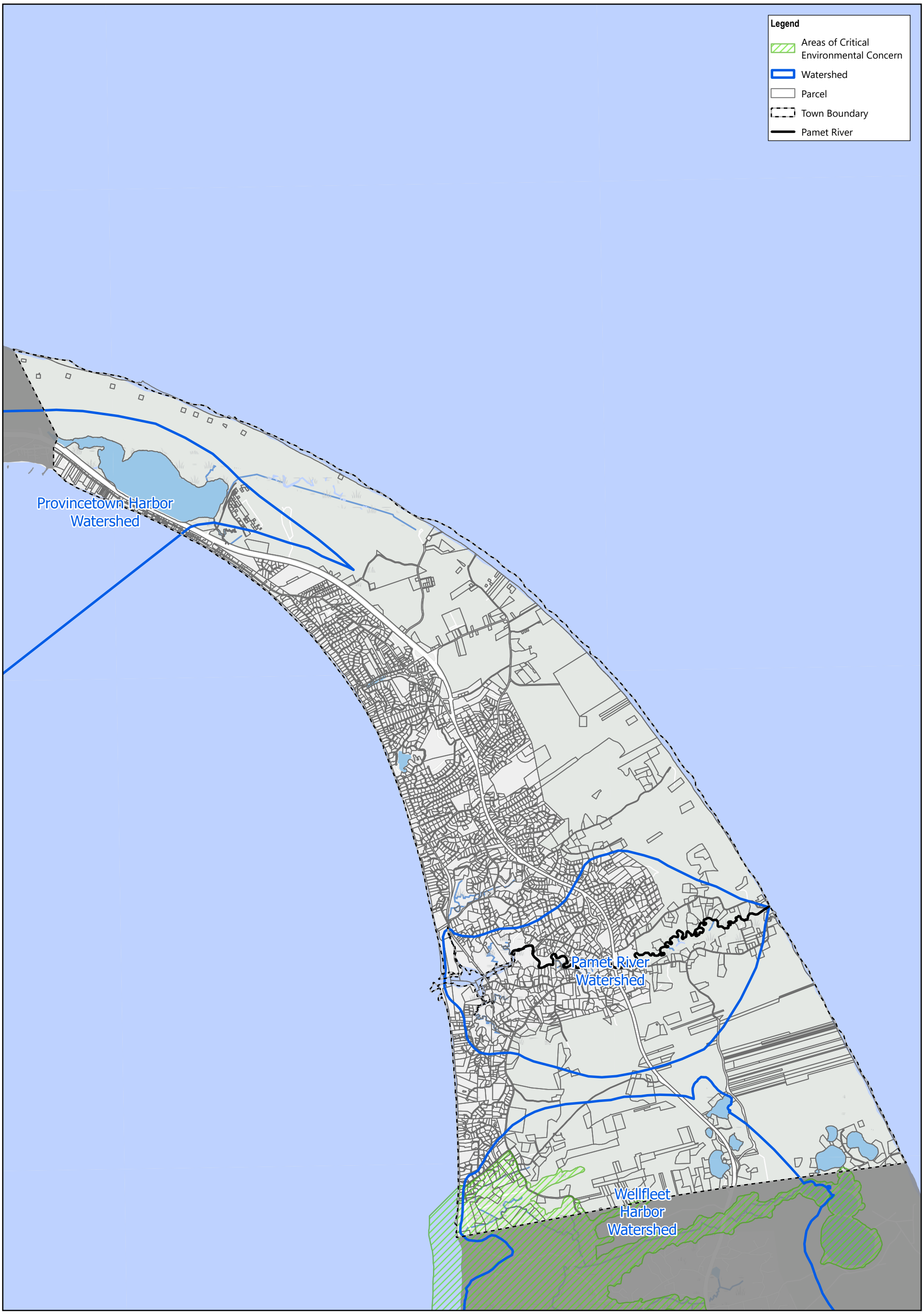
NATIONAL HERITAGE AND CULTURAL RESOURCES

Project No. **12603461**
Revision No. **-**
Date **10/9/2025**

FIGURE 7-4

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TRURO, MA

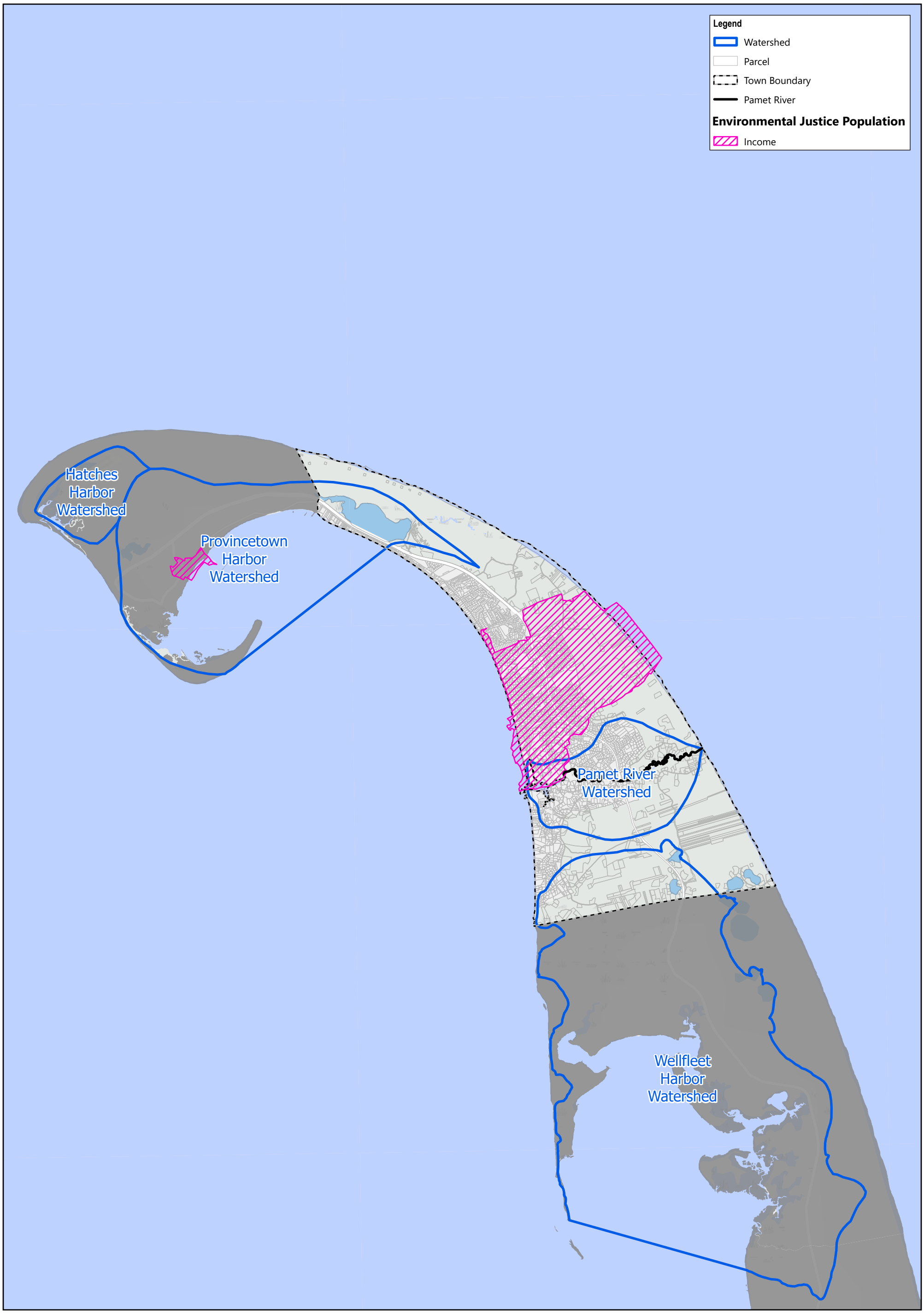
AREAS OF CRITICAL ENVIRONMENTAL CONCERN

Project No. **12603461**
Revision No. **-**
Date **10/9/2025**

FIGURE 7-5

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

ENVIRONMENTAL JUSTICE AREAS WITHIN FIVE MILES OF TRURO

Project No. **12603461**
Revision No. **-**
Date **10/9/2025**

FIGURE 8-1

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 8-1 Wellfleet Harbor EJ Areas
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Appendices

Appendix A

Draft Needs Assessment Report

Town of Truro Comprehensive Watershed Management Plan - Needs Assessment Report

DRAFT – Rev1

Town of Truro, MA

October 31, 2025



Project name		Truro CWMP					
Document title		Town of Truro Comprehensive Watershed Management Plan - Needs Assessment Report | DRAFT – Rev1					
Project number		12603461					
File name		Draft NAR - Working.docx					
Status Code	**Revision**	**Author**	**Reviewer**		**Approved for issue**		
			Name	**Signature**	**Name**	**Signature**	**Date**
S3	Rev0	Julia Khrakovsky					7/17/24
S3	Rev1	Julia Khrakovsky			Julia Khrakovsky	Julia Khrakovsky	10/31/25
Status code]							
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Executive Summary

The Needs Assessment Report (NAR) represents the first phase of Truro's Comprehensive Watershed Management Plan (CWMP) Project. The purpose of the CWMP is to develop an environmentally sound and cost-effective strategy for managing wastewater and reducing nitrogen loading throughout the Town of Truro (the Planning Area, Figure ES-1). The CWMP will provide the Town with a long-term plan to meet water quality goals and protect public health.

This NAR establishes the technical foundation for the CWMP by identifying and evaluating existing and future wastewater and nitrogen management needs across the Planning Area. The needs assessment draws on available data, including land use information, population projections, and existing planning documents.

The NAR evaluates regulatory requirements and local goals related to wastewater and nitrogen management and water resource protection. This report summarizes previous wastewater planning efforts to build on existing data and ensure consistency with ongoing regional initiatives. Based on Truro's existing conditions and water quality, areas with nutrient related or wastewater related issues were divided into study areas. As discussed throughout the report, multiple sensitive receptors were analyzed to identify the study areas, these receptors include the following:

- Areas with high concentrations of failed/failing septic systems or cesspools, aging systems, and outdated wastewater disposal
- Elevated nitrates: parcels with nitrate concentrations exceeding 5 mg/L
- Small parcels: parcels with a lot size less than 0.25 acres
- Inadequate separation to groundwater: developed or developable parcels with a separation to groundwater less than 4 ft

Figure ES-2 shows the sensitive receptors outlined above within the Town of Truro. The following Study Areas were defined for this project.

Study Area A: Beach Point—In 2014, Beach Point was identified as an area of concern in Phase I of the Integrated Water Resources Management Plan. The primary concern identified in the Beach Point area is wastewater management.. Beach Point is a high-density area that sees a significant influx of summer visitors, creating significant increases in nitrogen loads. Some parcels in the area utilize cesspools and many have a small lot size and small separation to groundwater as shown in Figure ES-3. Portions of Beach Point fall within the Provincetown Harbor watershed.

Study Area B: Pamet River Watershed—Pamet River is a coastal watershed that has not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for the system. Per the Cape Cod Commission 208 Plan, a nitrogen reduction goal of 25% was assumed for watersheds without a completed scientific evaluation and established targets. The Pamet River watershed has a number of cesspools, parcels with high nitrates, and areas with small separation to groundwater as shown in Figure ES-4.

Study Area C: Provincetown Harbor Watershed—Provincetown Harbor is a coastal watershed that has not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for the system. Per the Cape Cod Commission 208 Plan, a nitrogen reduction goal of 25% was assumed for watersheds without a completed scientific evaluation and established targets. A cluster of parcels in the Provincetown Harbor watershed, known as High Head, has multiple small parcels and cesspools, as shown in Figure ES-5. Flows outlined for Study Area C do not include the portion of Beach Point within the Provincetown Harbor Watershed as it is included in Study Area A. Future alternative evaluations for Study Area C will consider the portion of Study Area A within the Provincetown Harbor watershed.

Study Area D: Wellfleet Harbor Watershed – Wellfleet Harbor is a coastal watershed that includes land area in portions of Eastham, Truro, and Wellfleet. Wellfleet Harbor has an MEP report that outlines target threshold watershed

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loads. There is a cluster of parcels in the study area with minimal depth to groundwater, high nitrates, cesspools, and failed systems, as shown in Figure ES-6. The Herring River subwatershed is the only portion of the Wellfleet Harbor watershed in Truro. The thresholds presented in the MEP report are used as a basis for determining Truro's removal goal for the watershed.

Study Area E: Pond Village / Sawyer Grove – A large portion of Truro is not within a coastal watershed. The Pond Village / Sawyer Grove area is a portion of Truro that lies between the Pamet River and Provincetown Harbor watersheds and contains numerous historical structures. It is an area with a cluster of parcels exhibiting constraints including high nitrates, cesspools, small lot size, and small distance to groundwater as shown in Figure ES-7.

Study Area F: Aldrich Road / Daniel Drive – The Aldrich Road / Daniel Drive study area is another portion of Truro outside of the coastal watersheds that has a cluster of sensitive parcels. This small area has several wells with elevated nitrates as shown in Figure ES-8.

Study Area G: Route 6 at Great Hollow South – The Route 6 at Great Hollow South study area is another portion of Truro outside of the coastal watersheds that has a cluster of sensitive parcels. This area has multiple cesspools and a few high nitrate parcels as shown in Figure ES-9.

Study Area H: Truro Central School (TCS), Walsh Property, and Quail Ridge Road – The TCS, Walsh Property, and Quail Ridge Rd Road West study area is also outside of Truro's coastal watershed. This area has many cesspools as shown in Figure ES-10. Additionally, this study area includes future affordable housing developments at the Walsh Property.

In addition to the above defined study areas, the NAR identified nitrogen management needs on a watershed level to support future nitrogen management planning. Watershed-level nitrogen reduction goals were developed based on available scientific studies and guidance documents. For coastal watersheds with completed Massachusetts Estuaries Project (MEP) reports and established nitrogen Total Maximum Daily Loads (TMDLs), the established TMDLs were used to estimate Truro's nitrogen reduction goals. For coastal watersheds that do not yet have a completed MEP report or established TMDL, the Cape Cod Commission's 208 Plan recommends applying a 25% nitrogen reduction planning allowance as a placeholder for nitrogen management planning until an MEP report and TMDL is established. The estimated watershed reduction goals are summarized in the Table below:

Table ES-1 Summary of Watershed Estimated Current and Future Nitrogen Reduction Goals

Watershed	Current Nitrogen Reduction Goal (kg-N/day)	Future Nitrogen Reduction Goal (kg-N/day)
Pamet River Watershed[1]	3.08	3.13
Provincetown Harbor Watershed[2]	0.79	0.87
Wellfleet Harbor Watershed[3]	0.25	0.25
Total	**4.12**	**4.25**

Notes:

1. Nitrogen reduction goal is 25% of Truro's load within the Provincetown Harbor watershed. Truro accounts for 7% of the Provincetown Harbor watershed load according to CCC. Loads for Provincetown Harbor are unattenuated, in accordance with CCC reports.
2. Nitrogen reduction goal is 25% of the watershed load. Loads for Provincetown Harbor are unattenuated, in accordance with CCC reports.
3. Nitrogen reduction goal is based on Truro's contribution to the Wellfleet Harbor Watershed, in accordance with the MEP reduction goal and methodology. Loads for Wellfleet Harbor are attenuated, in accordance with MEP reports. Attenuation in Wellfleet Harbor is minor.
4. Future reduction goals are estimated using the established threshold loads and estimated future loads are based on the housing production plan

The watershed nitrogen reduction goals presented in the table above provide a framework for evaluating potential nitrogen management alternatives in the next phase of Truro's Comprehensive Watershed Management Plan project.

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- 1.3 Summary of Prior Reports 1
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Appendix A Beach Point Study Area Flows Memorandum
Appendix B Beach Point Study Area Wastewater Treatment Alternatives Memorandum

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List of Acronyms

ACEC	Areas of Critical Environmental Concern
ACS	American Community Survey
BFE	Base Flood Elevation
BOD	Biological Oxygen Demand
BOH	Board of Health
CSP	Coastal Systems Program
CWA	Clean Water Act
CWMP	Comprehensive Wastewater Management Plan
DCR	Department of Conservation and Recreation
DEP	Department of Environmental Protection
EPA	Environmental Protection Agency
EOEEA	Executive Office of Energy and Environmental Affairs
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
GIS	Geographical Information System
HNA	Housing Needs Assessment
HPP	Housing Production Plan
I/A	Innovative and Alternative
IWRMP	Integrated Water Resource Management Plan
LEED	Leadership in Energy and Environmental Design
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MC-FRM	Massachusetts Coastal Flood Risk Model
MEP	Massachusetts Estuaries Project

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MEPA	Massachusetts Environmental Protection Agency
MVC	Marthas Vineyard Commission
NAR	Needs Assessment Report
NAVD88	North American Vertical Datum of 1988
NHESP	Natural Heritage and Endangered Species Program
NOI	Notice of Intent
ORW	Outstanding Resource Water
SMAST	School for Marine Science and Technology
SSIR	Septic System Inspection Report
TMDL	Total Maximum Daily Load
TWMP	Targeted Watershed Management Plan
UMDI	University of Donahue Institute
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WEF MOP 32	Water Environment Federation Manual of Practice No. 32
WPA	Wetlands Protection Act
WROC	Water Resources Oversight Committee
WWTF	Wastewater Treatment Facility

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1. Introduction

1.1 Project Focus and Scope

The purpose of the Truro Comprehensive Wastewater Management Plan (CWMP) Project is to provide an environmentally and economically sound plan for nitrogen reduction, wastewater treatment, and treated effluent recharge in the Project Planning Area (Planning Area). The Planning Area is defined as the entire Town of Truro, Massachusetts (Town).

The CWMP consists of three phases; this Needs Assessment Report (NAR) is the first phase of the CWMP Project. It is designed to develop the understanding of existing and future conditions in the Planning Area that will be used through the entire CWMP project. The Needs Assessment provides the framework and necessary background information to complete the second phase of the Project where alternatives to remedy wastewater problems will be developed and evaluated (screened) for overall feasibility. The final phase of the Project will consist of a cost evaluation, environmental impact analysis of feasible alternatives, and a recommended plan of action.

This Needs Assessment Report utilizes existing information and estimations of future land use as well as population and water usage data to project future wastewater flow and loadings for the planning period. Wastewater issues and specific problem areas of the Town are identified and evaluated. Regulatory requirements and the Town's goals related to wastewater management and growth management are also incorporated into the Project.

1.2 Planned Review Process

An environmental review process by the Executive Office of Energy and Environmental Affairs (EOEEA) will be initiated for this project through the Massachusetts Environmental Policy Act (MEPA) process. All of the documents prepared under the MEPA process will be submitted to the Massachusetts Department of Environmental Protection (MassDEP), MEPA, and other interested parties for review and comment.

1.3 Summary of Prior Reports

The following documents were provided to GHD and were used in the development of this report:

- 'Source Water Assessment and Protection (SWAP) Report for Provincetown Water Department', prepared by the Massachusetts Department of Environmental Protection and dated April 2004.
- 'Summary of Water Quality Monitoring Program, for the Provincetown Harbor, East Harbor Lagoon, Pamet Harbor and Hatches Harbor Embayment Systems (2007 – 2009) Final', prepared by the Coastal Systems Laboratory School of Marine Science and Technology (SMAST) University of Massachusetts – Dartmouth and dated September 2010
- 'Truro Integrated Water Resources Management Plan, Phase 1', prepared by Weston & Sampson and dated October 2014
- 'Cape Cod Area Wide Water Quality Management Plan Update (208 Plan)', prepared by the Cape Cod Commission and dated June 2015
- 'Community Housing Needs Assessment' prepared for the Truro Housing Authority by Development Cycles and dated September 2015
- 'Cape Cod Commission Watershed Report: Outer Cape Provincetown Harbor', dated October 2017
- 'Cape Cod Commission Watershed Report: Outer Cape Pamet River', dated October 2017
- 'Cape Cod Commission Watershed Report: Outer Cape Wellfleet Harbor', dated October 2017

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- '208 Plan Cape Cod Area Wide Water Quality Management Plan Update – 2017 Implementation Report', prepared by the Cape Cod Commission
- 'Truro Integrated Water Resources Management Plan Phase II Report for the Water Resources Oversite Committee', prepared by Weston & Sampson and dated February 2018
- 'Massachusetts Water Conservation Standards', prepared by the Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs and the Water Resources Commission and dated July 2018
- '2021 Climate Action Plan Cape Cod' prepared by the Cape Cod Commission and dated July 2021
- 'Increasing Coastal Resiliency Through Intermunicipal Shoreline Management. Phase 1 Final Report Prepared for the Towns of Eastham, Wellfleet, Truro and Provincetown. Tech Rep: 20-CL-04', prepared by the Coastal Processes and Ecosystems Lab at the Center for Coastal Studies Provincetown Massachusetts and dated 2020
- '2023 Annual Drinking Water Quality Report for the Provincetown Water Department', prepared by the Provincetown Water Department and dated 2023

1.4 Scope and limitations

This report has been prepared by GHD for Town of Truro, MA and may only be used and relied on by Town of Truro, MA for the purpose agreed between GHD and Town of Truro, MA as set out in this report.

GHD otherwise disclaims responsibility to any person other than Town of Truro, MA arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

2. Background

2.1 Project Site and Planning Area

The Town of Truro, Massachusetts is located on Cape Cod and is bordered by the Towns of Provincetown and Wellfleet, as shown in Figure 1.1. The Planning Area for this project is defined as the Town boundaries and includes the portions of the watersheds within the Town boundaries. The Planning Area is designed to identify the wastewater and other nitrogen-related needs within the Town. The Town has three coastal estuary watersheds within the Planning Area:

2.1.1 Provincetown Harbor

The Provincetown Harbor watershed is a coastal estuary shared by Truro and Provincetown. The Cape Cod Commission Watershed Report estimates that Provincetown contributed 93% of the watershed Nitrogen load and Truro contributed the remaining 7% of Provincetown Harbor's Nitrogen load.

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2.1.2 Pamet River

The Pamet River watershed is entirely in the Town of Truro. The river is divided into two distinct hydrological sections through a clapper valve installed to the west of Route 6 – the upper Pamet River (upstream of the clapper valve) is freshwater and the lower Pamet (downstream of the clapper valve) is a salt marsh estuary. During significant Atlantic Ocean storms in the late 1900s, Ballston Beach, located on the eastern coast of Truro, has been over-washed. A 1992 storm resulted in the Upper Pamet River valley being flooded with four feet of saltwater.

2.1.3 Wellfleet Harbor

The Wellfleet Harbor watershed is shared by the Towns of Truro, Wellfleet, and Eastham. The Cape Cod Commission Watershed Report estimates that Wellfleet contributes 87% of the watershed Nitrogen load, Eastham contributes 11%, and Truro contributes the remaining 2%. The sub-watersheds are:

- Herring River / The Gut (located in the Town of Truro and Wellfleet)
- Duck Creek (located completely outside of Truro)
- The Cove (located completely outside of Truro)
- Drummer Cove / Blackfish Creek (located completely outside of Truro)
- Hatches Creek (located completely outside of Truro)
- Wellfleet Harbor (located completely outside of Truro)
- Loagy Bay (located completely outside of Truro)

2.2 Planning Period

The planning period for this project, which is the time span over which wastewater facility needs are forecasted, is 20 years, from 2027 through 2047. The MassDEP *Guide to Comprehensive Wastewater Management Planning* (January 1996) requires a minimum planning period of 20 years.

2.3 Population and Demographic

This section outlines the population and demographic data that was reviewed to characterize the current and anticipated future population in the Town for the planning period (2027-2047).

2.3.1 Resident Characteristics

Truro is a highly seasonal community, experiencing a large influx of visitors and seasonal residents during the summer months. The Town has a population density of 117 people per square mile. The 2020 US Census listed the total population of the Town as 2,454 people. The 2022 American Community Survey (ACS) lists the Town's income per capita as $89,243. The median age of Town residents is 65. Figure 2.1 shows a breakdown of the Town's employment by industry.

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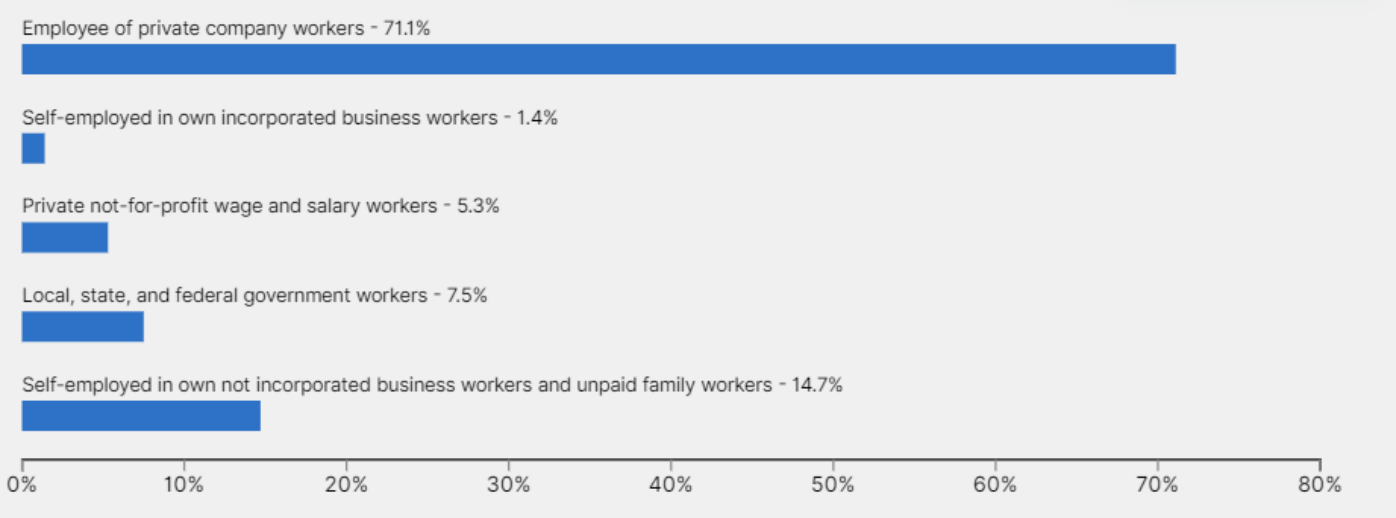


Figure 2.1 Industries in Truro – 2020 American Community Survey

2.3.2 Future Population and Growth

The US Census classifies geographical areas into one of three categories, as follows:

– Urbanized areas of 50,000 people or more
– Urban clusters between 2,500 and 50,000 people
– Rural areas of less than 2,500 people

According to the US Census, the Town is classified as a rural area. The 2020 US Census indicates that Barnstable County has a very high seasonal population, with approximately 51.5% of all the housing units in the lower Cape classified as vacant/seasonal units (Cape Cod Commission, 2024).

Under an agreement with the Massachusetts Secretary of the Commonwealth, the University of Massachusetts Donahue Institute (UMDI) has produced population projections for all Massachusetts municipalities at 5-year intervals through the year 2050. UMDI projections are estimated based on trends in fertility, mortality and net migration. As shown in Figure 2.2, the UMDI projections for the Town indicate a decline in population, decreasing by approximately 50% between 2020 and 2050.

The '2015 Truro Housing Needs Assessment and Production Plan (2015 Truro HPP)' also projects a decline in resident population. The HPP attributes the projected decline in population to a number of factors including the seasonal local economy, the town's wealth compared to the high housing costs, the lack of multi-family rental housing, the aging population, and the high rental costs. Additionally, the 2015 Truro HPP outlines the need to develop workforce housing needs with the goal to increase eligible housing units by 0.50% of its total units every calendar year over a 5 year planning period, or 260 units total. While this plan is intended for 2023 to 2027, for the purpose of this assessment we have carried the same goal for the duration of the planning period (development of 260 new housing units over a 20 year planning period), and used the following assumptions from the HPP to convert anticipated dwelling unit generation to population projections: 25% of households containing one person, 50% of households containing two people, and 25% of households containing three people.

Figure 2.2 and Table 2.1 show the Town's historical and projected growth obtained from UMDI and the US Census Bureau, and also the housing development goals outlined in the HPP. Historical population data was obtained from UMDI and the US Census Bureau. For planning purposes, the proposed developments outlined in Truro's Housing Needs Assessment and Production Plan, as discussed above, will be utilized to provide a conservative estimate on future wastewater generation.

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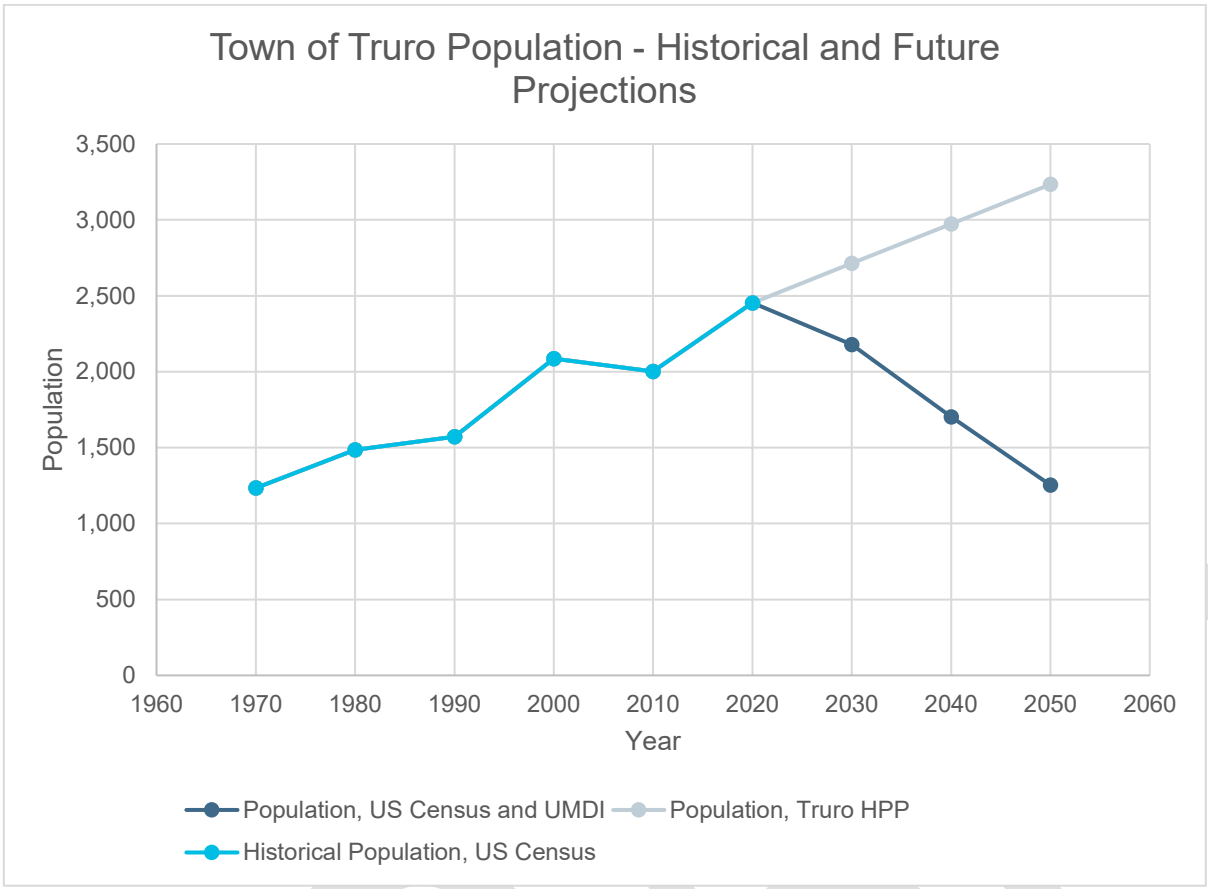


Figure 2.2 *Town of Truro Historical and Future Population Projections*

Table 2.1 *Town of Truro Historical and Projected Population*

Year	Population, US Census and UMDI	Population, Truro HPP
1970	1,234	1,234
1980	1,486	1,486
1990	1,573	1,573
2000	2,087	2,087
2010	2,003	2,003
2020	2,454	2,454
2030	2,179	2,714
2040	1,702	2,974
2050	1,254	3,234

Sources:
Years 1970 – 1990: US Census
Years 2000 – 2050: UMDI Population Projection, Truro Housing Needs Assessment and Production Plan

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2.4 Watershed & Nutrient Management Planning History

2.4.1 Water Resources Protection Plan (1985)

The Water Resources Protection Plan, prepared by IEP, Inc. in December 1985, assessed the hydrogeologic characteristics of the Town of Truro ground-water system. Truro is situated on two water lenses – the Pamet lens in North Truro and Chequesset lens in South Truro and Wellfleet. These lenses are hydrologically divided by the Pamet River system, which is fed by groundwater from both lenses.

The report commented on the capability of the underlying aquifer to yield high quantities of high-quality water. The report noted that aquifer is sufficient enough to serve the needs of both Truro and Provincetown (at the time of the evaluation), however it is also susceptible to contamination from salt water intrusion and chemical contamination (for example from leaking underground storage tanks). The majority of properties in Truro are served by both private wells and on-site septic systems. The findings of the report indicate that the zoning, subdivision and health regulations (circa 1985) were inadequate to protect the quality of groundwater.

The report conducted a buildout analysis based on zoning bylaws and subdivision rules and regulations (at the time of the evaluation) and noted that under these buildout conditions the South Hollow wellfield is anticipated to reach a nitrate concentration of 5 mg/L and the Knowles Crossing wellfield is anticipated to exceed this guideline (5 mg/L of nitrate-nitrogen was used as a guideline in this evaluation to indicate potential high nitrate concentrations due to septic systems). The report also evaluated available private well data noted elevated levels of nitrate-nitrogen and sodium throughout the Town. It also noted concentrated areas of nitrate-nitrogen concentrations over 5 mg/L in the Pond Village area of North Truro. The report noted that the Title 5 regulations current at the time of the evaluation required private wells to be sited at least 100 feet from an on-site septic system, but did not consider groundwater direction.

The report also noted that preliminary data suggests that the Upper Pamet River may be undergoing eutrophication. The report provided recommendations that the Town update their regulations and bylaws to protect groundwater quality.

2.4.2 Pamet River Investigation Groundwater Assessment Study (1997)

The Pamet River Investigation Groundwater Assessment Study, prepared in 1997 by the Cape Cod Commission Water Resources Office assessed the impacts associated with the removal of the tide gate and dike structures. During significant Atlantic Ocean storms at Ballston Beach, the Upper Pamet River has periodically been flooded with saltwater. These flood events prompted an evaluation of the potential removal of the existing clapper valve at Wilder Dike, which separates the freshwater portion of the Upper Pamet River from the coastal estuary system in the Lower Pamet River.

Concerns about removing the clapper valve include degradation in drinking water quality in wells in or near the watershed and flooding of existing septic systems. The calibrated groundwater model developed for this study indicated minimal increases in groundwater fluctuations near the river, with virtually unmeasurable changes greater than 500 feet from the river. The evaluations field data and model findings indicated that the marsh peat's low permeability dampens tidal impacts on groundwater levels, and the significant aquifer thickness minimizes saltwater flow effects in the Upper Pamet River valley.

Although the report determined that there will be insignificant impacts on groundwater levels surrounding the Pamet River, additional data collection and analyses were recommended to better understand how groundwater flows into the river, to quantify the magnitude of the river/aquifer system interactions with the underlying saltwater surface, and to determine how improvement in tidal interactions could affect draining of salt water from the system during the net over-wash of Ballston Beach. The report recommends the implementation of a long-term stream flow monitoring program at Wilder Dike and various points within the river, groundwater modeling of these results, and the establishment of an over-wash response plan to facilitate the removal of saltwater following the over-wash of Ballston Beach.

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2.4.3 Summary of Water Quality Monitoring Program for the Provincetown Harbor, East Harbor Lagoon, Pamet Harbor and Hatches Harbor Embayments Systems (2010)

A Water Quality Monitoring Program, supported by the 604(b) grant was implemented for Pamet Harbor and Provincetown Harbor between 2007 and 2009. This was a joint initiative between the Coastal Systems Program (CSP) at the University of Massachusetts – Dartmouth and the municipalities of Provincetown and Truro. Based on the results of the three-year monitoring program, the study found that both Pamet Harbor and East Harbor (also known as Pilgrim Lake) are exhibiting signs of low water quality. Pamet Harbor presented with TN levels ranging from 0.775 – 0.357 mg/L and PO_4 levels ranging from 0.031 – 0.009 mg/L. East Harbor Lagoon presented with TN concentrations ranging 1.221 to 0.401 mg/L and PO_4 concentrations ranging 0.046-0.007 mg/L. Target concentrations for oligotrophic classifications for N and P are 0.30 mg/L (according to MEP) and 0.012 mg/L, respectively.

Low water quality in Pamet Harbor and East Harbor was described as likely impacting the health of the estuarine habitat and the report recommended that the Towns of Truro and Provincetown would benefit from a detailed assessment of the levels of habitat impairment and the development of nutrient related thresholds for these two watersheds. While Pamet Harbor is entirely in Truro, East Harbor watershed is shared between the Towns, although largely in Truro.

2.4.4 Integrated Water Resources Management Plan: Phase I (2014)

The 'Integrated Water Resources Management Plan, Phase 1' prepared by Weston & Sampson and dated October 2014 evaluated nutrient loading impacts to Truro's groundwater and surface water resources.

This plan focuses on managing surface water and groundwater resources. Rather than large-scale infrastructure changes, the IWRMP outlined an incremental approach to enhance stormwater and wastewater management. The plan recommended implementation of innovative nutrient removal technologies such as advanced septic system technologies, real-time nitrogen load mapping, and ongoing water quality monitoring. The findings of the Phase I report indicate that the following locations require future efforts to address issues:

Beach Point: The primary concern identified in the Beach Point area is wastewater management options. Beach Point is a primarily commercial zone that sees a significant influx of summer visitors, creating significant increases in nitrogen loads.

East Harbor (also referred to as Pilgrim Lake): East Harbor is a significant water body situated just north and west of Moon Pond. East Harbor has seen significant algal blooms, odor problems, and increasing eutrophication over the last two decades, which are attributed to increased nutrient loading from stormwater sources and wastewater inputs. According to Massachusetts Department of Transportation (MassDOT) records, the majority of stormwater drainage from Route 6 drains directly to East Harbor.

2.4.5 Integrated Water Resources Management Plan: Phase II (2018)

The Phase II report of the Integrated Water Resources Management summarized public outreach efforts, provides an assessment of ground water near East Harbor, discusses potential town-wide methods for controlling water quality, and proposed development of storm water treatment measures. The groundwater and surface water monitoring conducted as part of this project showed that concentrations of phosphate, nitrate, and ammonia/nitrogen in both Pamet River and East Harbor were higher in 2015 than in 2007-2009. The findings of the IWRMP Phase II report recommended that Truro establish regular water quality monitoring of the wells along Beach Point Road and that alternatives for serving Beach Point with a centralized sewer collection system should be developed. The Phase II study looked more closely at the areas of concern identified in Phase I. The report included recommendations for local regulations and options to the improve onsite wastewater disposal systems, enhanced Nitrogen removal through I/A septic systems, and fertilizer management.

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2.4.6 Walsh Property – Drinking Water Protection Memorandum (2022)

The Walsh Property memorandum, prepared by Scott Horsley, reviewed the potential of developing the Walsh Property. As part of the evaluation, the memorandum reviewed reports prepared by Tighe & Bond (January 2022) and Sole Source Consulting (August 2022). Mr. Horsley concluded that it is possible to develop the property with careful planning and design. Mr. Horsley recommended special attention to Zone 1 and Zone 2 areas. A conservative approach to the site would include the development of a cluster/neighborhood wastewater treatment facility which would be designed to treat both the proposed flow from the Walsh property development as well as existing flow from neighboring properties. This would result in a net water-quality improvements compared to existing conditions. The report suggested that the Truro Central School as a potential site for the cluster wastewater treatment system.

2.4.7 208 Plan: Cape Cod Area Wide Water Quality Management Plan Update (2015)

The 2015 "208 Plan", which is an update to the 1978 Section 208 Plan for Cape Cod, outlines strategies and regulatory reforms that can be implemented to meet watershed TMDL requirements on Cape Cod. The report outlines 67 nutrient reduction, remediation and restoration technologies and approaches that can be evaluated by Towns for inclusion in a TMDL compliance plan.

2.4.8 Cape Cod Commission Watershed Reports

Cape Cod Commission has produced Watershed Reports for each Cape Cod watershed. Each Watershed Report summarizes the degree of nitrogen impairment and potential nitrogen management strategies, based on available information. For watersheds that have not undergone a scientific evaluation to establish nitrogen management thresholds, the Watershed Reports outline initial assumptions that can be used to initiate planning efforts in these watersheds. The Watershed Reports use the MEP recommendations for the required nitrogen load reductions necessary to meet the threshold loads, where available. In watersheds where an MEP evaluation has not been conducted a 25% reduction is recommended to initiate planning efforts. All three watersheds within the Town of Truro have a CCC Watershed Report.

Table 2.2 Summary of Cape Cod Commission Watershed Report

Watershed	Total Estimated Current Septic Flow (Million Gallons Per Year)	Contributing Towns	Estimated Nitrogen Load (kilograms / year)[1]				
			Wastewater[4]	Fertilizer[5]	Stormwater	Other[6]	Total
Pamet River[1]	31 MGY (0.08 MGD)	Truro (100%)	3,069 (68%)	266 (6%)	738 (16%)	429 (10%)	4,502
Provincetown[2] Harbor	99 MGY (0.27 MGD)	Provincetown (93%) Truro (7%)	11,939 (72%)	1,174 (7%)	2,929 (18%)	503 (3%)	16,544
Wellfleet Harbor[3,7]	271 MGY (0.74 MGD)	Wellfleet (87%) Eastham (11%) Truro (2%)	22,591 (73%)	2,138 (7%)	4,577 (15%)	1,587 (5%)	30,893

Notes:

1. 'Cape Cod Commission Watershed Report: Outer Cape Pamet River', dated October 2017
2. 'Cape Cod Commission Watershed Report: Outer Cape Provincetown Harbor', dated October 2017

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Watershed	Total Estimated Current Septic Flow (Million Gallons Per Year)	Contributing Towns	Estimated Nitrogen Load (kilograms / year)[1]				
			Wastewater[4]	Fertilizer[5]	Stormwater	Other[6]	Total

3. 'Cape Cod Commission Watershed Report: Outer Cape Wellfleet Harbor', dated October 2017. Wellfleet Harbor values are preliminary estimates that were developed prior to the establishment of the final Wellfleet Harbor TMDL and are provided for reference only. This project will use the nitrogen breakdown documented in the final TMDL for Wellfleet Harbor (dated 2023).

4. Includes nitrogen loads from septic systems and wastewater treatment facilities

5. Includes nitrogen loads from lawns, cranberry bogs, and golf courses.

6. Includes nitrogen loads from landfills and atmospheric deposition to vacant land.

2.4.9 Targeted Watershed Management Plan – Wellfleet Harbor

The Town of Wellfleet submitted a draft Wellfleet Harbor Targeted Watershed Management Plan (TWMP) to MassDEP for review in 2022. A Notice of Intent (NOI) was filed in May 2024 to apply for a watershed permit for the Wellfleet Harbor watershed, which is shared between Truro and Wellfleet. Wellfleet's intended plan describes the integration of several nitrogen mitigation strategies, including Innovative and Alternative (I/A) septic systems, centralized sewering, fertilizer management, and stormwater best management practices.

2.4.10 The Massachusetts Estuaries Project and Reports – Wellfleet Harbor

In 2001, the Massachusetts Estuaries Project (MEP) was initiated through a partnership between the Massachusetts Department of Environmental Protection (MassDEP), UMass Dartmouth, and southern Massachusetts Communities. The purpose of the MEP is to quantify current nitrogen loads to Southeastern Massachusetts estuaries and to estimate the nitrogen reductions that would be required to support healthy ecosystems. To date, an MEP report has been completed and Total Maximum Daily Loads (TMDLs) have been established for one of the three major estuaries in the Town of Wellfleet—Wellfleet Harbor. This NAR incorporates the findings of the Wellfleet Harbor MEP report and utilizes other resources to quantify needs for watersheds without an MEP report.

3. Existing Water & Wastewater Infrastructure

3.1 Existing Wastewater Infrastructure

The majority of the parcels in Truro utilize traditional Title 5 onsite septic systems or cesspools. These traditional systems are not designed to treat nitrogen and phosphorus, and there is currently no municipal centralized system for sewer collection and treatment. Wastewater flows for on-site systems less than 10,000 gpd are regulated by Title 5, while flows greater than 10,000 gpd require a State-issued groundwater discharge permit. Although there are no groundwater discharge permits registered in Truro, there are several large properties that may require a GWDP currently or in the future, including, North of Highland Camping Area, Cloverleaf, Hortons, and Adventure Bound Camping Resorts.

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Title 5 systems receive their name because they were designed based on Title 5 regulations (1978 or 1995 iterations). Title 5 of the Massachusetts State Environmental Code provides minimum standards for the "…protection of public health, safety, welfare and the environment by requiring the proper siting, construction, upgrade and maintenance of on-site wastewater disposal systems and appropriate means for the transport and disposal of septage." The regulations contained in 310 CMR 15.00 come under the jurisdiction of MassDEP and are enforced in conjunction with the local health department through permits, inspections, and fines. Title 5 systems are composed of three main elements: a septic tank, distribution box, and soil absorption system. Septic tanks remove floatable and settleable solids from the waste stream and can act as an anaerobic digester to digest (remove) solids, as well as a flow equalization tank. The tank is usually constructed of concrete and either consists of a baffled chamber or inlet and outlet tees designed to isolate the solids in the tank and eliminate short circuiting of floatables. The distribution box receives the effluent from the septic tank and distributes it evenly throughout the leaching system. The distribution box is typically a small watertight concrete structure with one inlet and several outlets. Soil absorption systems come in many forms including leaching trenches, leaching pits, leaching galleries, and leaching fields. The selection of a particular type of soil absorption system for a particular design will depend upon the specific site considerations and costs.

Cesspools are subsurface structures with open joints or holes in the walls and bottom through which the wastewater percolates into the ground. Solids collect in the bottom where they decompose or can be removed as septage. Board of Health (BOH) records indicate that a small number of properties in the Town utilize cesspools. Truro's Board of Health Regulations (effective July 1, 2021) define cesspools as failed systems and require that these systems be updated to meet Title 5 regulations prior to December 31, 2023.

Innovative & Alternative (I/A) Systems are alternative on-site systems that use advanced technologies to provide a higher level of treatment than traditional Title 5 systems. The Title 5 regulations allow a smaller soil absorption system when some types of I/A systems are used. Unlike traditional septic systems, I/A septic systems can be designed to reduce Biological Oxygen Demand (BOD) and remove nutrients, such as nitrogen and phosphorus. These systems have more monitoring requirements than a regular Title 5 system. Alternative systems are usually required when a property owner has minimal space for a soil absorption system; when the property is located in a nitrogen sensitive area; or as a condition for approval of variances. There are several different I/A technologies which have been approved by MassDEP for use in Massachusetts. These technologies are approved in four different categories: General Use, Piloting Use, Provisional Use, and Remedial Use.

– General use systems can be used anywhere a conventional system can be installed.
– Piloting use systems allow for field testing of new technologies and require additional inspection and testing.
– Provisional use systems are installed for further testing of piloted systems and require regular inspection and testing to confirm they can provide appropriate levels for protection.
– Remedial use systems are approved for use to improve conditions of an existing system that is failing or has failed. These systems require regular inspection and testing.

MassDEP keeps an updated list of approved I/A technologies on its website: **https://www.mass.gov/info-details/approved-title-5-innovativealternative-technologies**

The Truro Board of Health Regulations (effective July 1, 2021) outline requirements for the installation of I/A systems. In the regulations, I/A systems are defined as technologies that are designed to meet a total nitrogen effluent limit of 19 mg/L or less. I/A systems are required for:

- Flows greater than 600 gpd
- Nitrogen credit applications (Nitrogen credit applications are only allowed by request in limited circumstances; this refers to the use of I/A technology for development of a property beyond the standard of 110 gpd of wastewater flow per 10,000 sf of area)
- Upgrades of certain non-conforming systems, as determined by the Board of Health
- Upgrades of previously approved systems that exceed a nitrogen loading rate of 110 gpd/10,000 square foot of lot area

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- In certain cases where a variance is required and use of the I/A will mitigate environmental impacts of the proposed system, as determined by the Board of Health

3.2 Existing Water Infrastructure

The 2023 Annual Drinking Water Quality Report for the Provincetown Water Department provides an overview of the current public water system in Truro. The majority (88%) of parcels in Truro rely on private on-site wells for drinking water. Approximately 600 properties utilize the public water system operated by Provincetown. Provincetown's public water supply is drawn from three wellfields located within the Pamet lens in Truro:

1. Knowles Crossing Wellfield: Consists of three individual wells. Groundwater pumped from this wellfield is treated at the Knowles Crossing Water Treatment Facility.
2. Paul D. Daley Wellfield (also known as South Hollow): Consists of six active individual wells. Groundwater pumped from this wellfield is treated at the Knowles Crossing Water Treatment Facility.
3. North Union Field: Consists of two individual wells. Groundwater pumped from this wellfield is treated at the South Hollow Corrosion Facility.

The Knowles Crossing Water Treatment Facility processes include membrane filtration for iron and manganese removal, disinfection, and pH adjustment. The South Hollow Corrosion Control Facility treatment process includes disinfection and pH adjustment.

In addition to the above listed wells, the Provincetown water system used two additional wells for an emergency supply. These wells are located at the former North Truro Air Force Base, located within the boundaries of the Cape Cod National Seashore.

The Source Water Assessment and Protection (SWAP) program assesses the susceptibility of public water supplies to potential contamination. The latest SWAP report for Provincetown, dated 2004, provided a high susceptibility ranking for this system; this ranking was based on information collected by DEP indicating the presence of pesticide storage and use, gas stations, junk yards and salvage yards, military facilities, and underground storage tanks that would potentially cause significant contamination within the source water areas.

4. Planning and Evaluation Criteria

4.1 Planning Period

The planning period for this Project, which is the time span over which wastewater needs are forecasted, is 20 years, from 2027 through 2047. The Massachusetts Department of Environmental Protection's (MassDEP) Guide to Wastewater Management Planning (January 1996) requires a minimum planning period of 20 years.

4.2 Survey Datum

All elevations in the CWMP Project will be presented in the North American Vertical Datum of 1988 (NAVD88), unless otherwise noted.

4.3 FEMA Flood Maps

The northern and southern ends of Truro are located within Special Flood Hazard Areas, specifically Zones AE and AO. These refer to areas subject to flooding by the 1% chance annual flood, or base flood. In addition, these hazard areas extend to the coast where they are characterized as Coastal Flood Zones VE with velocity hazards due to wave action. The Base Flood Elevations (BFEs) for these Zones range from 11 to 17 feet (FEMA 2014). The Federal

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Emergency Management Agency maps (FEMA) FIRM (Flood Insurance Rate Maps) reviewed as part of this project were all revised July 16, 2014. Figure 4.1 shows the FEMA flood hazard zones.

4.4 Permit Limits

Two types of permits that may be required for this project with regards to nutrient limits and wastewater discharge. These include a groundwater discharge permit for a wastewater treatment facility and watershed permits.

314 CMR 5.00 regulates discharge of pollutants to the groundwaters of Massachusetts. It directs the DEP to regulate the outlets for these discharges and any associated treatment works. The requirements are designed to ensure that groundwaters are protected for their actual and potential use as a source of potable water, that surface waters are protected for their existing and designated uses, and that 314 CMR 4.00, Massachusetts Surface Water Quality Standards, are attained and maintained (MassDEP 2016). This is applicable to any new wastewater treatment facility with a design flow over 10,000 gallons per day.

MassDEP issued new regulations under 314 CMR 21.00, titled Watershed Permit Regulations, effective July 7, 2023, in order to reduce nitrogen loads in Massachusetts' coastal estuaries and embayments. These regulations will serve to address and eliminate the water quality issues observed in these watersheds and are applicable to any watershed with a TMDL. For the Town of Truro, this only includes Wellfleet Harbor, as Provincetown Harbor and Pamet River do not have established TMDLs. The application shall include:

Under this framework, a Watershed Permit sets forth performance standards, authorized activities, and specific timeframes to achieve nutrient load reductions necessary for meeting the specific water quality and habitat restoration goals identified in a watershed analysis. These goals align with the designated uses of the waterbody, as established by MassDEP under 314 CMR 4.00, targeting the nutrients identified in the watershed analysis (MassDEP 2023).

4.5 Environmental and Sustainability Considerations

This Section outlines environmental and sustainability considerations that will be evaluated during both the planning and design phases of the Project, including water conservation, energy efficiency, energy recovery, and alternative energy.

4.5.1 Background

The Environmental Protection Agency (EPA) estimates that water and wastewater treatment together represent approximately 3% of the total energy consumption in the United States. It is typically one of the largest energy users in a community, often accounting for 30 to 60% of a municipal government's energy usage (USEPA, 2008). There are many opportunities to reduce the total energy usage at a facility; both to reduce the carbon footprint of the facility and to realize operational savings through the minimization of wasted power.

The Water Environment Federation Manual of Practice No. 32 – Energy Conservation in Water and Wastewater Facilities (WEF MOP 32) defines energy conservation measures as 'physical improvement, plant operation, or equipment maintenance practices that result in a reduction in utility or operating cost.' Several rating systems have been developed to help identify energy reduction measures and sustainability opportunities at facilities, including Leadership in Energy and Environmental Design (LEED) certification and the Envision Rating System. Additionally, many industry design standards including TR-16 (which is considered the New England design standard) incorporate sustainability considerations into their guidelines. The promotion of clean energy through the maximization of energy efficiency and renewable energy opportunities is encouraged by the Commonwealth of Massachusetts Sustainable Development Principles.

4.5.2 Water Conservation

The Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) and Water Resources Commission developed the "Massachusetts Water Conservation Standards" (last updated in 2018) to set

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state-wide goals for water conservation and water-use efficiency. The document discusses both the environmental benefits of water conservation and the potentially significant financial savings of water conservation through reduced operation and maintenance costs, reduced wastewater treatment costs, resulting increase in water and wastewater treatment plant capacities, and savings from avoiding having to find and develop new sources of water for the community. Water conservation efforts that can be undertaken by a wastewater treatment facility include installing reduced flow plumbing, reducing infiltration and inflow in the collection system, maximizing reuse of reclaimed wastewater, and implementing water conserving landscaping practices. The following water conservation principles will be evaluated for new infrastructure proposed as part of this Project.

Reduced Flow Plumbing: Reduced flow plumbing should be considered in design whenever possible and permitted by the local plumbing code. Devices that can be installed in the facility to reduce water consumption include water-saving toilets, reduced flush devices, and restricted flow shower heads.

Reclaimed Water Reuse: Reclaimed wastewater is wastewater discharged from buildings and process that is treated at a wastewater treatment facility and then reused in other applications. TR-16 Guides for the Design of Wastewater Treatment Works, prepared by the New England Interstate Water Pollution Control Commission, recommends conducting an assessment to determine if there are any economic effluent reuse opportunities at a facility to minimize the use of potable water at the facility. Increasing treated wastewater recharge and reuse is one of the 10 major recommendations of the 2004 Massachusetts Water Policy issued by the EOEEA. 314 CMR 20.00 – Reclaimed Water Program and Standards, which was most recently updated in 2009, outline the requirements for allowable uses of reclaimed water. Currently allowable uses of reclaimed water under these regulations include cooling water, toilet and urinal flushing, and irrigation to golf courses, parks, agricultural fields, landscaped areas and cemeteries.

Landscaping: Wherever possible, New England Design Standard TR-16 recommends that native species be used in landscaping on projects to reduce supplementary watering needs and the need for soil amendments and fertilizers. Landscaping features, such as open-grid pavers, should be considered to minimize stormwater runoff (and pollutant loading through runoff), and heat island effect from paved surfaces. Promoting stormwater recharge close to its site of origin is one of the 10 major recommendations of the 2004 Massachusetts Water Policy issued by the EOEEA.

4.5.3 Alternative Energy

Several potential sources of alternative energy production could be utilized at a future potential wastewater treatment facility designed to treat Truro's wastewater. Depending on the amount of power produced and site conditions, the electricity generated from production can either be used on-site or fed back to the local utility in a net metering arrangement. In a net metering arrangement, the facility sells back electricity produced in return for a predetermined credit towards its usage bill. The follow alternative energy sources should be considered:

Solar: Solar photovoltaic (PV) arrays can be used by facilities with adequate space to produce renewable energy on-site. Arrays can be ground-mounted or roof-mounted depending on the orientation of the buildings and available roof space. South-facing roofs with minimal shadow interference provide the most ideal conditions for a roof-mounted solar array.

A shade analysis would need to be conducted at a potential site to determine the feasibility of a solar installation. On average, Massachusetts experiences 4.5 "sun hours per day" of solar energy. This means that over an entire year, direct sunlight hits an area for an average of 4.5 hours per day. In comparison Phoenix, Arizona experiences 6.4 sun hours per day. For an equivalent amount of power output from a PV panel in Massachusetts, the module area would be designed to be approximately 40% larger than in Phoenix.

Wind: Wind turbines can be used to harvest wind energy from sites with ideal conditions. According to MassDEP, Massachusetts has a rich source of onshore wind energy that is mostly located in the coastal areas and western ridgelines. While there is potential for wind energy on Cape Cod, wind resources can vary significantly at the micro level. WEF MOP 32 recommends that a potential site is monitored for wind potential for at least a year to determine its suitability for a wind turbine installation.

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In addition to wind potential, several other factors need to be considered when assessing a potential turbine location including sound impact, shadow flicker, visual impact, and potential environmental permitting. Massachusetts State regulations (Massachusetts Air Pollution Control Regulation, Regulation 310 CMR 7.10) do not allow a rise of 10 decibels (db) or greater above background levels at a property boundary. Environmental considerations include whether the site is within a state designation of NHESP Open Space, Wetland, or other land-use designations or restrictions.

Geothermal: Geothermal systems use the nearly constant temperature of the earth to act as a heat source and a heat sink to heat and cool buildings through a heat pump. A heat exchanger is a system of pipes buried in the shallow ground near the building. A fluid, usually water or a mixture or water and antifreeze, circulates through the pipes and absorbs or gives off heat to the ground. In the winter the heat pump removes heat from the heat exchanger and pumps it through an air delivery system to heat a building's interior. In the summer the system runs in reverse removing heat from the building and using the ground as a heat sink. Heat removed from the building during the summer can also be used to heat water.

4.5.4 Summary

The above described Environmental and Sustainability considerations will be further evaluated in future stages of the Truro Comprehensive Watershed Management Plan. A future greenhouse gas (GHG) emissions assessment will be performed on the alternatives identified for addressing Truro's nutrient loads. This GHG emissions assessment will identify how alternatives are meeting various sustainability-related standards.

5. Existing Conditions

5.1 Natural Resources

5.1.1 Climate and Sea Level Rise

Sea level has historically risen and fallen with the formation and melting of glaciers and polar ice. Since the last ice age, sea level has continued to rise at roughly 10 inches per century. Recent research indicates that the pace of sea level change in the 20th century has been faster than any century in the previous 2,700 years (Kopp et al., 2016).Due to its peninsula location, the climate on the Cape is highly influenced by both the Atlantic Ocean and Cape Cod Bay.

The Massachusetts Climate Change Assessment (2022) is a statewide analysis detailing how Massachusetts people, environments, and infrastructure may be affected by climate change and related hazards through the end of the century. The assessment details results from the Massachusetts Coast Flood Risk Model (MC-FRM) and provides sea level rise projections for the Cape as a whole (Table 5.1). The assessment also notes that there will be increased flooding from storm surges caused by sea level rise.

Table 5.1 Sea Level Rise Projection Relative to Estimated 2020 Sea Level

	2020	2030	2050	2070
Sea Level Rise – North Shore[1]	0 ft	0.59 ft	1.79 ft	3.59 ft
Sea Level Rise – South Shore[2]	0 ft	0.62 ft	1.92 ft	3.72 ft

Notes:

1. North shore refers to the northern coast of Massachusetts, from Salisbury to Provincetown.
2. South shore refers to the southern coast of Massachusetts, from Provincetown to Westport.

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The Cape Cod Climate Action Plan serves to address the challenges faced on Cape Cod due to the changing global climate. The Climate Action Plan is aligned with the goals of the Commonwealth of Massachusetts; it identifies strategies and actions to reduce GHG emissions and to engage local and regional resiliency to increasing climate threats. Development within the Cape Cod floodplain has led to over 15,000 properties being at risk of destructive impacts from severe weather events. The continued release of GHGs into the atmosphere will only increase these climate change-induced problems.

The 'Coastal Resiliency through Intermunicipal Shoreline Management Phase I Final Report for the Towns of Eastham, Wellfleet, Truro, and Provincetown' focused on identifying existing baseline conditions for the eastern shoreline of Cape Cod Bay. The report noted that the eastern shoreline of Cape Cod Bay experiences the effects of climate change in the form of frequent powerful coastal storms with high storm surges, significant flood events that impact public and private roadways and structures, increased frequency in damage to upstream infrastructure due to tidal flooding, and overburdened stormwater management systems.

The alternatives analysis and recommended plan for this project will consider impacts of sea level rise and the changing climate to assess vulnerabilities.

5.1.2 Soils

USGS classifies the majority of soils in Truro as Carver coarse sands. Coarse sands are characteristically very permeable and have high infiltration capacities. Under Title 5, these soils are classified as Class 1, and are allotted the highest effluent loading rates. The soil series in the Town, as classified by the United States Department of Agriculture, is shown in Figure 5.1.

5.1.3 Surface Waters

Truro contains three coastal watersheds (Provincetown Harbor, Pamet River, and Wellfleet Harbor) and a number of ponds. Many of Truro's ponds are kettle ponds, meaning they were formed by retreating glaciers. According to the Phase I IWRMP, the total land area of Truro's ponds is approximately 35 square miles. All of Truro's major ponds fall within the Cape Cod National Seashore, making them largely outside of the jurisdiction of the Town. Two smaller Truro Ponds are not owned by the National Park Service: Pilgrim Pond (also referred to as Village Pond) and Great Swamp. According to the Massachusetts Vegetated Buffer Manual, surface runoff contributes over 80% of the sediment and nutrients in Massachusetts waterbodies. Vegetated buffers are areas of vegetation that are strategically placed near waterbodies to protect water quality during construction by slowing, capturing, and filtering runoff. Vegetated buffers can include swales, infiltration basins, filter strips, constructed wetlands, or other natural, existing, or established vegetation. During the design stage of this project, special consideration should be given to vegetated buffers to minimize runoff into rivers, lakes, and ponds.

5.1.3.1 Surface Water Classifications

In Massachusetts, coastal, marine, and fresh (inland) waters are classified by 314 CMR 4.00 (The Massachusetts Surface Water Quality Standards), most recently updated in 2021, into the following classifications:

Coastal/Marine:

– Class SA—Waters designated as an excellent quality habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions; and for primary and secondary contact recreation. Where designated in the regulations, the waters are suitable for shellfish harvesting without depuration. These waters shall have excellent aesthetic value.
– Class SB—Waters designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions; and for primary and secondary contact recreation. Where designated in the regulations, the waters are suitable for shellfish harvesting with depuration. These waters shall have consistently good aesthetic value.

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– Class SC—Waters designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions; and for secondary contact recreation. These waters shall have good aesthetic value.

Fresh/Inland:

– Class A—Waters designated as an excellent habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions; and for primary and secondary contact recreation. These waters shall have excellent aesthetic value and are protected as Outstanding Resource Waters (ORWs).
– Class B—Waters designated as an excellent habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions; and for primary and secondary contact recreation. The waters are suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.
– Class C—Waters designated as a habitat for fish, other aquatic life and wildlife, including for their reproduction, migration, growth, and other critical functions; and for primary and secondary contact recreation. These waters shall be suitable for the irrigation of crops used for consumption after cooking and for compatible industrial cooling and process uses. These waters shall have good aesthetic value.

The Atlantic Ocean and other surface waters within/bordering the Cape Cod National Seashore are designated as Class SA for coastal and marine waters, and as Class B for fresh waters. These waters are also qualified as ORWs, which are waters designated for protection in 314 CMR 4.06. This includes Class A Public Water Supplies and their tributaries, certain wetlands, certain surface waters, and other waters based on their outstanding socio-economic, recreational, ecological, and/or aesthetic values.

5.1.3.2 Total Maximum Daily Loads (TMDL)

The Federal Clean Water Act (CWA) requires states to develop a list of impaired waters, which are waters that are unable to meet state-established water quality standards for their intended use (e.g. drinking water supply, fishing, recreational swimming and boating, or healthy ecosystems for plants and animals). States are then required to develop TMDLs for the impaired waters that are affected by pollutants. A TMDL is a determination of the maximum amount of pollutants that a body of water can withstand and still function as an ecosystem.

In 1998, the EPA required all states to submit strategies for completing TMDLs within eight to 13 years. Massachusetts submitted a two-stage strategy. The first stage would make use of existing studies and information by working to implement corrective actions where feasible; develop a pilot program to define data collection needs and procedures to be used for TMDL development; and develop and standardize TMDL determination methods for pollutants that did not have well-established protocols. The second stage focused on developing the TMDLs, beginning with the TMDLs for pollutants with well-established determination methods.

Once TMDLs are determined, MassDEP develops a draft TMDL Report, followed by a public review and comment period. After addressing public comments, MassDEP submits the TMDL Report to EPA for formal approval. The TMDL development process requires that communities develop plans to restore the health of water bodies and then make progress toward implementation of the plans.

MassDEP monitors the progress of communities in achieving TMDLs. Restoration of water bodies is an extended process, so MassDEP looks for reasonable progress. If no reasonable progress is being made, MassDEP can take enforcement action. The CWA requires states to monitor the quality of their water resources to determine if the water meets the standards for intended uses. This information is reported to the EPA in the Integrated List of Waters. Category 5 of the Integrated List itemizes water bodies that are “impaired or threatened for one or more uses and requiring a TMDL.” Therefore, this list becomes the basis for determining the water bodies for which TMDLs will be established. Waterbodies on the Integrated List of Waters are reviewed in further detail in Section 5.1.3.3.

The nitrogen TMDL for Wellfleet Harbor, which is partially located in Truro, was finalized in 2023. A preliminary water quality evaluation was completed in 2010 as part of the 604(b) grant, for Provincetown Harbor and East Harbor, however, this data has not yet been incorporated into the TMDL.

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5.1.3.3 Integrated List of Waters Classifications

Every two years the State of Massachusetts is required to submit a state-wide report describing the status of water quality in the Commonwealth to EPA. The "Massachusetts Year 2022 Integrated List of Waters" was prepared by the Massachusetts Division of Watershed Management through the Watershed Planning Program to fulfill this requirement. The document is commonly known as the "303(d)" list.

The Integrated List for 2022 divides waterbodies in Massachusetts into the following categories:

1. Waters unimpaired and not threatened for all designated uses.
2. Unimpaired for some uses; other uses not assessed.
3. Insufficient information to make assessments for any uses.
4. Impaired for one or more uses, but not requiring the development of a TMDL.
   - 4a. TMDL has been completed.
   - 4b. Other pollution control requirements are reasonably expected to result in the attainment of designated uses.
   - 4c. Impairment is not caused by a pollutant, TMDL not required.
5. Impaired for one or more uses and requiring a restorative "action" plan, such as a TMDL or Alternative Restoration Plan (impairment due to pollutants such as nutrients, metals, pesticides, solids, and pathogens).

Because of a state-wide Department of Public Health Advisory on the consumption of finfish, no waters were listed as Category 1 in the 2022 report. Table 5.2 lists the water bodies in the Town that are listed in the Integrated List, their categorization, and causes of impairment.

Table 5.2 Integrated List of Waterbodies in Truro

Waterbody	Category	Impairment
Village Pond	3	N/A
East Harbor (Pilgrim Lake)	4a	Fecal Coliform
Great Pond	4a	Mercury in Fish Tissue
Horseleech Pond	4a	Mercury in Fish Tissue
Pamet River	4a	Fecal Coliform
Provincetown Harbor	4a	Fecal Coliform
Round Pond (East)	4a	Mercury in Fish Tissue
Round Pond (West)	4a	Mercury in Fish Tissue
Slough Pond	4a	Mercury in Fish Tissue
Snow Pond	4a	Mercury in Fish Tissue
Ryder Pond	5[1]	Mercury in Fish Tissue Dissolved Oxygen Phosphorus, Total
Wellfleet Harbor	5	Nitrogen, Total Nitrogen Eutrophication Biological Indicators

Source:

Massachusetts Year 2022 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts Waters Pursuant to Sections 305(b), 314, and 303(d) of the Clean Water Act.

Notes:

1. Nutrient-related impairment.

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The 2022 303(d) list indicates that two of the 12 listed waterbodies in the Town require a TMDL for a nutrient-related impairment (Table 5.2). Wellfleet Harbor, which is shared between Wellfleet, Truro and Eastham, has a Total Nitrogen TMDL. Ryder Pond is listed as requiring a TMDL for phosphorus.

5.1.3.4 Pathogens Sampling

In the Massachusetts Department of Public Health's "Marine and Freshwater Beach Testing in Massachusetts Annual Report for the 2023 Season" 13 locations were tested either weekly or monthly for enterococci. All testing locations were marine beaches; no freshwater bodies were included in this sampling. One single exceedance occurred at Head of the Meadow Beach located in the National Seashore and six exceedances occurred at Pamet Harbor. No exceedances were detected at the 11 other sampling points. The report indicates that bacteria exceedances could potentially occur from discharge of sewage by boats, pet waste, re-suspension of sediment, or surface runoff following rainfall events.

5.1.3.5 Stormwater Sampling

5.1.4 Groundwater

5.1.4.1 Anticipated Depth to Groundwater

Depth to groundwater is an important consideration for the design of septic systems. Title 5 regulations require 5-feet minimum of separation between the top of maximum high groundwater elevation and the bottom of the soil absorption system. Figure 5.2 shows areas within the Town of Truro with insufficient depth to groundwater for Title 5 systems.

5.1.4.2 Water Quality

Nitrogen compounds can be used as an indicator of groundwater degradation resulting from the use of onsite subsurface wastewater disposal systems. Typical sources of nitrates in groundwater include runoff from fertilizer use, leaching from septic tanks, erosion of natural deposits, and atmospheric deposition. The US EPA sets Maximum Contaminant Limits (MCLs) for parameters of concern which establish a legal threshold limit for the parameter in a public drinking water system. The MCL for nitrate is 10 mg/L. A national analysis of nutrient concentrations in streams and groundwater from 1992 to 2004 by the United States Geological Survey (USGS) indicates a national background nitrogen concentration of 0.58 mg/L.

The Provincetown Water Department supplies drinking water to the Town of Provincetown and several areas within the Town of Truro, specifically the northern portion of the Town along Shore Road and Route 6. Provincetown's water supply consists of three wellfields located in Truro's Pamet Lens of the Cape Cod Aquifer. The Lens extends from the north side of the Pamet River to Pilgrim Lake (East Harbor). Sources include the South Hollow Wellfield, Knowles Crossing Wellfield, and North Union Field. Two additional wells are located at the former North Truro Air Force Base for emergency supply.

Over the 5-year period of 2019-2023, the highest level of nitrates detected by the Provincetown Water Department was 0.62 ppm (compared to a MCL of 10 ppm). Possible human influences for the nitrate concentration slightly above background may be from septic systems, fertilizer or erosion of natural deposits.

Table 5.3 2019-2023 Water Supply Nitrate Concentrations

Year	Highest Level Detect (mg/L)
2019	0.52
2020	0.58
2021	0.58
2022	0.56

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Year	Highest Level Detect (mg/L)
2023	0.62

Notes:
1. Data compiled from Provincetown Water Department Annual Drinking Water Quality Reports

The Truro Health & Conservation Department maintains a database of available nitrate concentration data from private wells (which is typically only required during the sale of a property, submission of building permits and septic permits or for a rental registration). Available nitrate data from private wells is discussed in Section 5.2.7.

5.1.5 Wetlands and Vernal Pools

Wetlands result from both salt water and fresh water, and are valuable for flood protection, nutrient uptake and release, wildlife habitat and propagation, groundwater recharge, and open space for recreation and scenic beauty. The Wetlands Protection Act (WPA) is administered and enforced by MassDEP's Wetlands Program. The WPA imposes restrictions on the removal, filling, dredging, or alteration of any designated wetland. The Town has Wetlands Conservation Regulations and Bylaws to protect natural resources and wetlands. As outlined in the Truro Conservation Regulations (revision dated July 2019) resource areas include:

- Swamp, marsh, vernal pool, pond or bog
- Land subject to tidal action, Coastal Bank, Coastal Beach, Barrier Beach and Coastal Dune
- Activities within 100 feet of any area listed above, known as the Buffer zone
- Riverfront Area, extending 200 feet from mean annual high water from a stream or river
- Within the 100-year flood zone (Land Subject to Coastal Storm Flowage)

Wetlands and vernal pools located in the Town are shown in Figure 5.3.

5.1.6 Protected Natural Areas

The Areas of Critical Environmental Concern (ACEC) Program was formed in 1975 and is administered by the Department of Conservation and Recreation (DCR). The Program identified "areas of critical environmental concern to the Commonwealth." Areas are identified and nominated by a Community and designated by the Massachusetts Secretary of Environmental Affairs. The Wellfleet Harbor ACEC is a designated area. A small portion extends into South Truro.

5.1.7 Habitats

The Massachusetts Natural Heritage and Endangered Species Program (NHESP) maintains an atlas of estimated habitats and priority sites for rare plants and wildlife in Massachusetts. NHESP categorizes rare species into one of three categories:

1. Endangered species are those that are in danger of extinction throughout all or a significant portion of their range or are in danger of extirpation from Massachusetts.
2. Threatened species are those that are likely to become endangered in Massachusetts in the foreseeable future throughout all or a significant portion of their range.
3. Species of Special Concern are those that have suffered a decline that could threaten the species if allowed to continue unchecked or occur in such small number or with such restricted distribution or specialized habitat requirements that they could easily become threatened in Massachusetts.

Species within the Town noted by the NHESP as endangered, threatened, or of special concern are listed in Table 5.4 and shown in Figure 5.4.

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Table 5.4 NHESP Identified Species in Truro

Grouping	General Name	Scientific Name	Classification
Mammals	Northern Long-eared Bat	*Myotis septenrionalis*	Endangered
Mammals	Tricolored Bat	*Perimyotis subflavus*	Endangered
Birds	Piping Plover	*Charadrius melodus*	Threatened
Birds	Roseate Tern	*Sterna dougallii dougallii*	Endangered
Birds	Rufa Red Knot	*Calidris canutus rufa*	Threatened
Insects	Monarch Butterfly	*Danaus plexippus*	Special Concern
Source: Species List: New England Ecological Services Field Office (fws.gov)			

As potential project locations are identified, the presence of endangered, threatened, and special concern species will be evaluated to minimize impacts. NHESP maps will be used as a screening tool when evaluating potential new infrastructure locations.

5.2 Existing Wastewater Infrastructure

5.2.1 Existing On-Site Systems

All of the parcels in Truro have on-site systems; the majority of parcels in Truro currently utilize traditional Title 5 on-site septic systems or cesspools for on-site wastewater management and recharge. Figure 5.5 shows the systems currently used in the Town. The analysis of this infrastructure provides a basis for estimating the nitrogen load resulting from wastewater discharge and developing a management plan.

5.2.1.1 Properties with Large Wastewater Discharges

Properties with design flows greater than 10,000 gallons per day are required to obtain a groundwater discharge permit or to connect to a sewer. DEP reviews the performance of large wastewater discharges under its Groundwater Discharge Permit Program (314 CMR 5.00). There are no private properties with a groundwater discharge permit in the Town of Truro, however, there are several large properties that may require a GWDP currently or in the future, including, North of Highland Camping Area, Cloverleaf, Hortons, and Adventure Bound Camping Resorts.

5.2.1.2 Properties with Minimal Land for Title 5 Systems

Minimum required land areas for a Title 5 septic system can be determined based on design guidelines outlined in the regulations. The regulations define minimum sizing criteria for a Title 5 system and minimum setback distance between the system and features such as property lines, private water supply wells, and surface water supplies. Title 5 requires a 100-foot radius be maintained between private water supply wells and a septic system. For the purposes of this evaluation, it was assumed that properties less than ¼ acre in size with an on-site wastewater system could potentially have difficulty siting a new on-site system or finding a new location for a failed system. Approximately 7% of the properties in Truro are ¼ acre or smaller. These properties are shown in Figure 5.6.

5.2.1.3 High Groundwater Area

Title 5 regulations require at least 4 feet of separation between the top of maximum high groundwater elevation and the bottom of the soil absorption system. The required separation distance is increased to 5 feet when the soils have a percolation rate of less than 2 minutes per inch, which is the case with Truro. Properties that cannot meet the minimum separation threshold require septic systems that must be elevated to provide sufficient separation between the top of the groundwater and the bottom of the soil absorption system.

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Depth to groundwater was estimated based on the Cape Cod Commission groundwater contour map. Approximately 7% of properties in Truro are in areas with estimated high groundwater conditions, as shown in Figure 5.2.

5.2.1.4 Septic System Age

Figure 5.7 shows the known age range of septic systems in Truro, based on available Town data. Infrastructure age data was available for approximately 15% of the systems in Truro. The data was used to identify areas where multiple systems are approaching or at their design life and may need to be replaced for age-related reasons. Of the systems with available age data approximately 30% are greater than 30 years old.

5.2.1.5 Description of Failed Septic Systems

As of July 2023, the Town has a list of seven documented failed septic systems that have been ordered to upgrade and approximately 100 cesspools. According to the Truro Board of Health, indicators of a failed septic system include:

- Any system which must be pumped in excess of two (2) times in a twelve-month period;
- Any system which includes a component that the Board of Health determines is structurally unsound;
- Any system which discharges effluent directly or indirectly to the surface of the ground through ponding, surface breakout or damp soils above the disposal area or to a wetland;
- Any system which meets any of the failure criteria itemized on the Title 5 Official Inspection form as described in 310 CMR 15.303 or 310 CMR 15.304;
- Any system with a leaching area with less than 4-feet (for 1978-code systems) or 5-feet (for 1995-code systems) of vertical separation to ground water; this distance shall be measured in the field (not “per plan”) by the inspector.
- Any cesspool as defined in Title 5 shall be deemed failed and shall be replaced with a title 5 compliant system no later than December 31, 2023.
- Any system with leaching areas/pits that are essentially at capacity, as defined in this section 6 article 3.1.i;
- Any systems that were not designed to accommodate the present existing use of the facility served;
- Any system deemed as failing to protect public health, safety and the environment.

5.2.1.6 Innovative/Alternative Septic Systems

As discussed in Section 3.1, I/A septic systems provide advanced treatment compared to traditional septic systems. Truro Board of Health regulations outline requirements for conversion from a Title 5 system to an I/A system (see Section 3.1). Table 5.5 shows a summary of treatment systems in Truro. The Town currently has approximately 65 I/A systems based on septic records provided by the Town, as shown in Figure 5.5. These technologies are approved in four different categories: General Use, Piloting Use, Provisional Use, and Remedial Use.

- General Use systems account for 42% of I/A systems in Truro. These include FAST, Advantex, BioClere, and Septitech systems.
- Truro does not have any piloting systems.
- The NitROE system makes up 3% of I/A systems in Truro and is approved for provisional use.
- Remedial systems make up 25% of I/A systems in Truro with the use of the MicroFast system.

Table 5.5 Summary of Treatment Systems

Treatment System	# of Parcels	Permitted TN Concentration (mg/L)	Approved Category for I/A
Title 5	2360	-	-

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Cesspool	107	-	-
Title V/ Cesspool	4	-	-
Tight Tank	5	-	-
I/A	64	-	-
Title V/ I/A	1	-	-
I/A not specified	*20*	-	-
FAST	*2*	*<25*	*General Use*
Advantex	*22*	*<25*	*General Use*
BioClere	*2*	*<25*	*General Use*
Septitech	*1*	*<25*	*General Use*
NitROE	*2*	*<11*	*Provisional Use*
MicroFast	*16*	*BOD5 and TSS Removal*	*Remedial Use*
No Information	1030		
Total Parcels	**3571**		

The following figure provides a distribution by percentage of the I/A technology categories that are currently in use in Truro.

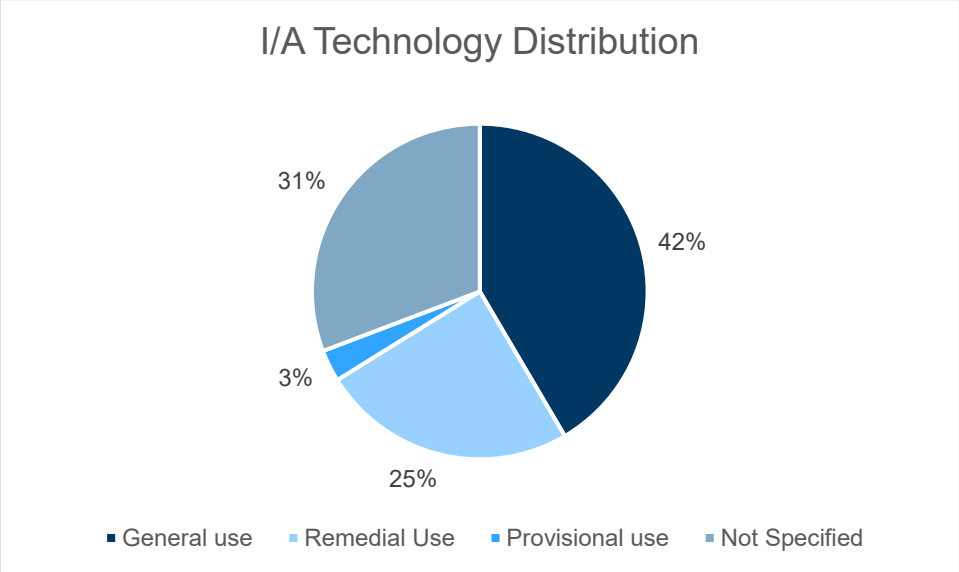


Figure 5.8 Town of Truro I/A Technology Summary

5.2.2 Private Wastewater Treatment Facilities

Currently, there are no private wastewater treatment facilities in Truro.

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5.3 Water Quality

5.3.1.1 High Groundwater Nitrate Concentrations

The Truro Health & Conservation Department maintains a data base of water quality data including nitrate concentration data from private wells (which is typically only required prior to the sale of a property, submission of building permits and septic permits or for a rental registration). Figure 5.9 shows areas of documented nitrate-nitrogen concentrations over 5 mg/L (based on available Town data).

5.3.1.2 Nitrogen Eutrophication to Coastal Estuaries

As documented in Section 2.4 initial water quality evaluations indicate signs of nitrogen eutrophication in Provincetown Harbor (Pilgrim Lake) and the Pamet River. Documented impacts of excessive nitrogen inputs into coastal estuaries include aesthetic degradation from excessive algae blooms, disruption to benthic communities (animals living in the coastal pond sediments) and loss of native eelgrass beds.

As discussed with DEP in 2024, the Cape Cod Commission (CCC) recommends an initial nitrogen management planning allowance for nitrogen-impaired watersheds without MEP reports or TMDLs to use a 25% nitrogen reduction. The Cape Cod Commission planning allowance will be used to establish an initial nitrogen management goal for these two watersheds. This initial planning allowance will need to be refined as scientific evaluations progress for both of these watersheds.

Wellfleet Harbor has an established nitrogen Total Nitrogen Maximum Daily Load Limit (TMDL). The TMDL quantifies the maximum amount of nitrogen (nitrogen threshold) to a specific estuary to maintain water quality goals. The data from the Wellfleet Harbor TMDL report will be used to establish nitrogen management goals for this watershed.

5.4 Land Use and Zoning

Analysis of the Town's Geographic Information System (GIS) database indicates a total of 3,571 parcels documented in the GIS database with a State Use Code. 207 parcels do not have an address associated with them; these parcels are rights-of-way, bodies of water, and the beach and were removed from the dataset of parcels. Properties are assigned a standard State land use code to allow for tax assessment of the properties. The properties and tax codes have been evaluated and summarized into groupings, as outlined in Table 5.6. The locations of developable and potentially developable parcels are shown on Figure 5.10.

Table 5.6 Summary of Parcel Counts by Land Use Code

Land Use Grouping	State Use Codes	Total Number of Properties	Percentage of Total
Developed Properties			
Single-Family Residential	101, 103, 106	2,157	60.4%
Multi-Family Residential	102, 104, 105, 109, 111, 112	258	7.22%
Commercial	301, 302, 310, 316, 325, 326, 333, 334, 340, 341, 343, 345, 351, 384, 386, 393	54	1.51%
Industrial	402, 410, 424, 431	4	0.11%
Other-includes Forest, agricultural, recreational, and exempt properties	712, 714, 719, 803, 805, 900, 910, 924, 930, 931, 932, 934, 935, 936, 943, 950,	497	13.92%

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Land Use Grouping	State Use Codes	Total Number of Properties	Percentage of Total
	951, 959, 960, 980, 981, 985, 996		
Developable Properties			
Residential	130, 131	254	7.11%
Commercial	390	3	0.08%
Industrial		0	0.00%
Undevelopable Properties			
Residential	132	135	3.78%
Commercial	392	2	0.06%
Industrial	442	0	0.00%
Null (Water and Beach ROW)	202, 221, 383,	207	5.80%
Total		**3,571**	

Several zoning requirements have been established for the Town with respect to new development. These include minimum lot sizes, frontage, road setbacks, and maximum building heights. The requirements for these dimensions vary by zoning class and are identified in the Town's zoning bylaws. The Town's zoning bylaws, as amended in April 2014, outline seven zoning districts. Minimum lot size for each type of parcel is 33,750 square feet, except for the seashore district which is three acres. The maximum building height in all districts is 30 feet. The distribution of the Town's zoning districts is shown in Figure 5.11.

Overlay districts are often used by towns to establish alternative land development requirements within a specific portion of the community. The following overlay districts are outlined in the zoning bylaws:

– Water Protection Overlay District is defined by the area shown on the atlas "Zones of Contribution to public supply wells and water table contours" dated December 1990. Town bylaws prohibit catch basins and storm sewers in this district unless other methods are infeasible. Public sewage treatment facilities with on-site disposal with tertiary treatment are also prohibited on these sites. Figure 5.12 shows the public water supply well locations and required protection radius.
– Flood Plain Overlay District includes all special flood hazard areas within the Town designated as Zone A, AE, AH, A1-30, and V1-30, on the Town Flood Insurance Rate Map (FIRM) dated July 3, 1985. Town bylaws require developments in these areas to address flood damage. Figure 5.13 is the FEMA floodplain map.
– Affordable Rental Housing District is an area designated to provide affordable housing to Truro residents. A portion of the Library Community Center off Standish Way is affordable housing. The Sally's Way development also provides 16 affordable housing rental homes.
– Solar Farm Overlay District is intended to identify locations for development and operation of solar energy equipment.

6. Flows and Loads

6.1 Study Areas

Based on the conditions in the Town described in the above sections of this Needs Assessment Report, areas with nutrient related or wastewater related issues were divided into study areas. As discussed throughout the report, multiple sensitive receptors were analyzed to identify the study areas, these receptors include the following:

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- Areas with high concentrations of failed/failing septic systems or cesspools, aging systems, and outdated wastewater disposal
- Elevated nitrates: parcels with nitrate concentrations exceeding 5 mg/L
- Small parcels: parcels with a lot size less than 0.25 acres
- Inadequate separation to groundwater: developed or developable parcels with a separation to groundwater less than 4 ft

Figure 6.1 shows the sensitive receptors outlined above within the Town of Truro. The following Study Areas were defined for this project.

Study Area A: Beach Point—In 2014, Beach Point was identified as an area of concern in Phase I of the Integrated Water Resources Management Plan. The primary concern identified in the Beach Point area is wastewater management.. Beach Point is a high-density area that sees a significant influx of summer visitors, creating significant increases in nitrogen loads. Some parcels in the area utilize cesspools and many have a small lot size and small separation to groundwater as shown in Figure 6.2. Portions of Beach Point fall within the Provincetown Harbor.

Study Area B: Pamet River Watershed—Pamet River is a coastal watershed that has not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for the system. Per the Cape Cod Commission 208 Plan, a nitrogen reduction goal of 25% was assumed for watersheds without a completed scientific evaluation and established targets. The Pamet River watershed has a number of cesspools, parcels with high nitrates, and areas with small separation to groundwater as shown in Figure 6.3.

Study Area C: Provincetown Harbor Watershed—Provincetown Harbor is a coastal watershed that has not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for the system. Per the Cape Cod Commission 208 Plan, a nitrogen reduction goal of 25% was assumed for watersheds without a completed scientific evaluation and established targets. A cluster of parcels in the Provincetown Harbor watershed, known as High Head, has multiple small parcels and cesspools, as shown in Figure 6.4. Flows outlined for Study Area C do not include the portion of Beach Point within the Provincetown Harbor Watershed as it is included in Study Area A. Future alternative evaluations for Study Area C will consider the portion of Study Area A within the Provincetown Harbor watershed.

Study Area D: Wellfleet Harbor Watershed – Wellfleet Harbor is a coastal watershed that includes land area in portions of Eastham, Truro, and Wellfleet. Wellfleet Harbor has an MEP report that outlines target threshold watershed loads. There is a cluster of parcels in the study area with minimal depth to groundwater, high nitrates, cesspools, and failed systems, as shown in Figure 6.5. The Herring River subwatershed is the only portion of the Wellfleet Harbor watershed in Truro. The thresholds presented in the MEP report are used as a basis for determining Truro's removal goal for the watershed.

Study Area E: Pond Village / Sawyer Grove – A large portion of Truro is not within a coastal watershed. The Pond Village / Sawyer Grove area is a portion of Truro that lies between the Pamet River and Provincetown Harbor watersheds and contains numerous historical structures. It is an area with a cluster of parcels exhibiting constraints including high nitrates, cesspools, small lot size, and small distance to groundwater as shown in Figure 6.6.

Study Area F: Aldrich Road / Daniel Drive – The Aldrich Road / Daniel Drive study area is another portion of Truro outside of the coastal watersheds that has a cluster of sensitive parcels. This small area has several wells with elevated nitrates as shown in Figure 6.7.

Study Area G: Route 6 at Great Hollow South – The Route 6 at Great Hollow South study area is another portion of Truro outside of the coastal watersheds that has a cluster of sensitive parcels. This area has multiple cesspools and a few high nitrate parcels as shown in Figure 6.8.

Study Area H: Truro Central School (TCS), Walsh Property, and Quail Ridge Road – The TCS, Walsh Property, and Quail Ridge Rd Road West study area is also outside of Truro's coastal watershed. This area has many cesspools as shown in Figure 6.9. Additionally, this study area includes future affordable housing developments at the Walsh Property.

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6.2 Town of Truro

The Town of Truro has a year-round population of under 3,000, and increases to over 15,000 in the summer months. To estimate existing conditions and to estimate the future conditions of the Town, data from the Town was utilized, in conjunction with the goals outlined in the Truro Housing Needs Assessment and Production Plan and assumptions from the Wellfleet Harbor MEP report. As outlined in Section 2.3.2, growth estimates were based on the Housing Production Plan and were used to assess future conditions and to develop a recommendation on the framework necessary to mitigate the wastewater challenges in the Town. The following sections provide a basis of the current and future conditions in the Town and outline anticipated wastewater flows and nitrogen loads.

6.2.1 Current Conditions

The Town has 3,364 parcels with a year-round population of 2,454 (according to the 2020 US Census) and a summer population of 15,000 to 20,000. Current land use data indicates that Truro has 2,417 developed residential parcels, 54 developed commercial parcels, and four developed industrial parcels. There are 207 parcels in the Town that do not have an address associated with them; these parcels are rights-of-way, bodies of water, and the Western Bay Beach for example and were not included in the Town's parcel counts. According to the 2023 Local Comprehensive Plan, there are a total of 3,001 housing units in Truro, with 1,333 of these units inhabited year-round.

6.2.2 Future Conditions

As stated earlier in Section 2.2.1, the Truro Housing Needs Assessment and Production Plan is being used to estimate population growth over the planning period. This conservative approach, which assumes that all the units proposed in the HPP are constructed and occupied within the planning period, is used to establish anticipated future wastewater flows. Land use data shows that the Town has 259 developable residential parcels and three developable commercial parcels. The Truro Housing Needs Assessment and Production Plan, which was unanimously approved at the Select Board meeting on October 24, 2023, outlines housing goals through 2035. The plan's housing production goal included creating a total of 110 new units within five years of adoption and 260 new units by 2035. The Plan suggested the following housing needs by bedroom size.

Table 6.1 Town of Truro Housing Needs by Bedroom Size, 2022 – 2035.

	Studio and 1 Bedroom	2 Bedroom	3+ Bedroom
Number of Units Needed by 2035	56	139	65

According to the HPP, the following is a breakdown of people per household in Truro.

Table 6.2 People Per Household in Truro

	1 Person	2 People	3+ People
Percent	35%	56%	9%

Based on the Truro Needs Assessment and Production Plan, the future developments in the area are as follows:

Table 6.3 Summary of Housing Needs Outlined in 2023 Draft Truro Housing Development Plan

Development Location	Number of Units [(1)]
Walsh Property (Walsh Way)	218
Clover Leaf (22 Highland Road)	39
181 Route 6	3
Total	**260**

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Development Location	Number of Units [1]
Notes: 1. Number of units for the Clover Leaf Property and 181 Route 6 is directly from the Draft Truro Housing Needs Assessment and Production Plan. Number of units for the Walsh Property was calculated by subtracting the number of units proposed in the Clover Leaf and 181 Route 6 properties from the total units needed (260).	

Based on input from the Town of Truro indicating that the Beach Point area is anticipated to see minimal growth over the 20-year planning period, a conservative 4.5% future growth allowance was assumed for the Beach Point Study area. This assumption is in-line with the allocation for Truro flow (150,000 gpd) that has been used in Provincetown's planning efforts, further described in section 6.2.

6.2.3 Water Consumption

Because the Town of Truro has limited available public water use data, water use assumptions from the Wellfleet Harbor MEP report were utilized to develop water consumption estimates for parcels without water use data. Wellfleet Harbor was used as a reference because it is the only watershed within the Town to have an MEP report and has similar seasonal characteristics. Wellfleet Harbor is a watershed shared between the Towns of Wellfleet, Truro, and Eastham, with a majority of the watershed in Wellfleet. For the Beach Point area, which is defined as 388 units between 168 Shore Drive and 706 Shore Drive, water use data from 2017 through 2022 was provided by the Provincetown Water Department and used to establish average water usage for this Study Area.

Parcels were split into five categories: single family residential, multi-family residential, commercial, agricultural, and industrial. Multi-use and exempt properties were paired with their closest of the five categories. Based on the Town of Wellfleet, the following water use values were assumed for parcels without public water use data:

Table 6.4 Average Water Use by Parcel Type

Parcel Type	Use Code(s)	Average Water Use (gpd)
Single Family Residential [1]	1010, 1060, 170*	145 gpd
Multi-Family Residential [1]	1020, 1040, 1050, 1090, 1110, 1120, 1300, 1320, 9590*, 9960*, 130*	290 gpd
Commercial	3010, 3020, 3160, 3250, 3260, 3330, 3340, 3400, 3410, 3430, 3450, 3510, 3840, 3860, 3900, 3920, 9000*, 9100*, 9240*, 9300*, 9310*, 9320*, 9340*, 9500*, 9510*, 9600*, 9800*, 9810*, 9850*, 310*	200 gpd / 1000ft^2 of building
Agricultural / Commercial Agricultural	370*, 170*	N/A
Industrial	4100, 4240, 4310	49 gpd / 1000ft^2 of building
Notes 1. Source: Massachusetts Estuaries Project Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Wellfleet Harbor Embayment System. Town of Wellfleet, Massachusetts. 2. Use codes with * were paired with the closest category, depending on the primary use of the parcel.		

There are two agricultural parcels, neither of which are located within any of the Town's coastal watersheds. Because of this and the lack of data for similar properties, water usages for these parcels were not calculated.

6.2.3.1 Existing Water Usage

Based on the assumptions outlined in Table 6.4 and current land use in the Town of Truro, the current average water use in the identified study areas is approximately 232,100 gpd. The existing water use by study area is as follows:

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Table 6.5 Water Use by Study Area

Study Area	Estimated Water Use (gpd) – Average Annual
Study Area A: Beach Point	39,800
Study Area B: Pamet River Watershed	92,000
Study Area C: Provincetown Harbor Watershed[1]	2,400
Study Area D: Wellfleet Harbor Watershed	13,500
Study Area E: Pond Village / Sawyer Grove	50,500
Study Area F: Aldrich Road / Daniel Drive	16,500
Study Area G: Route 6 at Great Hollow South	14,300
Study Area H: TCS, Walsh Property, and Quail Ridge Road West	3,100
Total	232,100
Notes: 1. Study Area C does not include portions of Beach Point within Provincetown Harbor Watershed	

6.2.3.2 Future Water Usage

Based on the future growth in the Town as outlined in Table 6.3 and the Town of Truro Housing Needs Assessment and Production Plan, an additional 37,700 gpd of water flow (average annual) is expected for the 260 new proposed residential units. The breakdown by study area of the anticipated growth in water use over the 20-year planning period is summarized in the following table.

Table 6.6 Additional Anticipated Water Use over Planning Period

Study Area	Development(s)	Anticipated Total Water Use (gpd) – Average Annual
Study Area B: Pamet River Watershed	181 Route 6: 3 units	435
Study Area G: Castle Road	Walsh Property: 218 units	31,610
Not within a Study Area	Clover Leaf: 39 units	5,655
Total	**260 units**	**37,700**
Notes: 1. Study areas not included in this area do not have anticipated housing developments within the planning period.		

6.2.4 Existing Flows and Loads

To convert the water use data to wastewater flows, a conversion factor of 0.9 was used in accordance with MEP methodology. To convert wastewater flows and nitrogen loads, the following nitrogen concentrations were used:

- Septic systems: 26.25 mg/L (consistent with the MEP methodology)
- Cesspools: 26.25 mg/L
- I/A systems: 19 mg/L
- Tight tanks: 0 mg/L
- For properties with unknown system types, a septic system was assumed and a nitrogen concentration of 26.25 was utilized.

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Based on this methodology and factors, the current average annual wastewater flows and wastewater nitrogen loads are calculated as follows:

Table 6.7 Current Wastewater Flows and Loads by Study Area

Study Area	Estimated Current Wastewater Generation (gpd)	Estimated Current Wastewater Nitrogen Load (kg-N/day)
Study Area A: Beach Point	35,800	3.56
Study Area B: Pamet River Watershed	82,800	7.97
Study Area C: Provincetown Harbor Watershed[1]	2,100	0.14
Study Area D: Wellfleet Harbor Watershed	12,200	1.19
Study Area E: Pond Village / Sawyer Grove	45,500	4.42
Study Area F: Aldrich Road / Daniel Drive	14,900	1.46
Study Area G: Route 6 at Great Hollow South	12,900	1.05
Study Area H: TCS, Walsh Property, and Quail Ridge Road West	2,800	0.28
Total	**209,000**	**20**

6.2.5 Future Flows and Loads

Based on the future conditions outlined in Section 6.1.2, the following are the anticipated future flows and loads:

Table 6.8 Estimated Wastewater Flows and Nitrogen Loads - Future

Watershed	Estimated Additional Average Wastewater Generation (gpd)	Estimated Additional Wastewater Nitrogen Load (kg-N/day)	Estimated Total Future Wastewater Generation (gpd)	Estimated Total Future Wastewater Nitrogen Load (kg-N/day)
Study Area A: Beach Point[1]	1,600	0.16	37,400	3.72
Study Area B: Pamet River Watershed	435	0.04	83,200	8.01
Study Area C: Provincetown Harbor Watershed[1]	0	0	2,100	0.14
Study Area D: Wellfleet Harbor Watershed	0	0	12,200	1.19
Study Area E: Pond Village / Sawyer Grove	0	0	45,500	4.42
Study Area F: Aldrich Road / Daniel Drive	0	0	14,900	1.46
Study Area G: Route 6 at Great Hollow South	0	0	12,900	1.05
Study Area F: TCS, Walsh Property, and Qual Ridge Road West	31,600	3.14	34,400	3.43

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Watershed	Estimated Additional Average Wastewater Generation (gpd)	Estimated Additional Wastewater Nitrogen Load (kg-N/day)	Estimated Total Future Wastewater Generation (gpd)	Estimated Total Future Wastewater Nitrogen Load (kg-N/day)
Total	33,600	3.35	242,600	23.43

Notes:

1. Estimated additional wastewater generation for the Beach Point Study Area is based on a future growth allowance of 4.5% over the 20 year planning period.

6.3 Beach Point Study Area

Beach Point is an area in northern Truro along Shore Road, bordering Provincetown to the north. For the purposes of this evaluation the Beach Point area is defined as 128 parcels (388 units) between 168 Shore Drive and 706 Shore Drive. The Towns of Truro and Provincetown have initiated preliminary discussions on a potential regional wastewater solution for the Beach Point Study Area. The Town of Provincetown has included a preliminary allocation for Truro to connect to Provincetown's collection system (through the future Phase 6B expansion of Provincetown's collection system). The allocation for Truro flow that has been used in Provincetown's planning efforts is 150,000 gpd, based on Title 5 flow estimates (maximum day flows). Provincetown has also indicated that average annual flows at the existing Provincetown Wastewater Treatment Facility (WWTF) are typically approximately 60% of Title 5 flows. The flows and loads for the Beach Point area and an alternatives analysis are evaluated in two separate stand-alone memorandums, as follows:

– Beach Point Wastewater Flow Characterization Memorandum (Appendix A)
– Beach Point Wastewater Treatment Alternatives Screening Analysis (Appendix B)

6.3.1 Existing Flows and Loads

Based on available Title 5 septic system data for Beach Point provided by the Town of Truro, the estimated maximum day wastewater flow for this area is 143,300 gpd. Using the 60% maximum day to average day conversion factor, the average annual wastewater flow of the Beach Point Study Area (as part of the Provincetown system[1]) is estimated at 85,980 gpd. Nitrogen loads for Beach Point were estimated using water meter readings and a nitrogen concentration of 26.25 mg/L (in accordance with MEP methodology), equating to a nitrogen load of 3.56 kg-N/day.

6.3.2 Future Flows and Loads

The Town has indicated that the Beach Point area is anticipated to see minimal growth over the 20-year planning period. Maintaining the 150,000 gpd Title 5 flow allowance that Provincetown planning currently incorporates would allow for an approximate future flow allowance of 4.5% for the 20-year planning period; this equated to an average daily wastewater flow of 89,900 gpd. The estimated future nitrogen load, based on water meter data and a 4.5% growth factor, is approximately 3.72 kg-N/day.

6.4 Reduction Goals

The Cape Cod Commission 208 Plan establishes a interim goal methodology to estimate nitrogen reduction targets for coastal estuaries that require nitrogen reduction to restore water quality but have not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for the system. For these watersheds, the CCC 208 Plan assumes a 25% reduction in existing nitrogen as an interim target reduction goal. Initial watershed nitrogen reduction goals for this project were calculated using the same methodology. Two of the three coastal watersheds within the Town of Truro, Pamet River and Provincetown Harbor have not completed scientific evaluations to establish

[1] Typically, the peaking factor between average day and maximum day flows decreases as average flows increase. The peaking factor for the Beach Point Study Area only (not as part of the larger Provincetown system) is anticipated to be less than 60% of Title 5 flows.

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a nitrogen reduction threshold. To quantify the nitrogen reduction goal for the Wellfleet Harbor watershed, the reduction ratio from the MEP report was used. Based on the MEP report, the threshold septic load of the Herring River subembayment is approximately 98% of the present septic load; therefore, the estimate of Truro's reduction goal for the watershed is based on the Threshold load and Truro's portion (based on land area) of nitrogen input to the Herring River subembayment. Based on this methodology, current and future nitrogen reduction goals for Truro's coastal watersheds are outlined in the following table.

Table 6.9 Watershed Current and Future Removal Goals

Watershed	Current Nitrogen Reduction Goal (kg-N/day)	Future Nitrogen Reduction Goal (kg-N/day)
Pamet River Watershed[1]	3.08	3.13
Provincetown Harbor Watershed[2]	0.79	0.87
Wellfleet Harbor Watershed[3]	0.25	0.25
Total	**4.12**	**4.25**

Notes:

5. Nitrogen reduction goal is 25% of Truro's load within the Provincetown Harbor watershed. Truro accounts for 7% of the Provincetown Harbor watershed load according to CCC. Loads for Provincetown Harbor are unattenuated, in accordance with CCC reports.
6. Nitrogen reduction goal is 25% of the watershed load. Loads for Provincetown Harbor are unattenuated, in accordance with CCC reports.
7. Nitrogen reduction goal is based on Truro's contribution to the Wellfleet Harbor Watershed, in accordance with the MEP reduction goal and methodology. Loads for Wellfleet Harbor are attenuated, in accordance with MEP reports. Attenuation in Wellfleet Harbor is minor.
8. Future reduction goals are estimated using the established threshold loads and estimated future loads are based on the housing production plan

7. Summary of Needs

The purpose of the CWMP Project is to address wastewater and nitrogen management needs in the Planning Area, which is defined as the Town of Truro. Primarily, the wastewater and nitrogen related issues must be clearly identified and defined. The planning initiative of this project includes developing recommendations to address the wastewater and nitrogen management needs of the Town of Truro. A second purpose of this Report is to review the wastewater planning history of the Town and the previous evaluations that have been developed for the Planning Area. A full understanding of the past (and ongoing) wastewater and nitrogen management efforts will allow for efficient development of a comprehensive management plan.

To evaluate the needs of the Town of Truro, the Town was divided into Study Areas. The needs of the study areas are as follows:

Table 7.1 Study Area Wastewater Management Needs

Study Area	Wastewater Management Needs
Study Area A: Beach Point	Clustered area with small parcels, cesspools, and small separation to groundwater
Study Area B: Pamet River Watershed	Cesspools, small depth to groundwater, high nitrates, and small lot size
Study Area C: Provincetown Harbor Watershed	Clustered area with small parcels and cesspools

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Study Area	Wastewater Management Needs
Study Area D: Wellfleet Harbor Watershed	Clustered area with small depth to groundwater, failed septic systems, cesspools, and high nitrates
Study Area E: Pond Village / Sawyer Grove	Clustered area with small parcels, small separation to groundwater, cesspools, and high nitrates
Study Area F: Aldrich Road / Daniel Drive	Clustered area with high nitrates
Study Area G: Route 6 at Great Hollow South	Clustered area with cesspools and high nitrates
Study Area H: TCS, Walsh Property, and Quail Ridge Road West	Clustered area with cesspools

7.1 Wastewater Flows and Nitrogen Loads

Wastewater flows and nitrogen loads were developed as part of this Needs Assessment Report based on existing land use in the Town, available water use data, data from the neighboring Town of Wellfleet (due to the lack of available water use data and other planning documents), and estimated growth within the Town over the planning period. For watersheds without a completed MEP report, a 25% reduction in nitrogen was used. A summary of the reduction goals based on the anticipated future wastewater flows in the Town's watersheds are summarized in the following table.

Table 7.2 Watershed Nitrogen Reduction Goals

Watershed	Anticipated Future Wastewater Generation (gpd)	Future Nitrogen Reduction Goal (kg-N/day)
Pamet River Watershed	83,200	3.13
Provincetown Harbor Watershed	19,900	0.87
Wellfleet Harbor Watershed	12,200	0.25
Watersheds Total	**115,300**	**4.25**

7.2 Recommendations and Next Steps

The next step of the Truro Comprehensive Watershed Management Plan is to identify and review alternatives for addressing the needs identified in this Needs Assessment Report.

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Figures

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Legend
- Watershed
- Parcel
- Town Boundary
- Pamet River

East Harbor

Provincetown Harbor Watershed

Pamet River Watershed

Wellfleet Harbor Watershed

Paper Size ANSI B

0 4,300

US Feet

N

Map Projection: Lambert Conformal Conic
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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

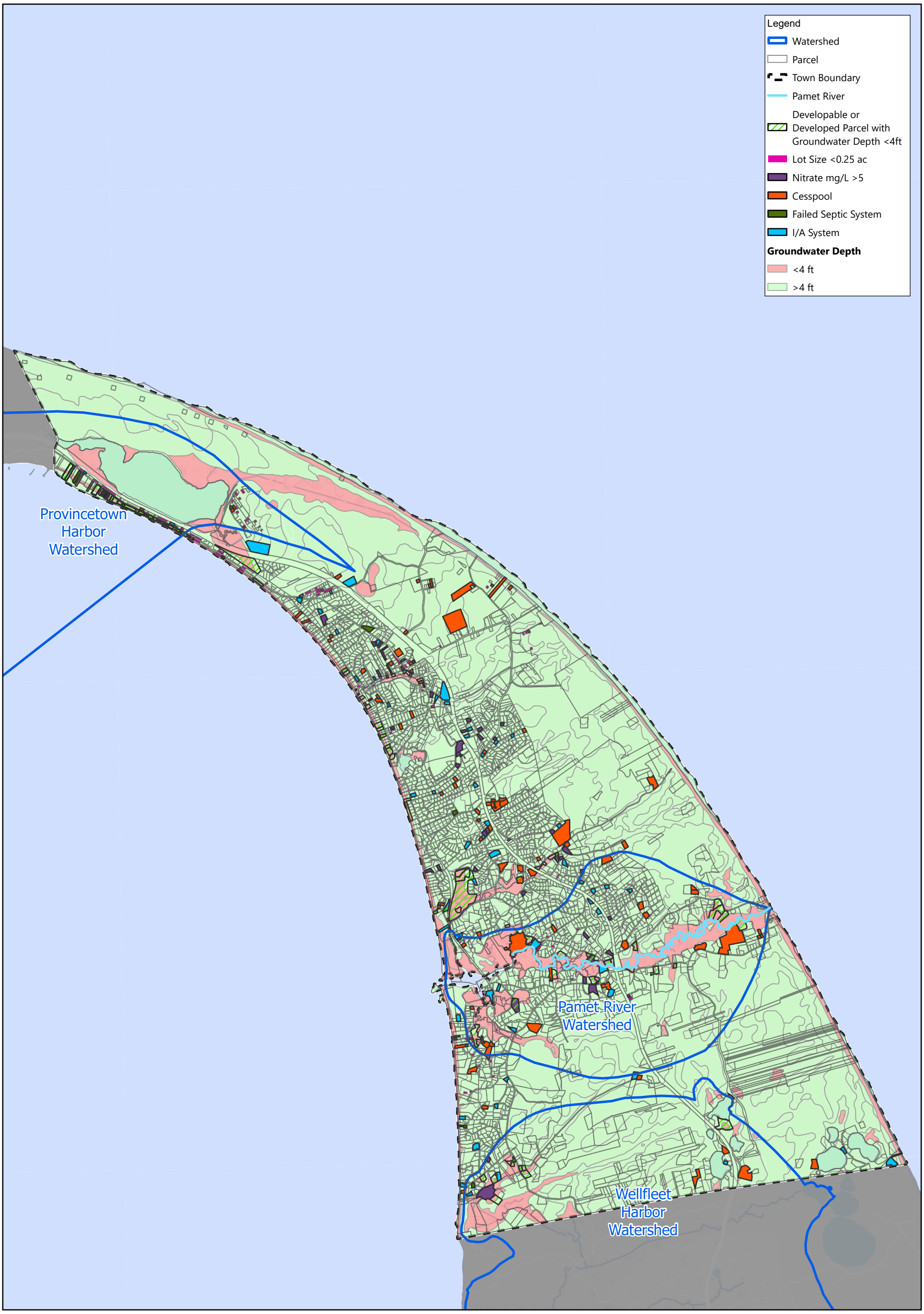
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Revision No. **-**
Date **7/2/2024**

PLANNING AREA

FIGURE ES-1

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Paper Size ANSI B

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US Feet

Map Projection: Lambert Conformal Conic
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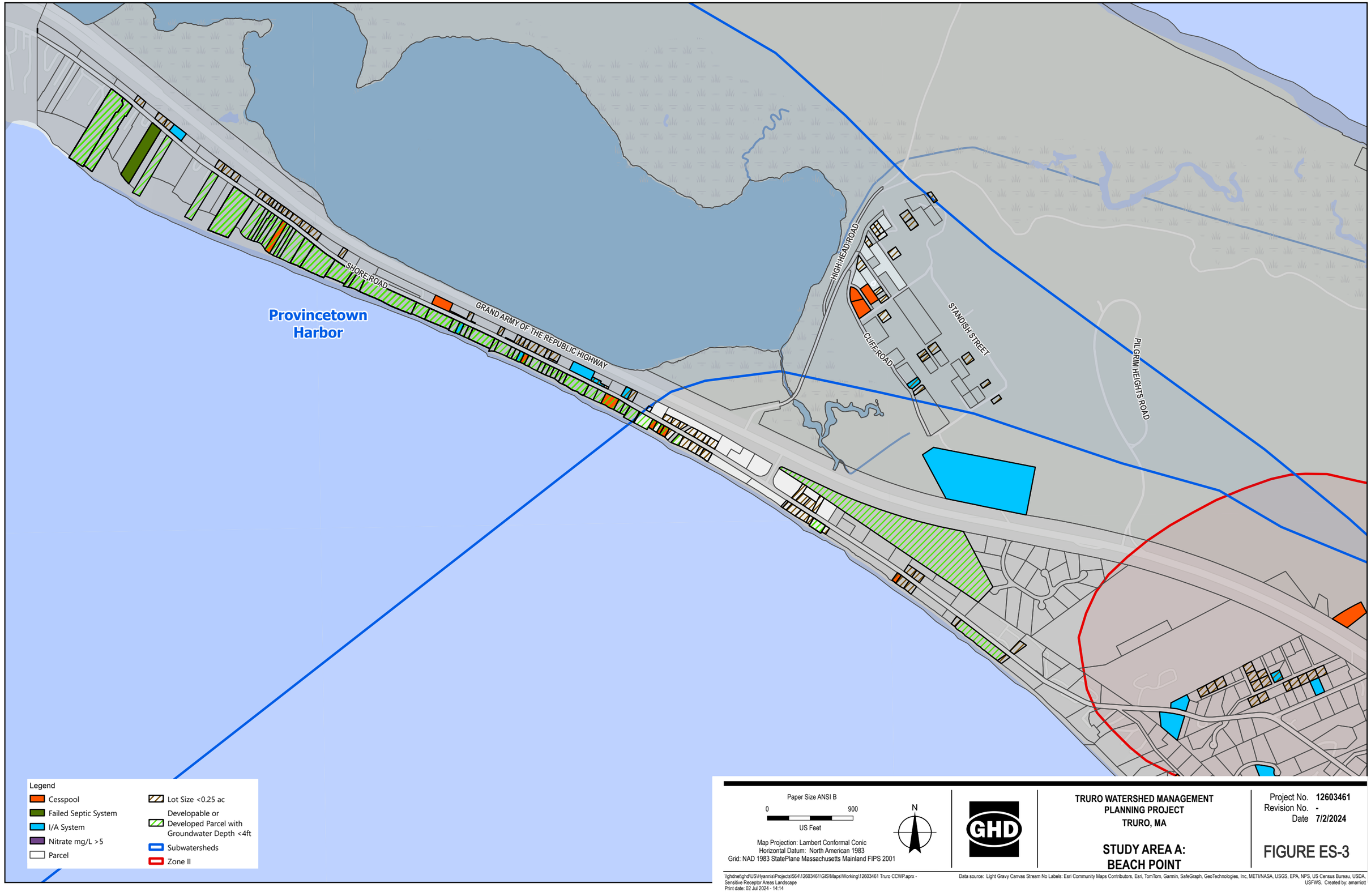
SENSITIVE RECEPTORS

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-2

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Paper Size ANSI B

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US Feet

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Map Projection: Lambert Conformal Conic
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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
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STUDY AREA A: BEACH POINT

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-3

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WHITMANVILLE ROAD
HIGGINS HOLLOW ROAD
LONG NOOK ROAD
OLD KINGS HIGHWAY
DYERS HOLLOW ROAD
OLD COLONY WAY
CASTLE ROAD
STONEY HILL ROAD
CORN HILL ROAD
GOSPEL PATH
UNION FIELD ROAD
NORTH PAMET ROAD
TOMS HILL PATH
MEETINGHOUSE ROAD
GRAND ARMY OF THE REPUBLIC HIGHWAY
TRURO CENTER ROAD
Pamet River
SOUTH PAMET ROAD
DEPOT ROAD
POND ROAD
OLD BRIDGE ROAD
COLLINS ROAD
PRINCE VALLEY ROAD
CEMETERY ROAD

Legend

- Cesspool
- Failed Septic System
- I/A System
- Nitrate mg/L >5
- Parcel
- Lot Size <0.25 ac
- Developable or Developed Parcel with Groundwater Depth <4ft
- Subwatersheds
- Zone II

Pamet River

- Estuary
- Freshwater

Paper Size ANSI B

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US Feet

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TRURO, MA

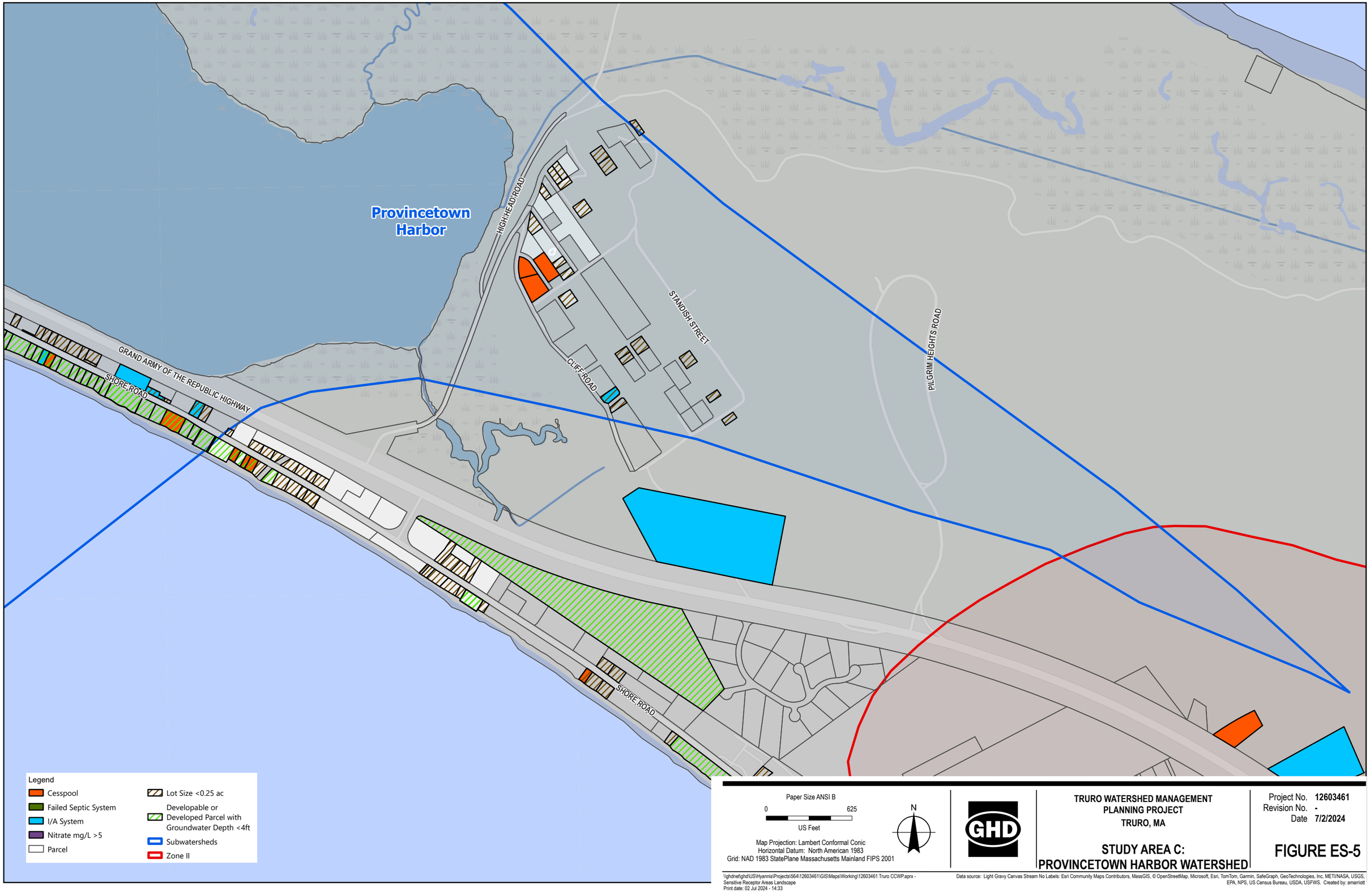
STUDY AREA B: PAMET RIVER

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-4

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US Feet

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

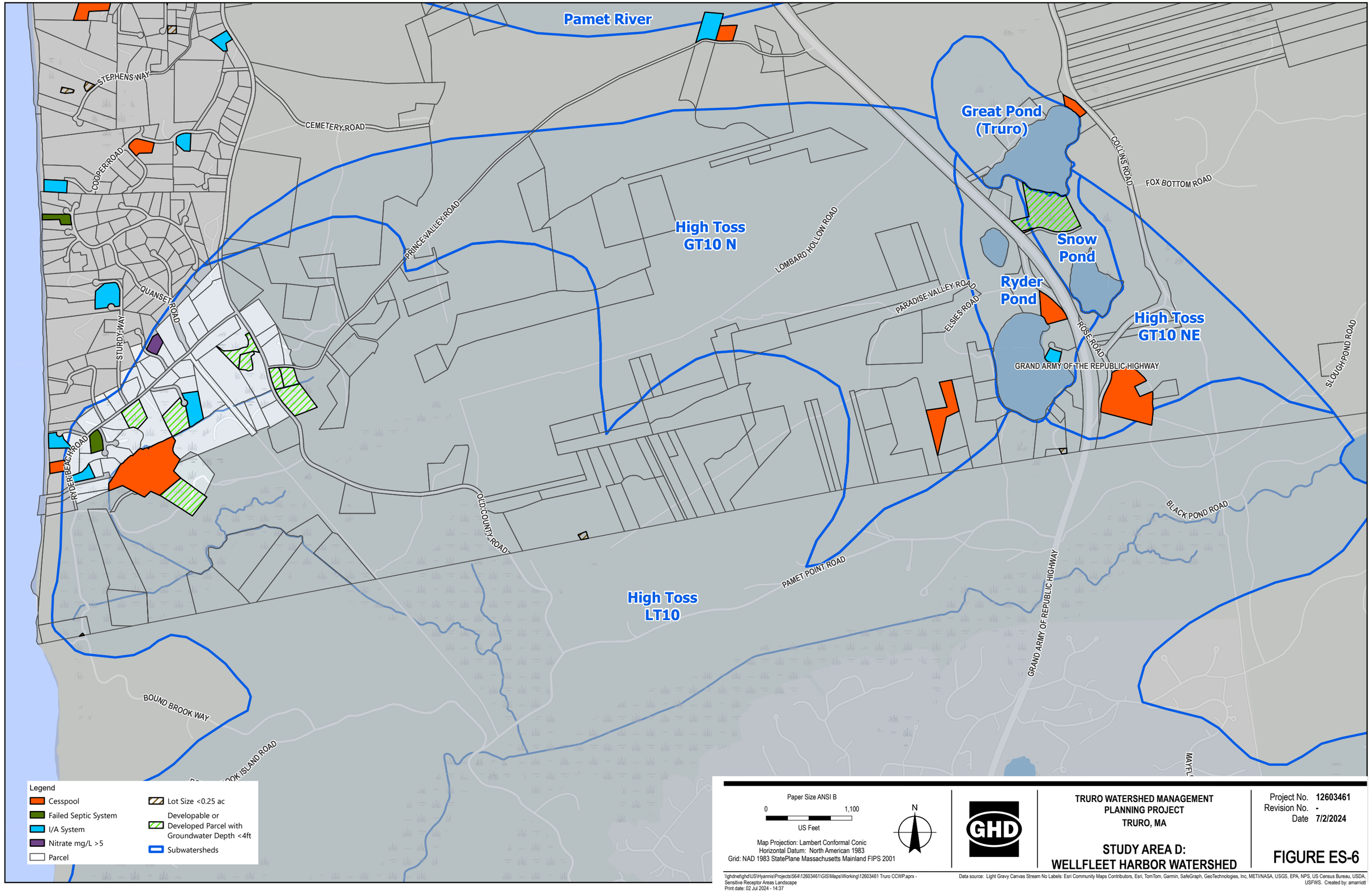
STUDY AREA C: PROVINCETOWN HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-5

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Paper Size ANSI B

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US Feet

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

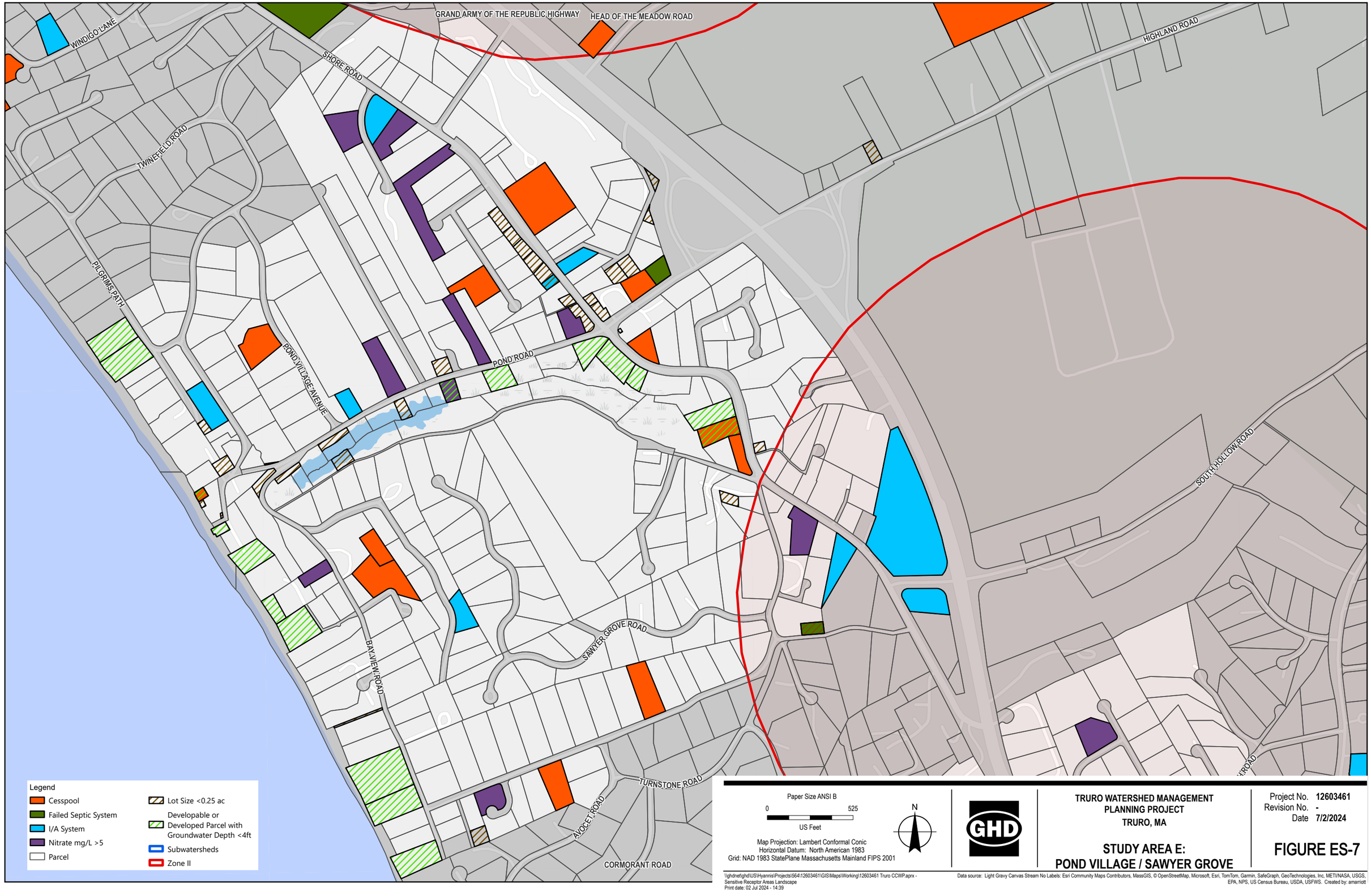
STUDY AREA D: WELLFLEET HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-6

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US Feet

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TRURO, MA

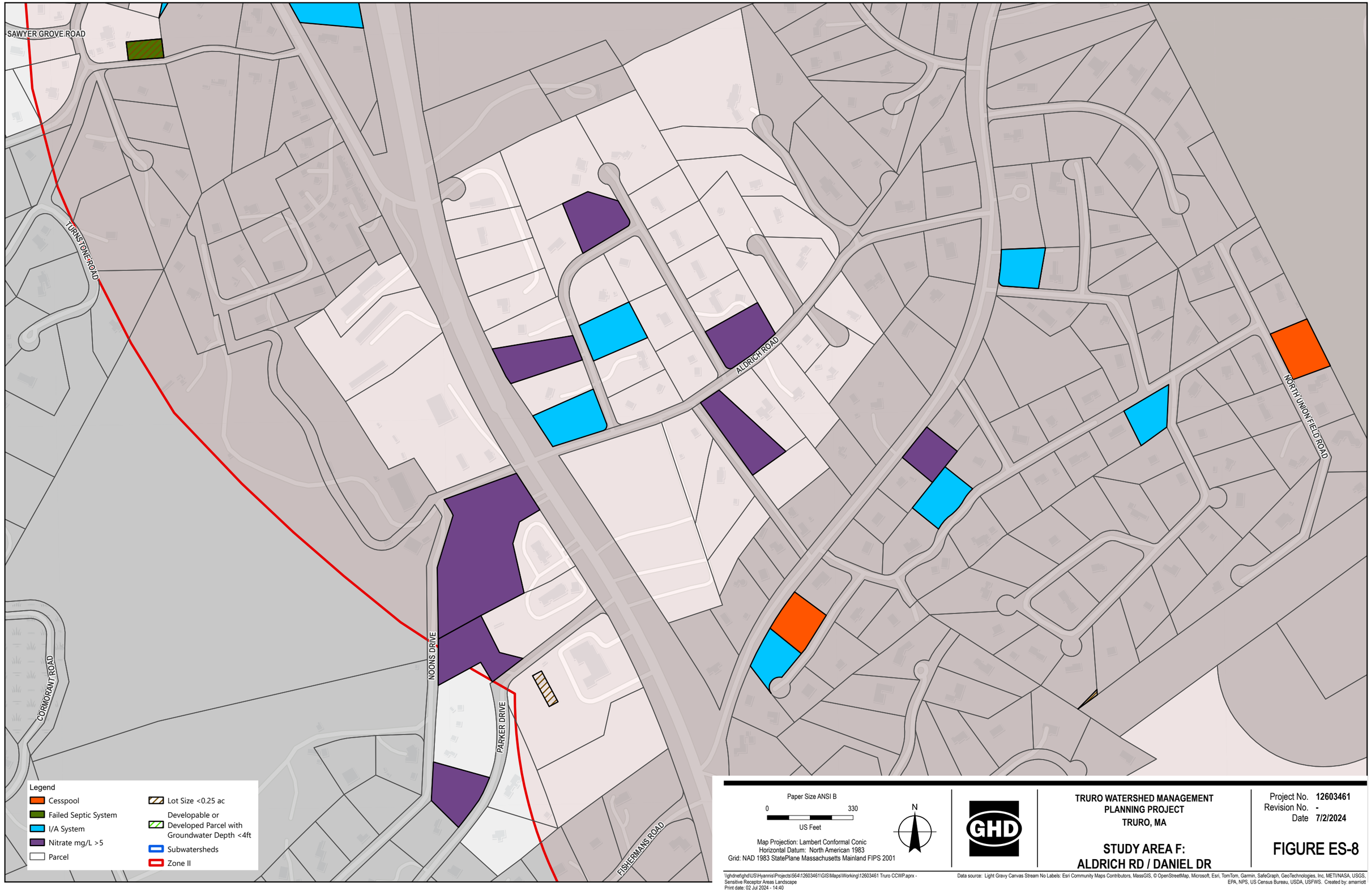
STUDY AREA E:
POND VILLAGE / SAWYER GROVE

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-7

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US Feet

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TRURO, MA

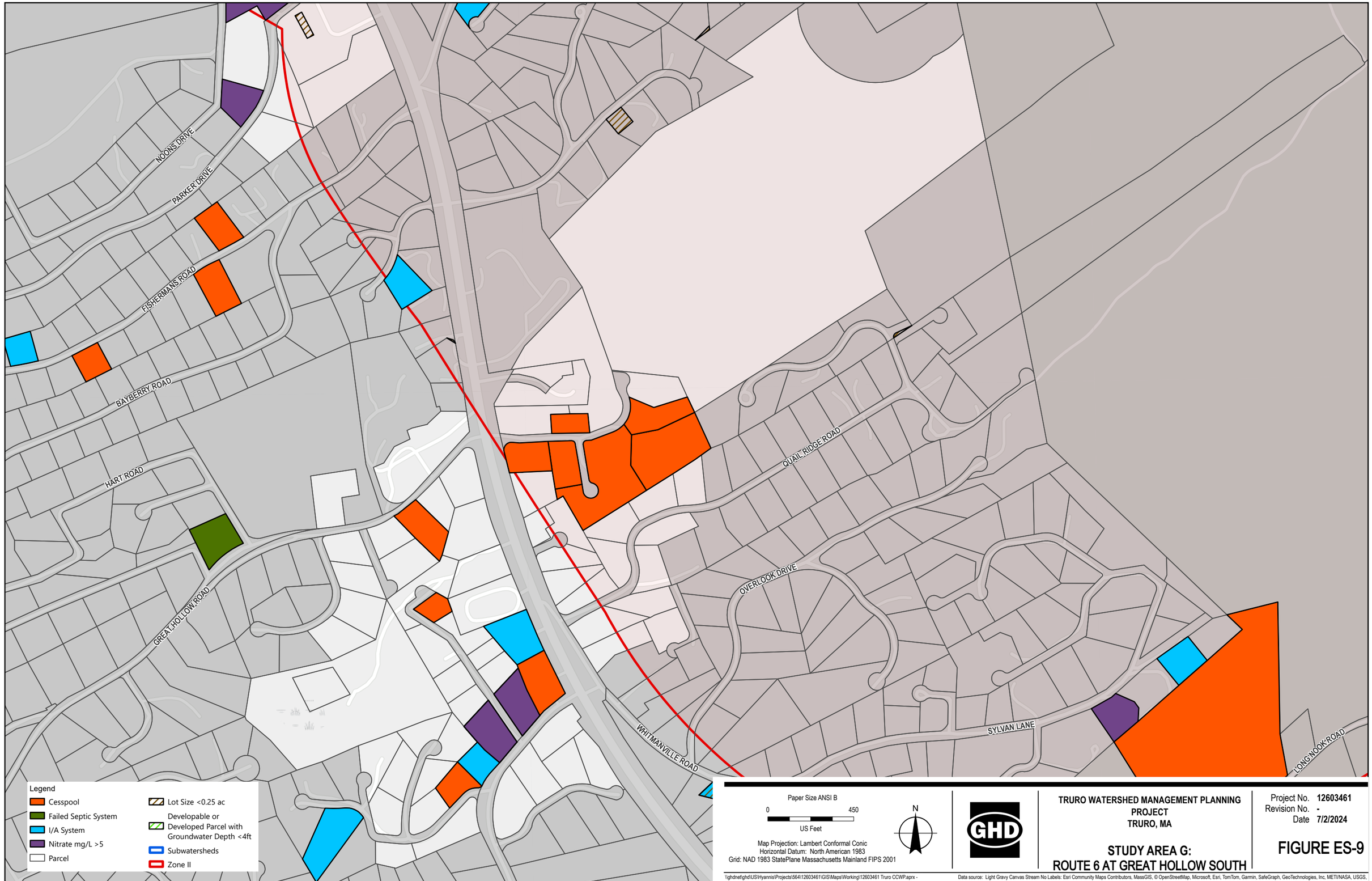
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Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-8

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Paper Size ANSI B

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US Feet

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

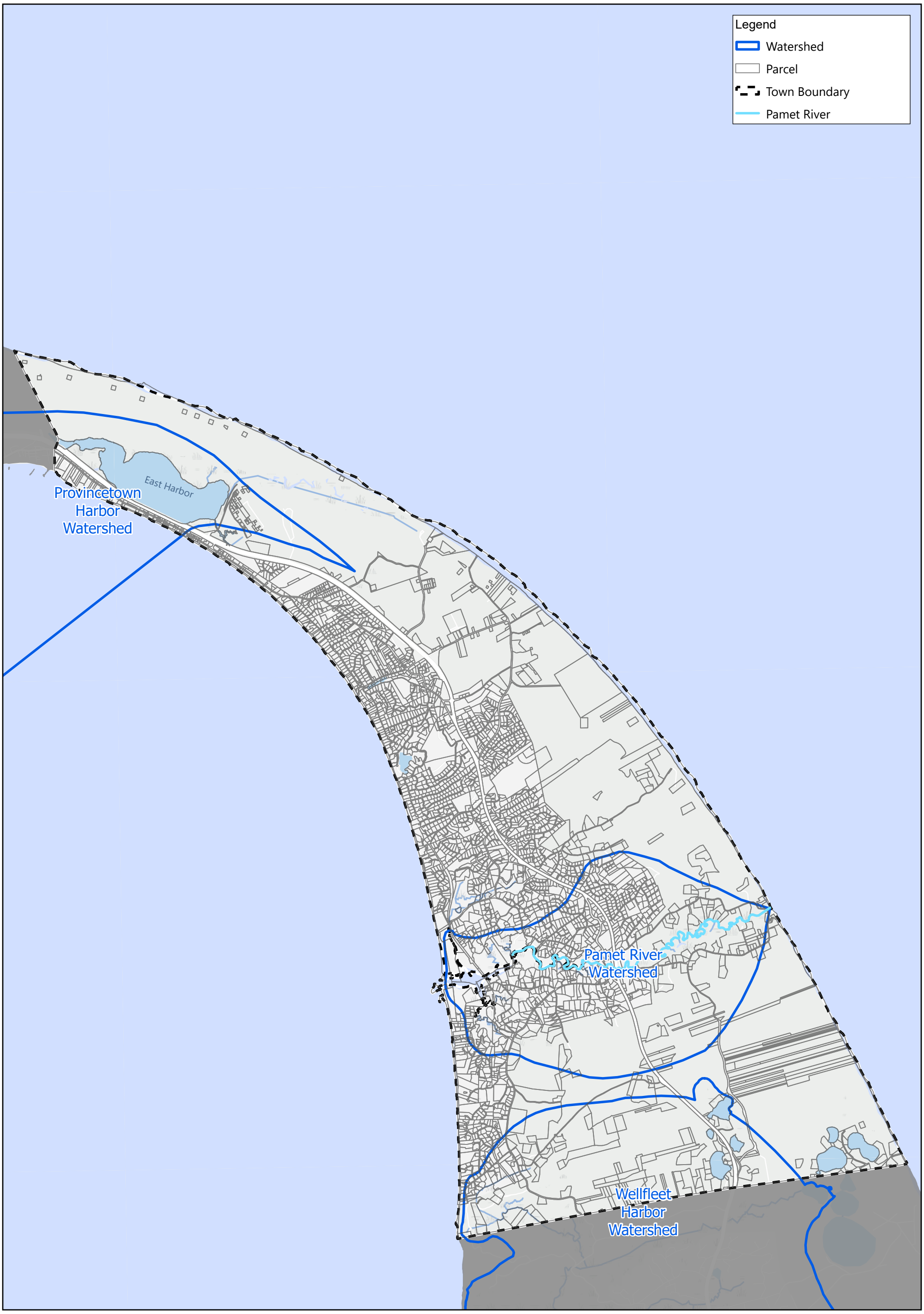
STUDY AREA G: ROUTE 6 AT GREAT HOLLOW SOUTH

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE ES-9

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Paper Size ANSI B

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US Feet

Map Projection: Lambert Conformal Conic
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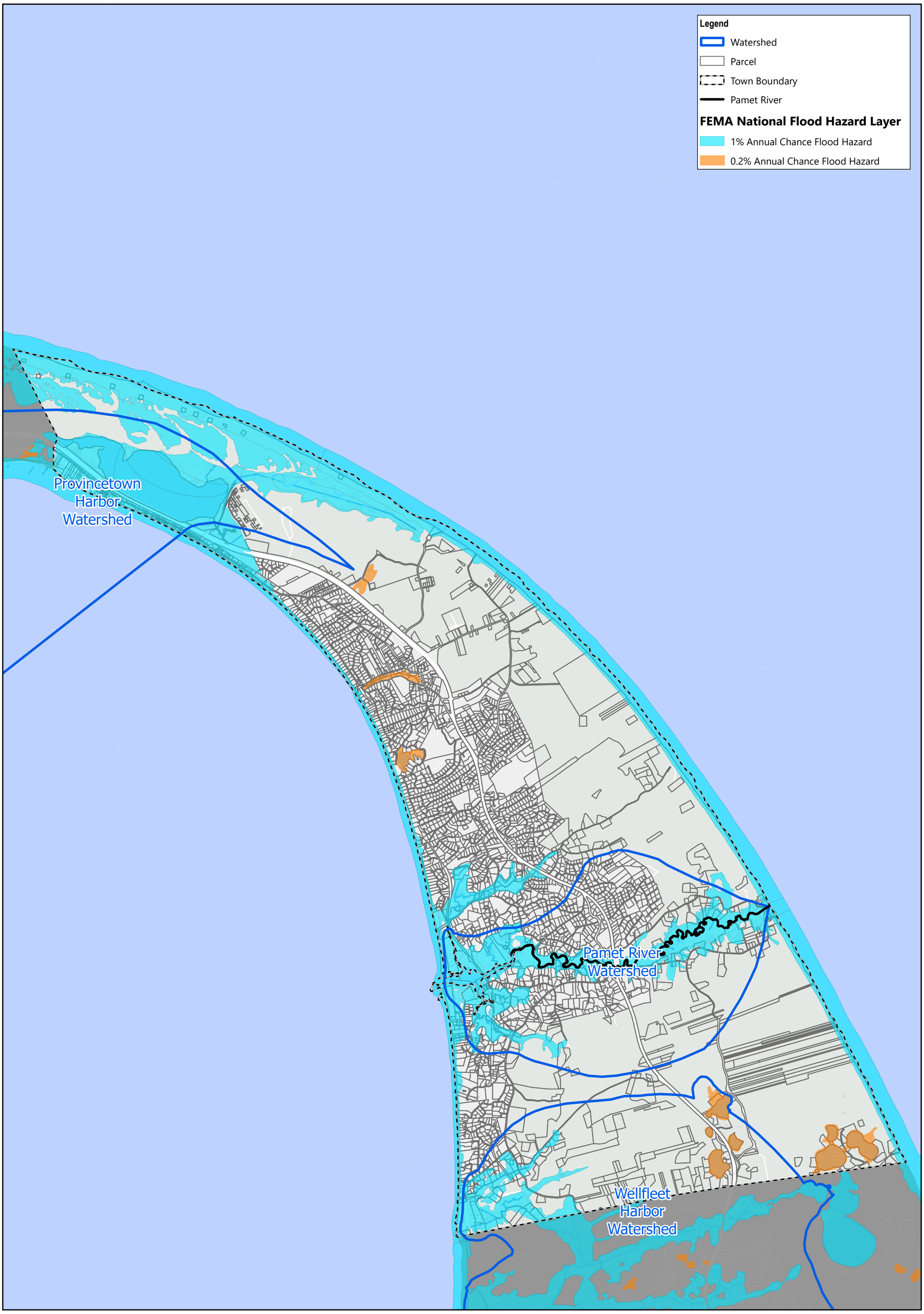
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Revision No. **-**
Date **7/2/2024**

FIGURE 1.1

PLANNING AREA

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Planning Area
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Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

N

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 4.2

FEMA Flood Hazard Zones

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-12 FEMA Flood Hazard Zones
Print date: 02 Jul 2024 - 13:47

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott

Map Unit Symbol	Map Unit Name	Infiltration Capacity
1	Water	
11A	Berryland mucky loamy coarse sand, 0 to 2 percent slopes	High
38A	Pipestone loamy coarse sand, 0 to 3 percent slopes	Low
53A	Freetown muck, ponded, coastal lowland, 0 to 1 percent slopes	Low
54A	Freetown and Swansea mucks, coastal lowland, 0 to 1 percent slopes	Low
55A	Freetown coarse sand, 0 to 3 percent slopes, sanded surface	Medium
66A	Ipswich - Pawcatuck - Matunuck complex, 0 to 2 percent slopes, very frequently flooded	Low
252A	Carver coarse sand, 0 to 3 percent slopes	High
252B	Carver coarse sand, 3 to 8 percent slopes	High
252C	Carver coarse sand, 8 to 15 percent slopes	High
252D	Carver coarse sand, 15 to 35 percent slopes	High
264B	Eastchop loamy fine sand, 3 to 8 percent slopes	Medium High
264C	Eastchop loamy fine sand, 8 to 15 percent slopes	Medium High
600	Pits, sand and gravel	
607	Water, saline	
608	Water, ocean	
610	Beaches, sand	Low
611	Dune land	Likely High
612C	Hooksan sand, 3 to 15 percent slopes	Medium High
612D	Hooksan sand, 15 to 35 percent slopes	Medium High
613C	Hooksan-Dune land complex, 15 to 35 percent slopes	Medium High
652	Dumps, landfill	
665	Udipsamments, smoothed	

Provincetown Harbor Watershed

Pamet River Watershed

Wellfleet Harbor Watershed

Legend

- Beaches
- Berryland
- Carver
- Dumps
- Dune land
- Eastchop
- Freetown
- Hooksan
- Ipswich
- Pipestone
- Pits
- Udipsamments
- Water
- Water, ocean
- Water, saline
- Parcel
- Watershed
- Town Boundary
- Pamet River

Paper Size ANSI B

0 4,000

US Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

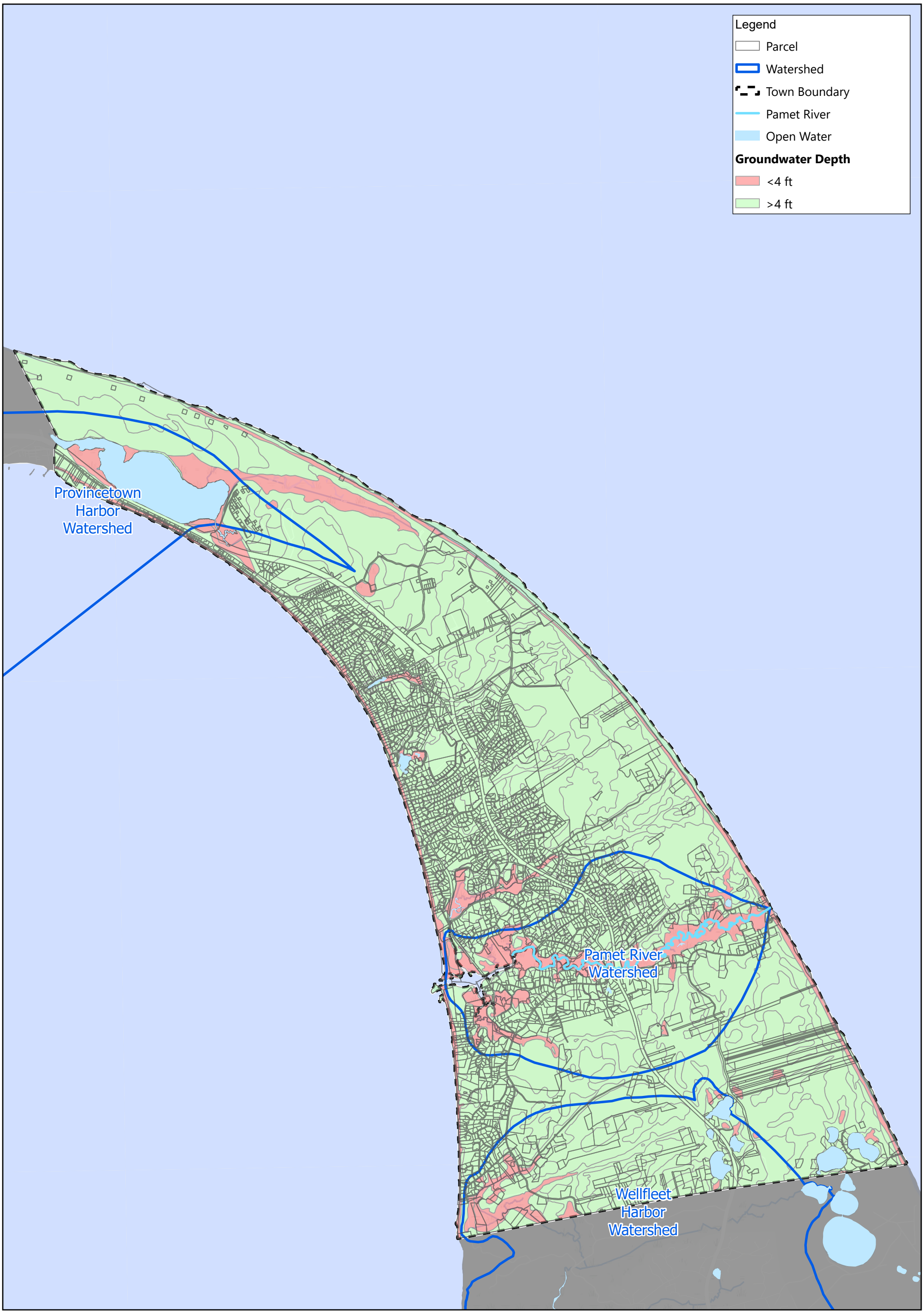
Project No. 12603461
Revision No. -
Date 7/10/2024

FIGURE 5.1

SOILS MAP

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Print date: 10 Jul 2024 - 09:11

Data source: . Created by: amarriott



Paper Size ANSI B

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US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

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GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

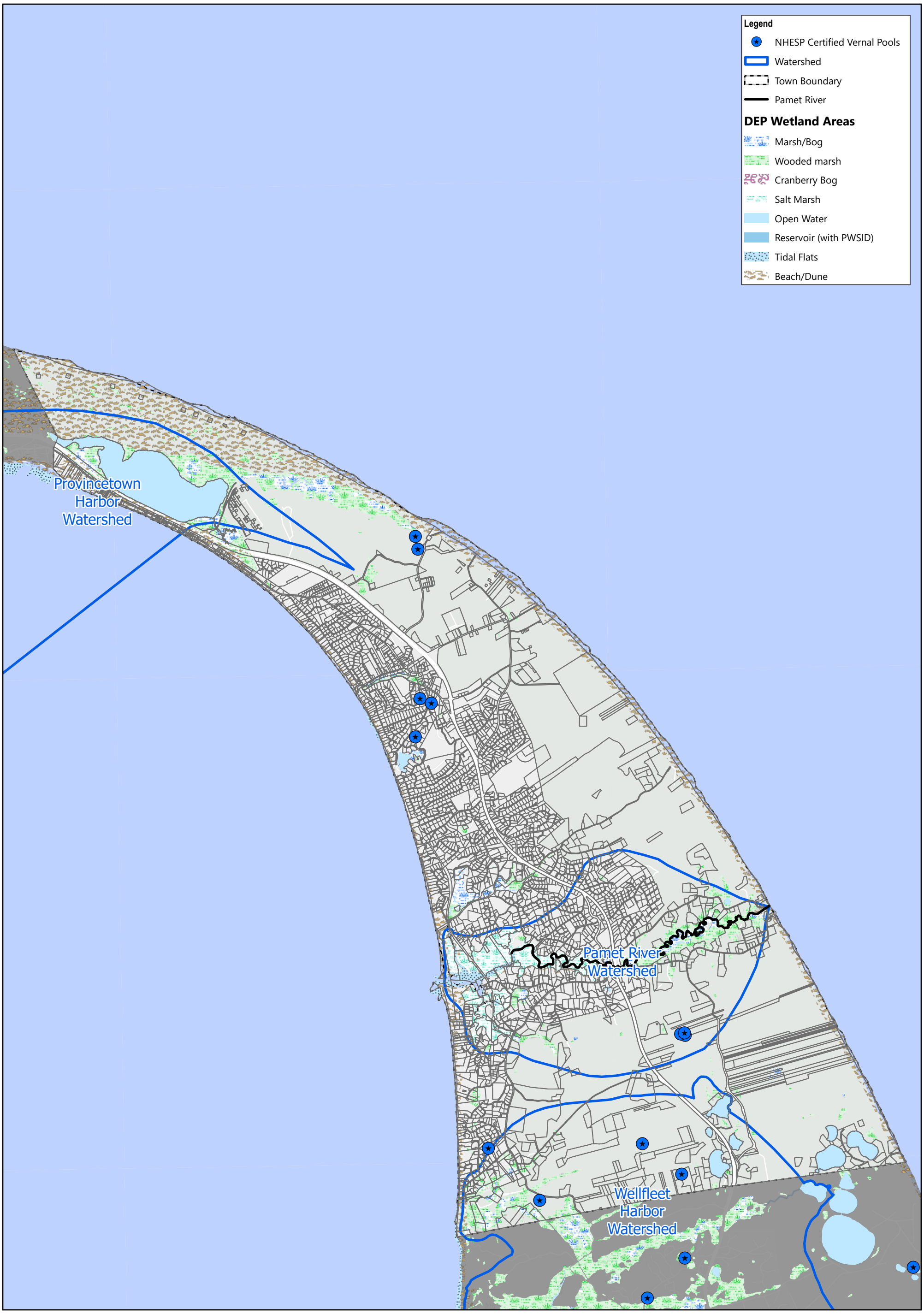
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.2

DEPTH TO GROUNDWATER

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Figure 5-2 Depth to Groundwater
Print date: 02 Jul 2024 - 13:38

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

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GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

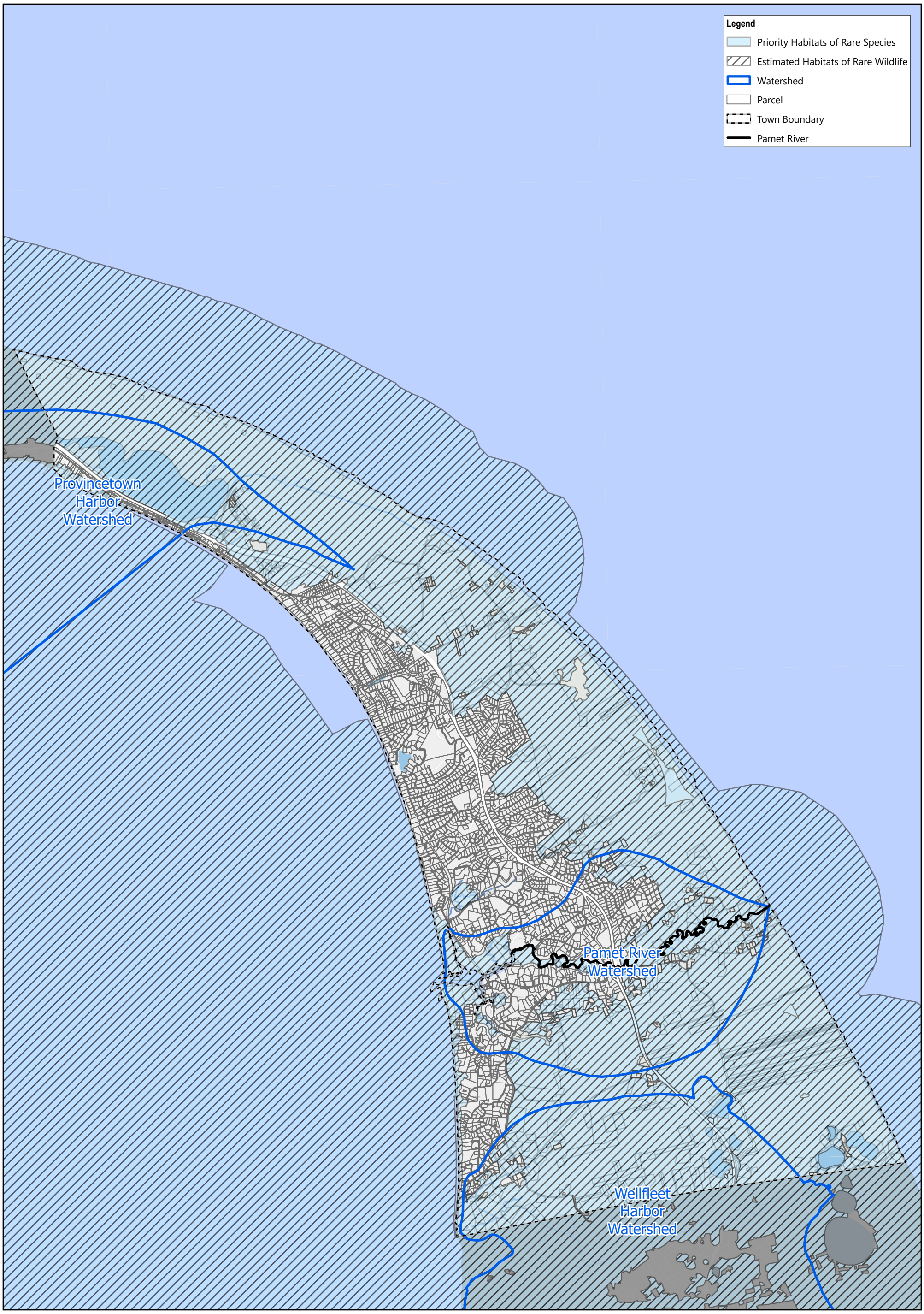
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.3

DEP WETLANDS AND VERNAL POOLS

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-3 DEP Wetlands and Vernal Pools
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Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

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US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

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GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

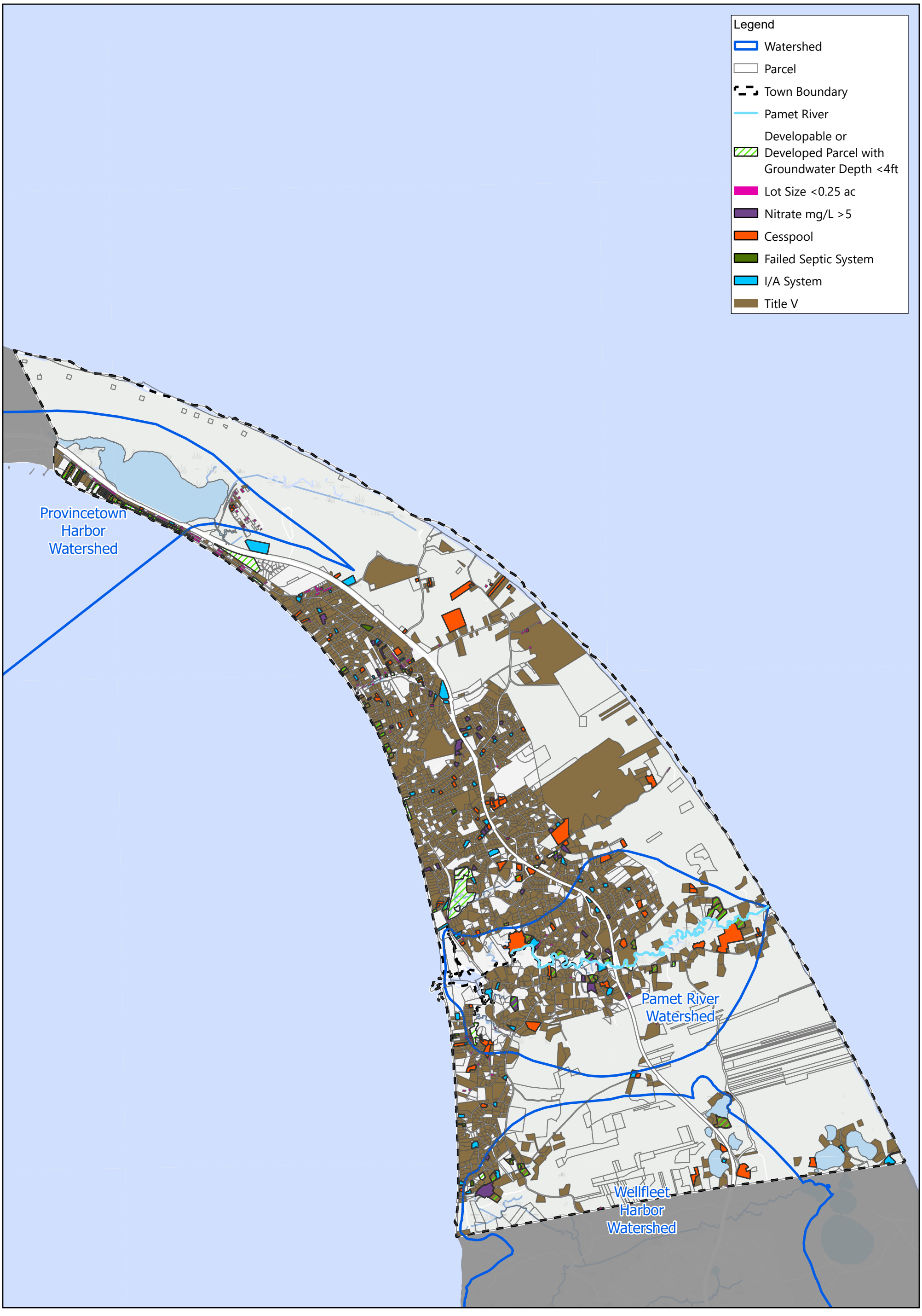
NATIONAL HERITAGE ENDANGERED SPECIES HABITATS

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.4

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-4 NHESP
Print date: 02 Jul 2024 - 13:45

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

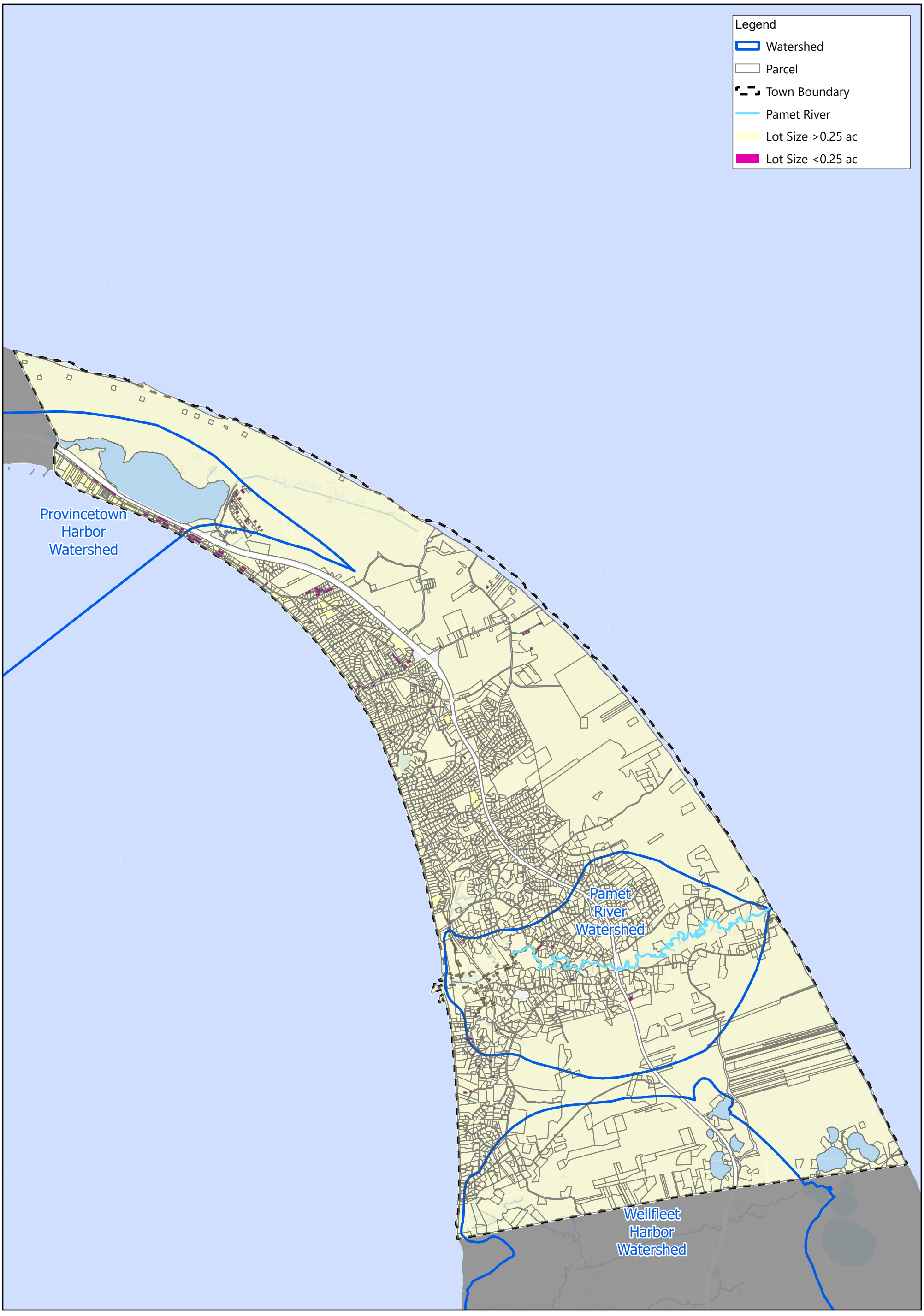
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.5

CURRENT TREATMENT SYSTEMS

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Print date: 02 Jul 2024 - 16:01

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Paper Size ANSI B

0 4,300

US Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

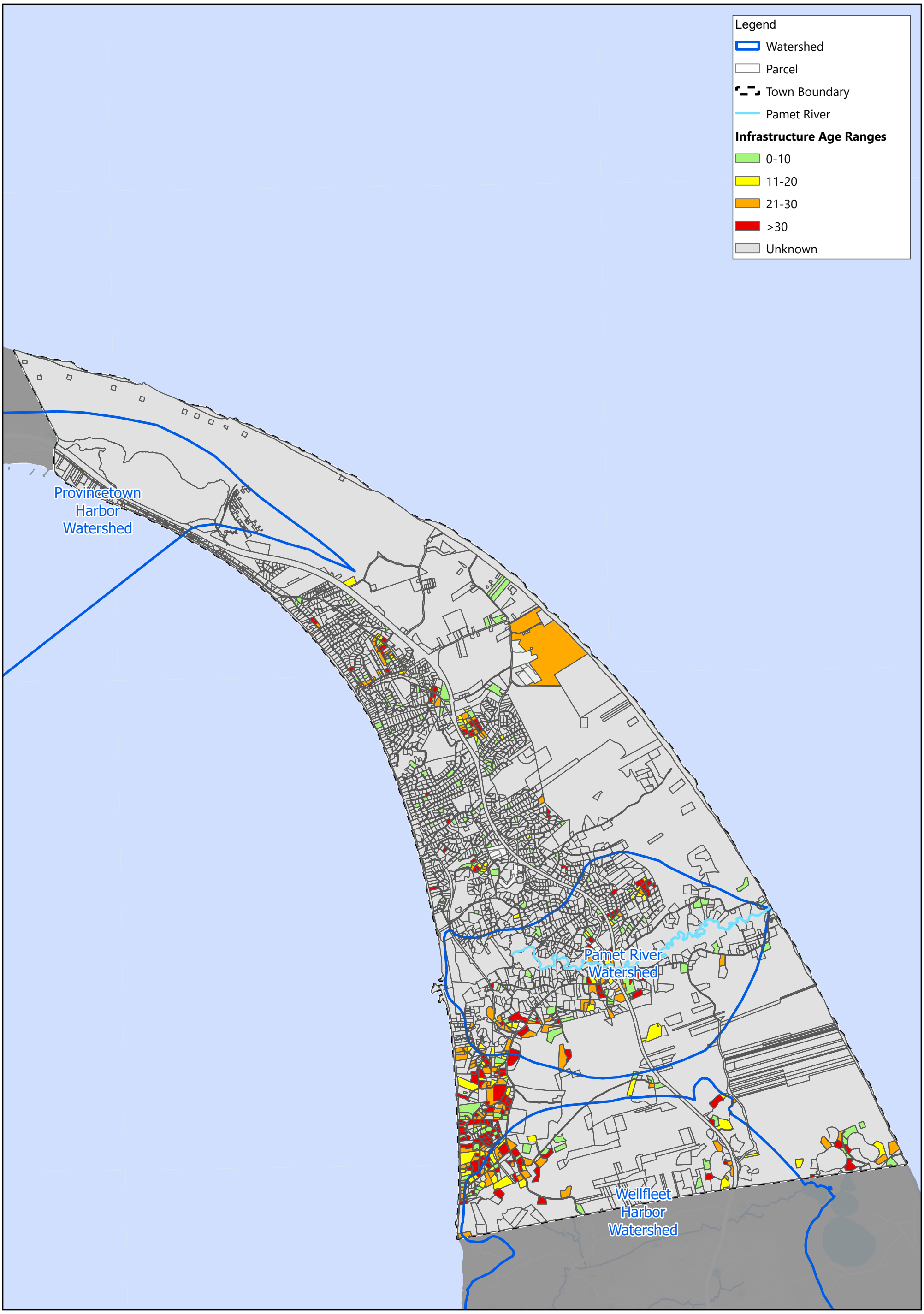
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.6

LOT SIZE

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Parcel Mapping
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Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

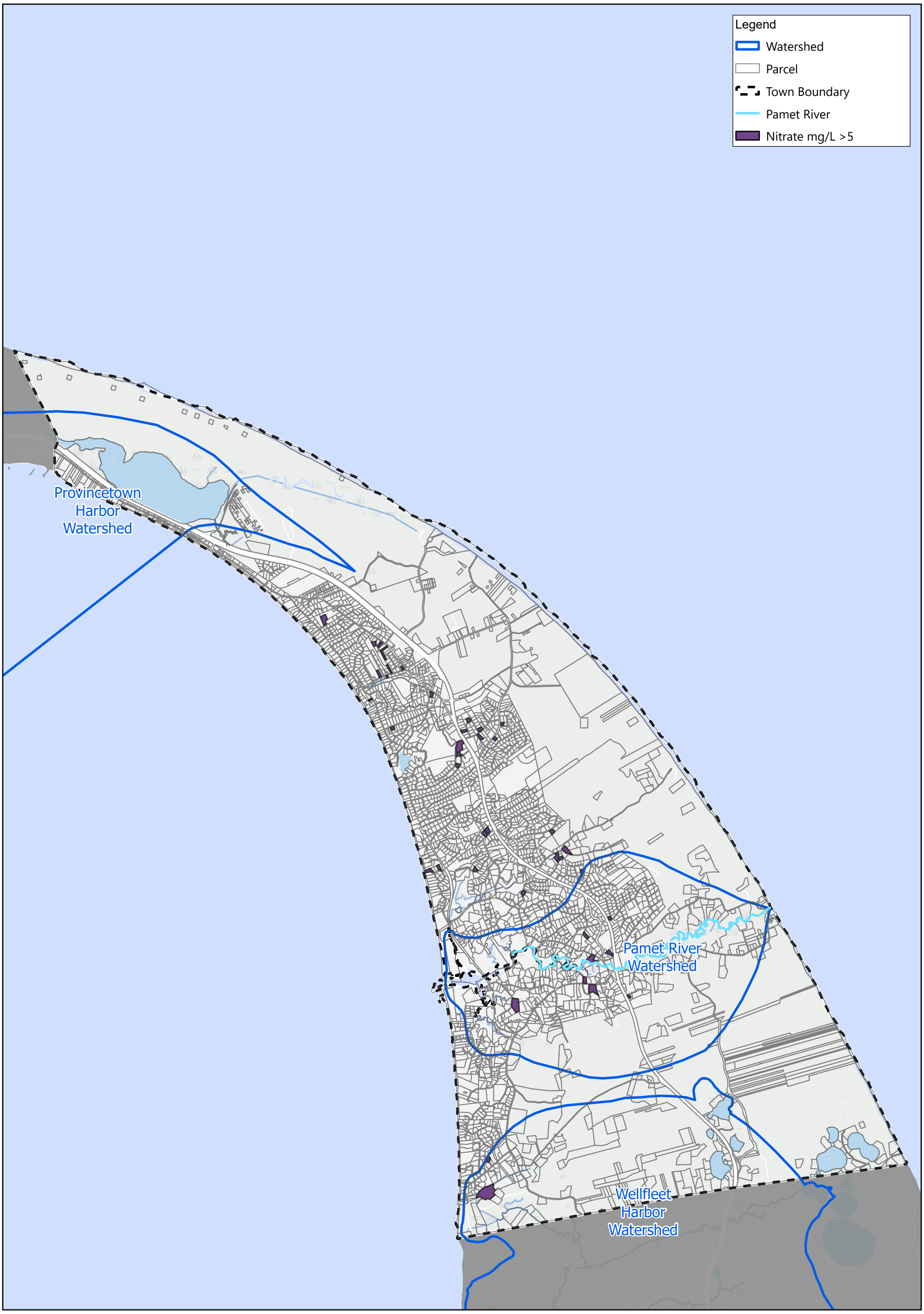
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.7

SEPTIC SYSTEM AGE

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Parcel Mapping
Print date: 02 Jul 2024 - 16:12

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Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

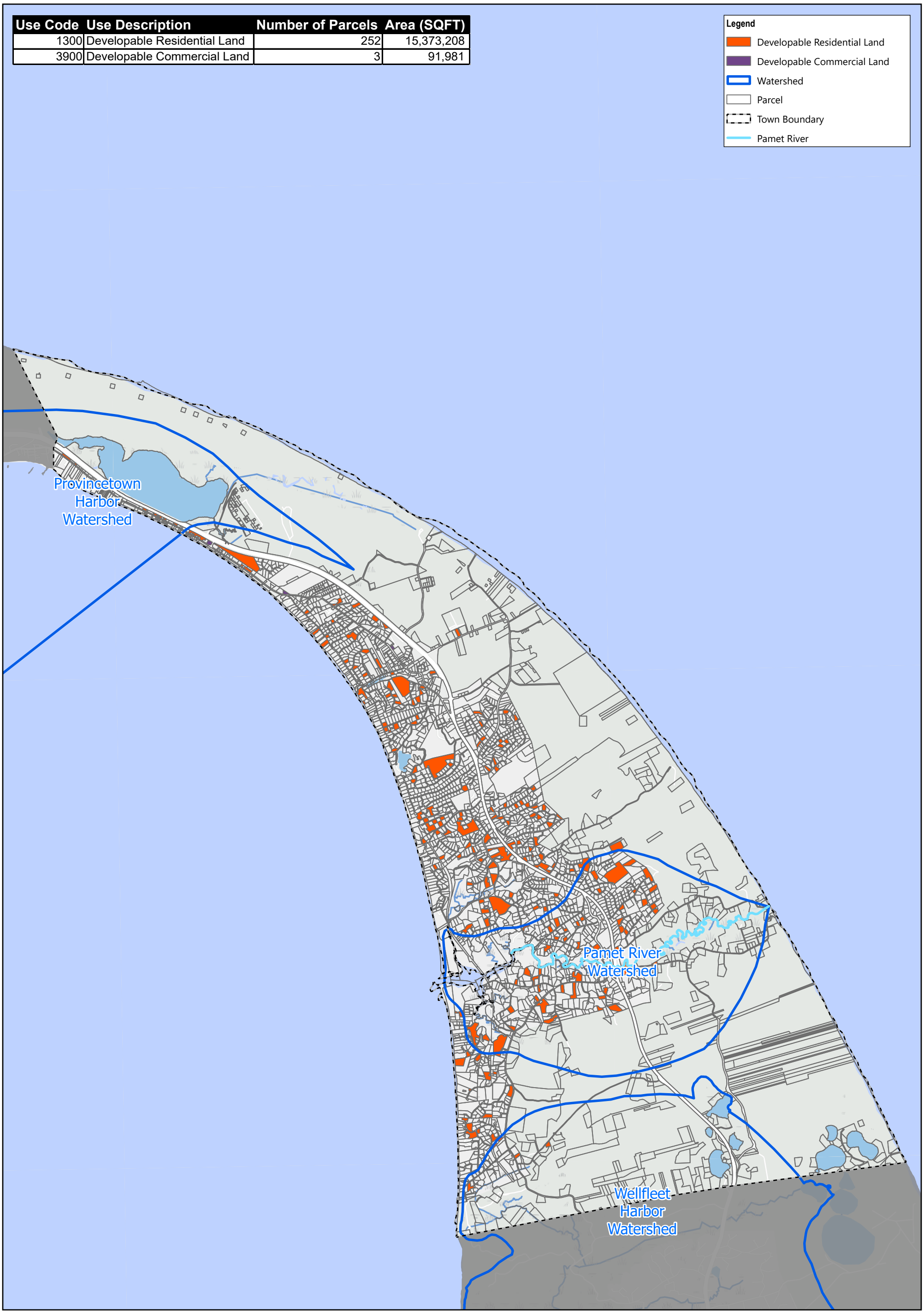
FIGURE 5.9

HIGH NITRATES

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Parcel Mapping
Print date: 02 Jul 2024 - 16:13

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott

Use Code	Use Description	Number of Parcels	Area (SQFT)
1300	Developable Residential Land	252	15,373,208
3900	Developable Commercial Land	3	91,981



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

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GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

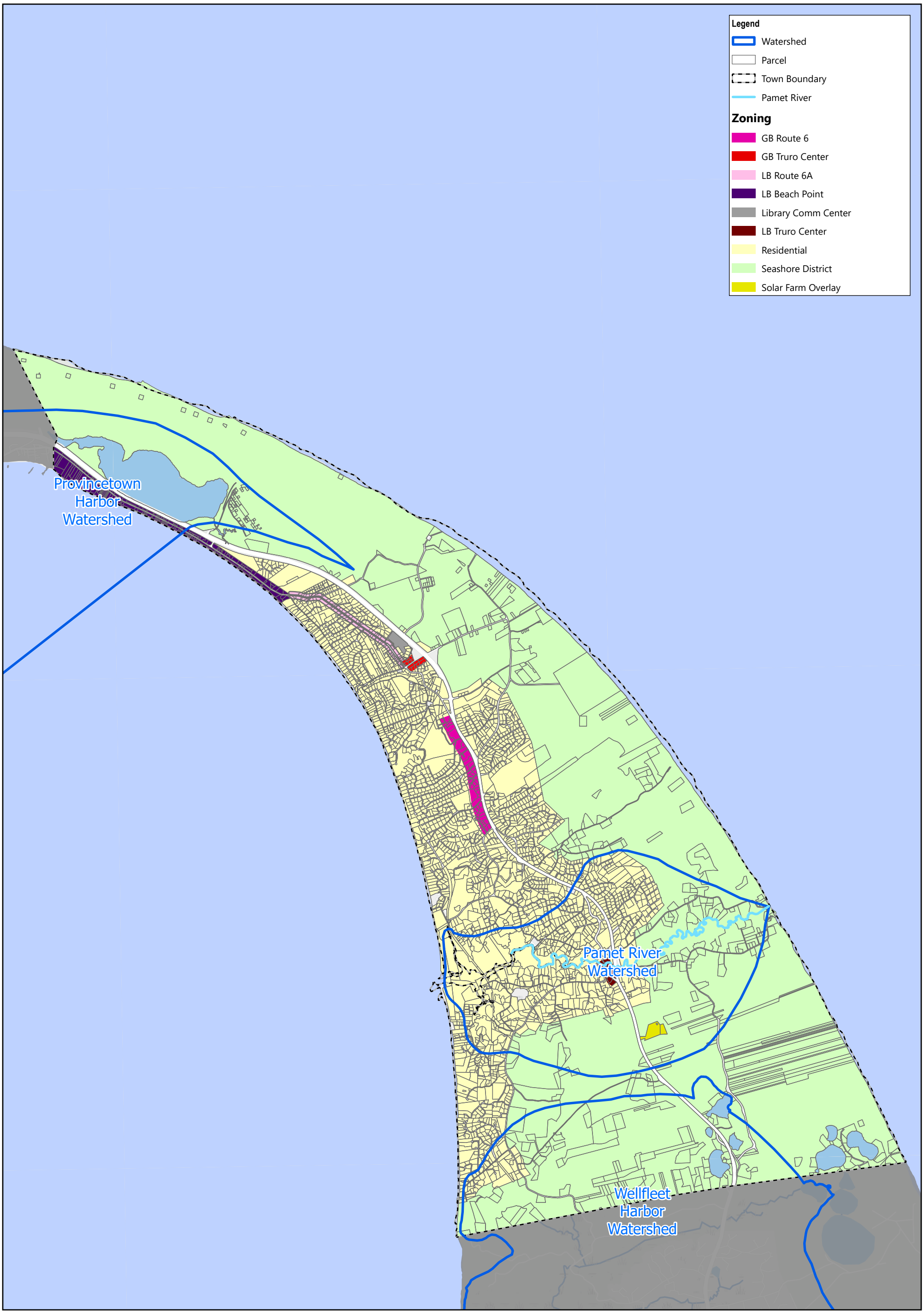
DEVELOPABLE AND POTENTIALLY DEVELOPABLE PROPERTIES

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.10

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-9 Developable and Potentially Developable Parcels
Print date: 02 Jul 2024 - 13:45

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
Grid: NAD 1983 2011 StatePlane Massachusetts Mnld FIPS 2001 FtUS

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.11

ZONING

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-10 Town Zoning Districts
Print date: 02 Jul 2024 - 13:46

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
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N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

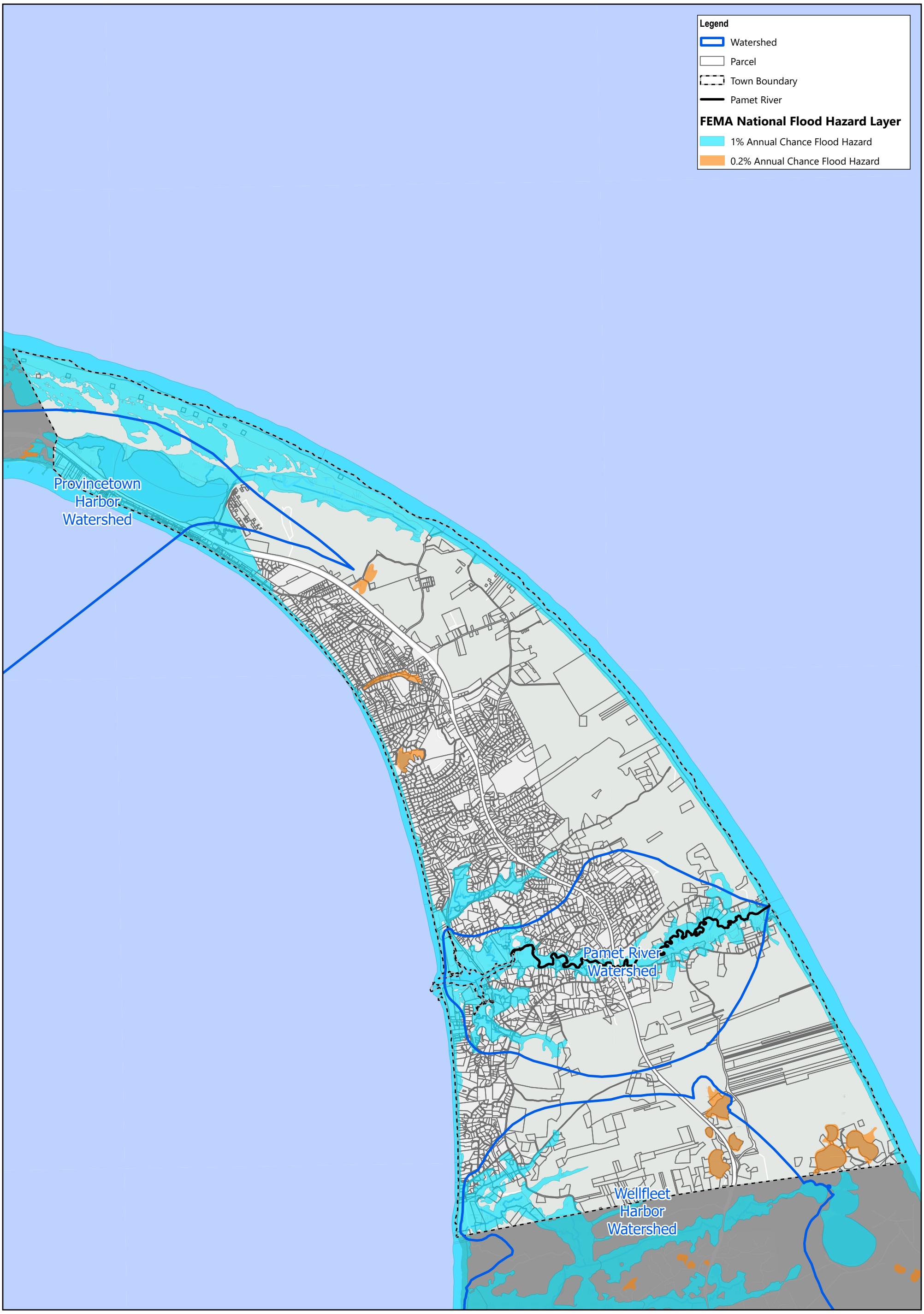
Project No. **12603461**
Revision No. **-**
Date **7/3/2024**

FIGURE 5.12

ZONE 1 PROTECTION AREAS

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-11 Zone 1 Protection Areas
Print date: 03 Jul 2024 - 10:03

Data source: . Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
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N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

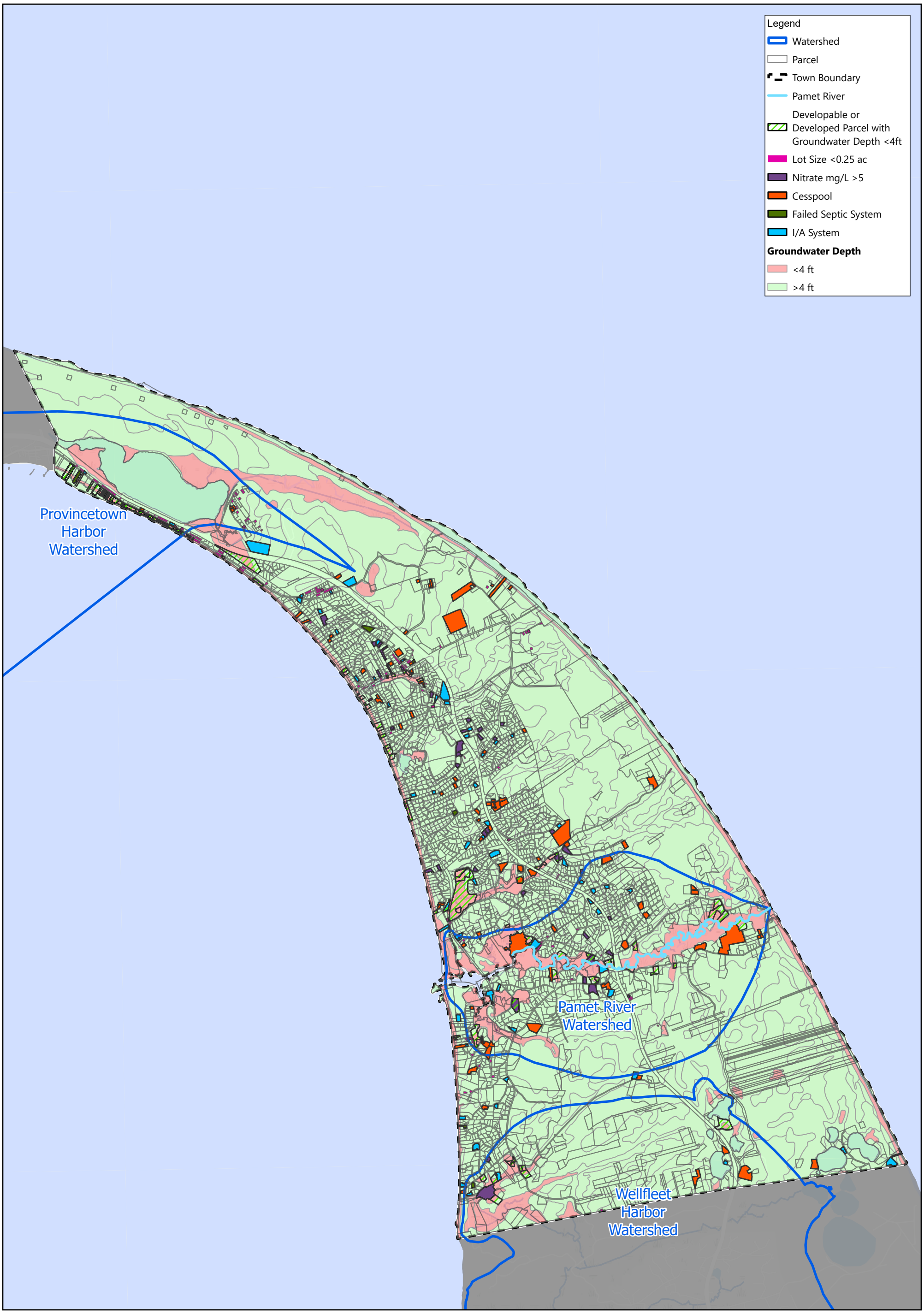
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 5.13

FEMA Flood Hazard Zones

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro NAR Figures.aprx - Figure 5-12 FEMA Flood Hazard Zones
Print date: 02 Jul 2024 - 13:47

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 4,300

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: NAD 1983 2011
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N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

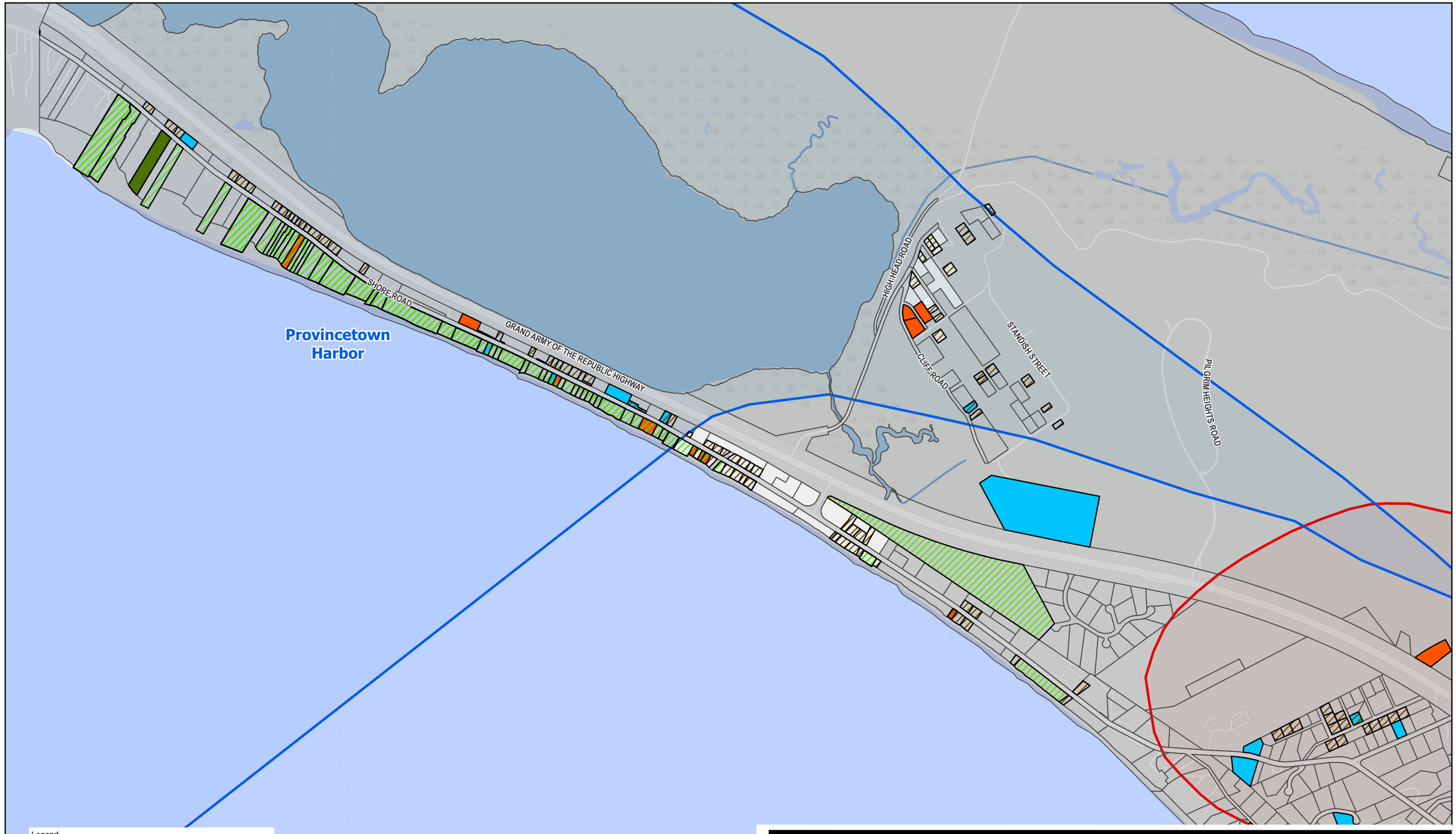
Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.1

SENSITIVE RECEPTORS

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Figure 6-1 Sensitive Receptors
Print date: 02 Jul 2024 - 14:07

Data source: Light Gravy Canvas Stream No Labels: Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 900

US Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

STUDY AREA A: BEACH POINT

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.2

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:14

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, E

USFWS. Created by: amarriott

WHITMANVILLE ROAD
LONGNOOK ROAD
HIGGINS HOLLOW ROAD
OLD KINGS HIGHWAY
DYERS HOLLOW ROAD
OLD COLONY WAY
CASTLE ROAD
CORN HILL ROAD
STONEY HILL ROAD
GOSPEL PATH
UNION FIELD ROAD
NORTH PAMET ROAD
TOMS HILL PATH
MEETINGHOUSE ROAD
GRAND ARMY OF THE REPUBLIC HIGHWAY
TRURO CENTER ROAD
Pamet River
SOUTH PAMET ROAD
DEPOT ROAD
MILL POND ROAD
OLD BRIDGE ROAD
COLLINS ROAD
PRINCE VALLEY ROAD
CEMETERY ROAD

Legend

- Cesspool
- Failed Septic System
- I/A System
- Nitrate mg/L >5
- Parcel
- Lot Size <0.25 ac
- Developable or Developed Parcel with Groundwater Depth <4ft
- Subwatersheds
- Zone II

Pamet River

- Estuary
- Freshwater

Paper Size ANSI B

0 1,250

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

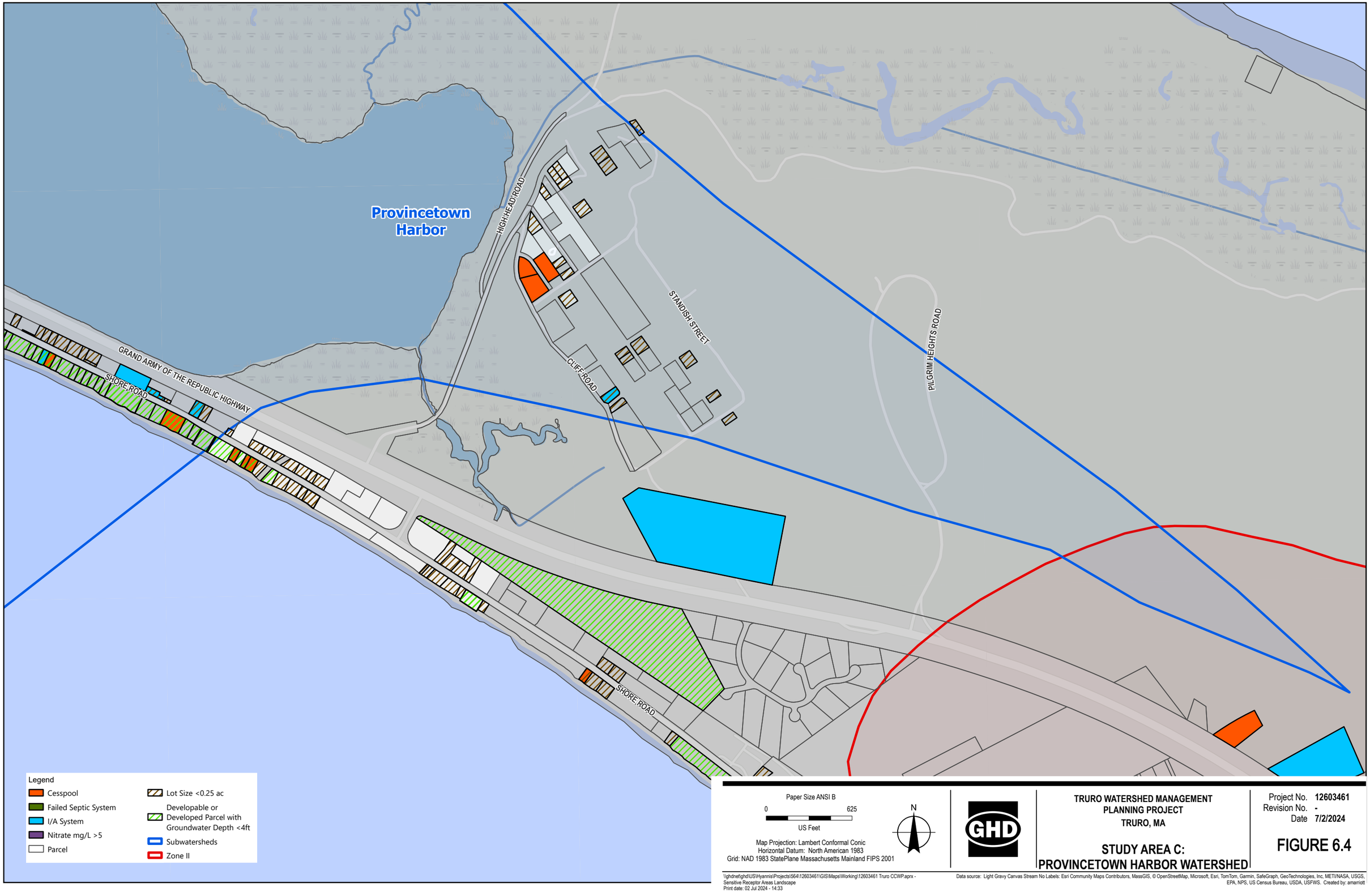
STUDY AREA B: PAMET RIVER

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.3

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:20

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 625

US Feet

N

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

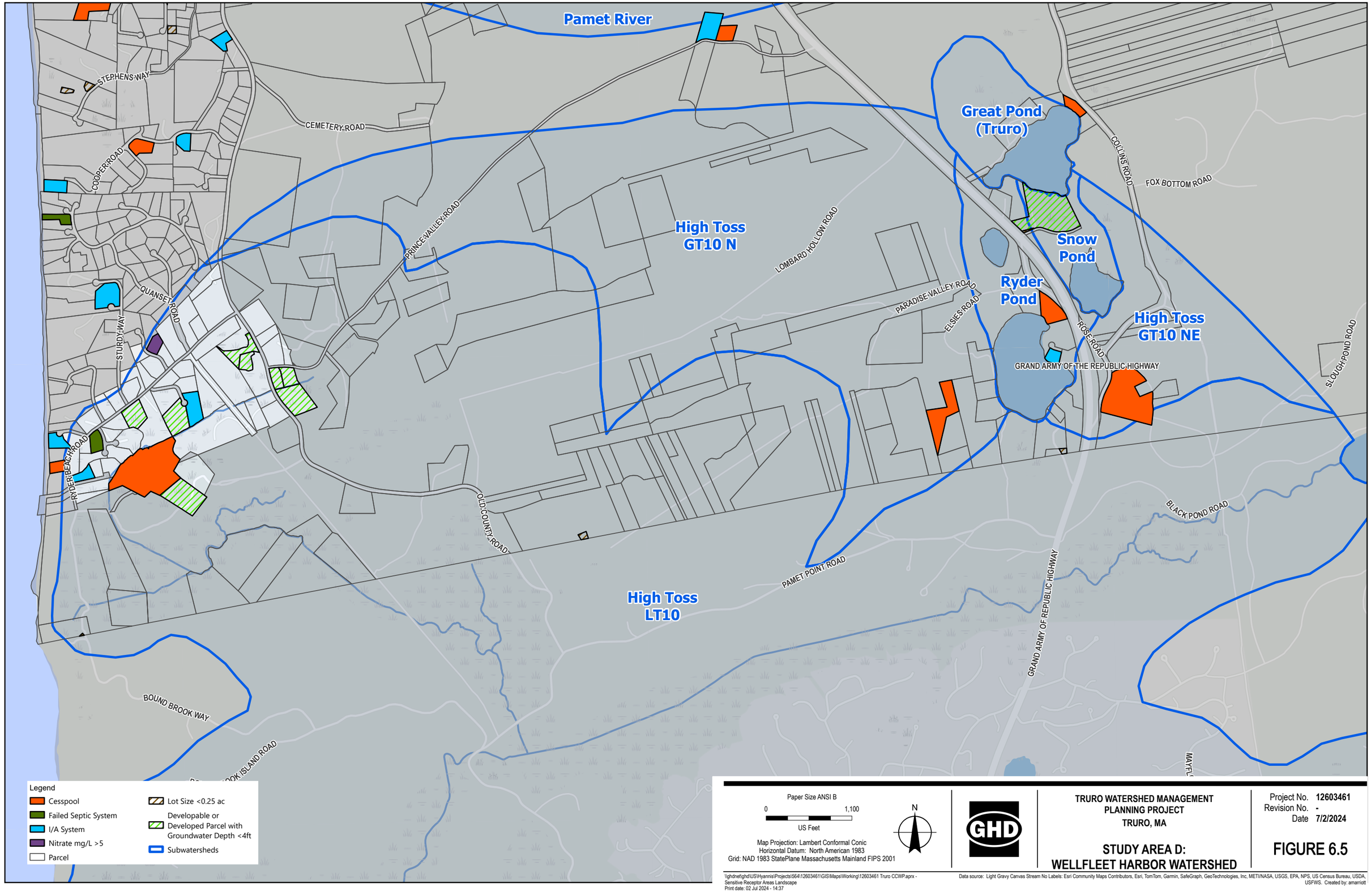
STUDY AREA C: PROVINCETOWN HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.4

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:33

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 1,100

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

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GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

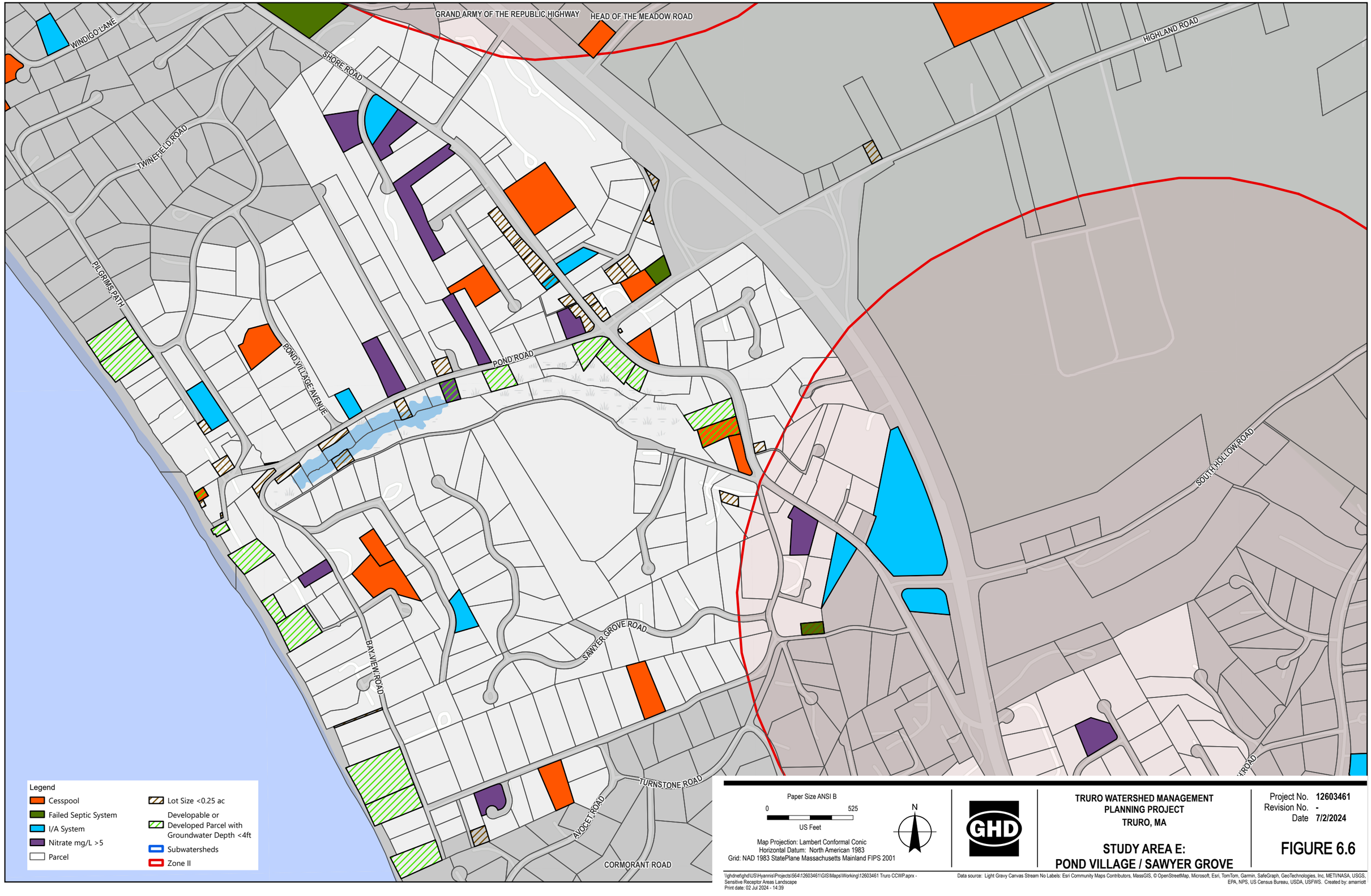
STUDY AREA D: WELLFLEET HARBOR WATERSHED

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.5

\\ghdnet\ghd\US\Hyannis\Projects\56\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:37

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

0 525

US Feet

Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

N

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

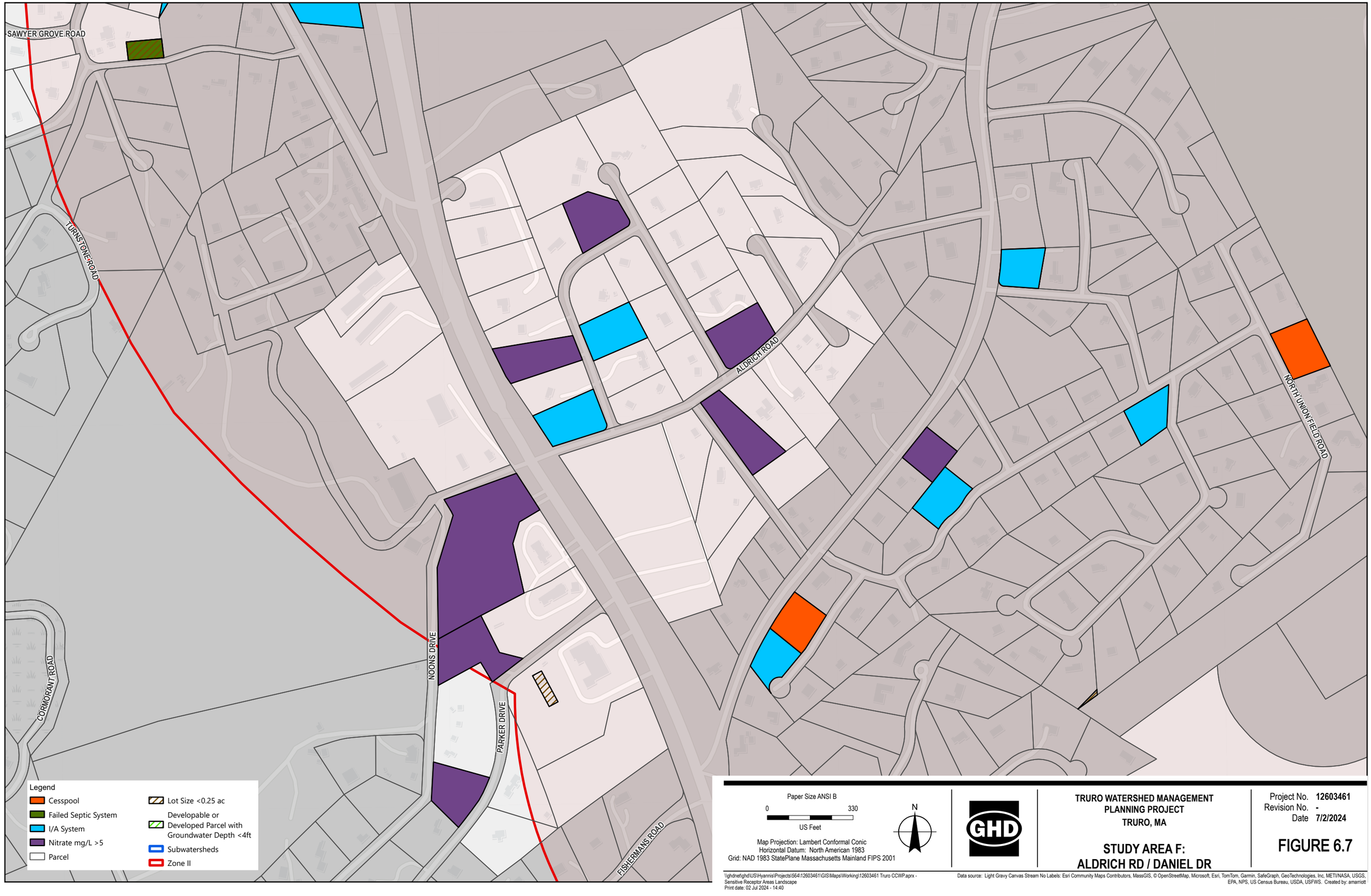
STUDY AREA E:
POND VILLAGE / SAWYER GROVE

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.6

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:39

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott



Paper Size ANSI B

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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

GHD

TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

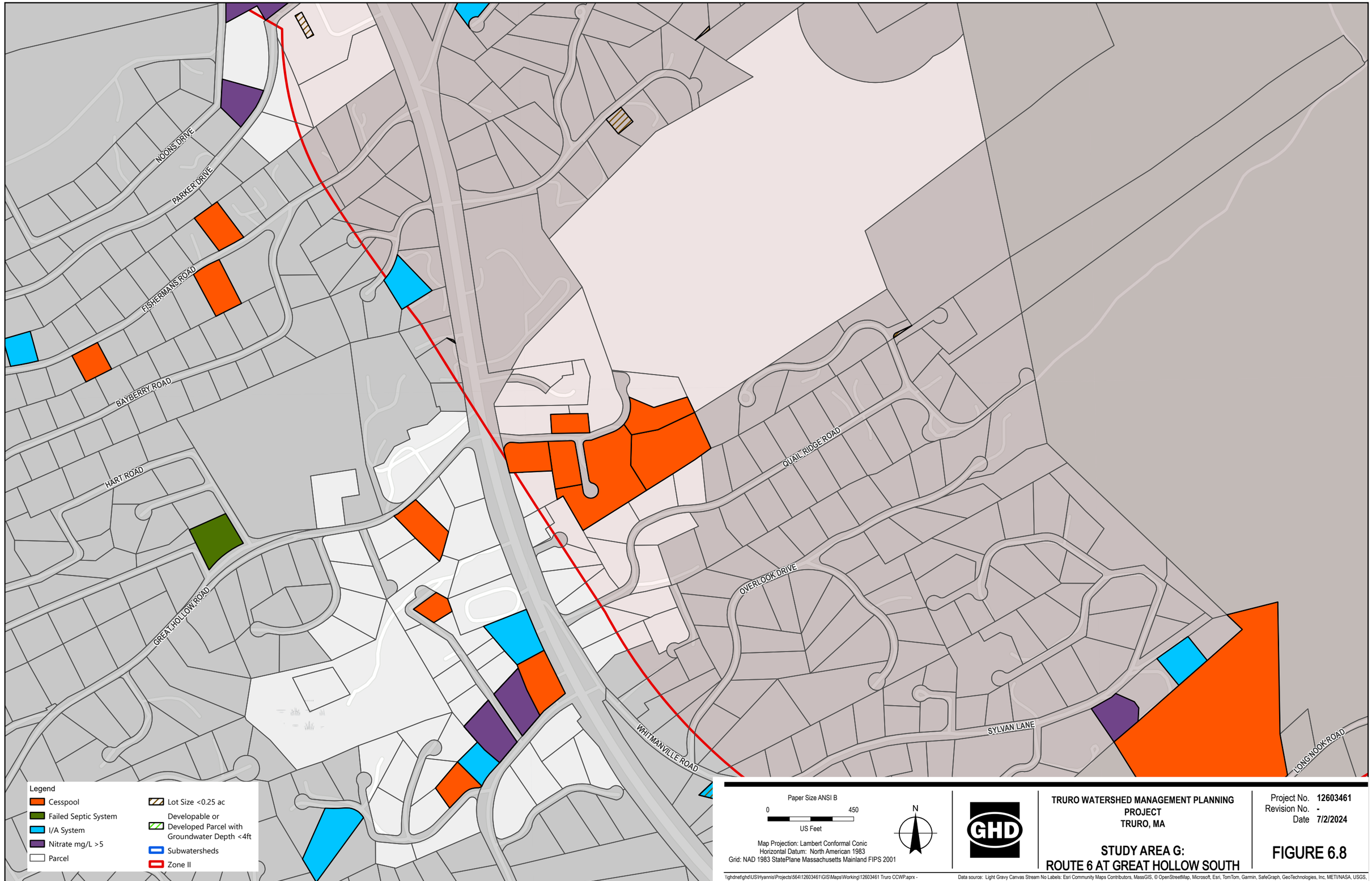
STUDY AREA F: ALDRICH RD / DANIEL DR

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.7

\\ghdnetghd\US\Hyannis\Projects\5641\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:40

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott



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Map Projection: Lambert Conformal Conic
Horizontal Datum: North American 1983
Grid: NAD 1983 StatePlane Massachusetts Mainland FIPS 2001

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TRURO WATERSHED MANAGEMENT PLANNING PROJECT
TRURO, MA

STUDY AREA G: ROUTE 6 AT GREAT HOLLOW SOUTH

Project No. **12603461**
Revision No. **-**
Date **7/2/2024**

FIGURE 6.8

\\ghdnet\ghd\US\Hyannis\Projects\564\12603461\GIS\Maps\Working\12603461 Truro CCWP.aprx - Sensitive Receptor Areas Landscape
Print date: 02 Jul 2024 - 14:41

Data source: Light Gravy Canvas Stream No Labels: Esri Community Maps Contributors, MassGIS, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS. Created by: amarriott

Appendices

DRAFT

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Appendix A

Beach Point Flow Characterization Memorandum

Memorandum

February 02, 2024

To	Emily Beebe, Town of Truro MA		
Copy to			
From	Anastasia Rudenko PE, BCEE, ENV SP	**Tel**	+1 774 470 1637
Subject	Beach Point Wastewater Flow Characterization	**Project no.**	12603461

Introduction

The Town of Truro is currently developing a Comprehensive Wastewater Management Plan (CWMP) to quantify wastewater management and nitrogen management needs in Truro and to develop a Recommended Plan to address the identified needs for a 20-year planning period.

Beach Point is an area in Northern Truro, MA along Shore Road, bordering Provincetown to the North. For the purposes of this evaluation the Beach Point area is defined as 388 parcels between 168 Shore Drive and 706 Shore Drive (referred to in this memo as the Beach Point Study Area). The Town has indicated that this area is anticipated to see minimal growth over the 20 year planning period.

The Town's of Truro and Provincetown have initiated preliminary discussion on a potential regional wastewater solution for the Beach Point Study Area. The Town of Provincetown has included a preliminary allocation for Truro to connect to Provincetown's collection system (through the future Phase 6B expansion of Provincetown's collection system). The allocation for Truro flow that has been used in Provincetown's planning efforts is 150,000 gpd, based on Title 5 flow estimates (maximum day flows). Provincetown has also indicated that average annual flows at the existing Provincetown Wastewater Treatment Facility (WWTF) are typically approximately 60% of Title 5 flows.

This memorandum outlines the methodology that was used to estimate anticipated wastewater flows in the Beach Point Study Area as part of Truro's planning evaluation.

Beach Point Study Area Wastewater Flow Characterization

The Town of Truro provided GHD with available Title 5 septic system design flows for the Beach Point Study Area. Based on the Title 5 data provided by the Town, the estimated maximum day wastewater flow for the Study Area is 142,500 gpd.

Using the 60% maximum day to average day conversion factor, the average annual wastewater flow the average annual wastewater flow of the Beach Point Study Area (as part of the Provincetown system[1]) is estimated at 85,500 gpd. Maintaining the 150,000 gpd Title 5 flow allowance that Provincetown planning currently incorporates would allow for a 5% future flow allowance for the 20-year planning period.

[1] Typically the peaking factor between average day and maximum day flows decreases as average flows increase. The peaking factor for the Beach Point Study Area only (not as part of the larger Provincetown system) is anticipated to be less than 60% of Title 5 flows.

Appendix B

Beach Point Wastewater Treatment Alternatives Screening Analysis

Technical Memorandum

July 2, 2024

To	Emily Beebe, Town of Truro MA	**Contact No.**	774-470-1637
Copy to		Email	anastasia.rudenko@ghd.com
From	Anastasia Rudenko, PE Peter Lusardi, PE	**Project No.**	12603461
Subject	Beach Point Wastewater Treatment Alternatives – DRAFT rev0		

1. Introduction

The Town of Truro is currently developing a Comprehensive Wastewater Management Plan (CWMP) to quantify wastewater management and nitrogen management needs in Truro and to develop a Recommended Plan to address the identified needs for a 20-year planning period. This memorandum reviews alternatives for wastewater treatment for the Beach Point area to provide an environmentally and economically sound nitrogen reduction for this Study Area.

Beach Point is an area in Truro along Shore Road, bordering Provincetown to the North. For the purposes of this evaluation the Beach Point area is defined as 388 water meter connections between 168 Shore Drive and 706 Shore Drive (referred to in this memo as the Beach Point Study Area). This area extends from the intersection of Shore and Knowles Heights Roads to the Truro-Provincetown boundary line. The Town has indicated that this area is anticipated to see minimal growth over the 20-year planning period, from 2027 through 2047. While there are 388 water meter connections, there are only 128 parcels in the Study Area; the Beach Point Study Area has a number of condominiums, motels, and other commercial facilities with multiple structures on a parcel.

2. Beach Point Areas with Inadequate Title 5 On-site Systems

The following is an inventory provided by the Town for on-lot systems in Beach Point (Study Area A).

Table 1 Beach Point (Study Area A) On-Lot Systems

Beach Point	Number of Systems
Study Area Total	**128**
Outside a Coastal Watershed	**37**
Cesspool	4
Title 5	33
Within Provincetown Harbor Watershed	**91**
Both Cesspool and Title 5	2

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Beach Point	Number of Systems
Cesspool	5
IA	5
Title 5	79

As presented in the above table, the Beach Point Study Area has 9 cesspools, 5 IA systems, 112 Title 5 systems, and 2 parcels with Title 5 and cesspool systems. Based on Truro's Board of Health Regulations, cesspools are classified as failed systems and require updates to meet Title 5 regulations. The Town of Truro also provided a list of documented failed septic systems; of the seven parcels on the list, one of these systems is within the Beach Point Study Area.

A portion of the Beach Point Study Area is located within the East Harbor Lagoon Subwatershed of Provincetown Harbor. Beach Point is an area of concern because East Harbor Lagoon is tidally restricted with fair to poor water quality at all monitoring stations. Previous evaluations, including the Phase I and Phase II Integrated Water Resources Management Plan by Weston and Sampson, have concluded that management of nutrient loads in East Harbor Lagoon would likely have significant positive effect on the habitat quality.

3. Beach Point Study Area Wastewater Flow Characterization

Various methods to characterize the Beach Point Study Area wastewater flows were evaluated. The characterization methods vary depending on the recommended treatment alternative.

To be consistent with Provincetown's flow estimation and methodology, Title 5 septic system flows were used to establish maximum day flows. The Town of Truro provided GHD with available Title 5 septic system design flows for the Beach Point Study Area. Based on the Title 5 data provided by the Town, the estimated maximum day wastewater flow for the Study Area is 143,300 gpd. Using the maximum day Title 5 flow of 143,300 gpd and applying a 60% conversion factor (maximum day to average day conversion based on flows at the Provincetown Wastewater Treatment Facility), this equates to an average wastewater flow of 86,000 gpd. At a TN concentration of 26.25 mg/l for Title 5 septic systems, the estimated TN load from septic systems in the study area is 8.6 kg/d. This methodology is further summarized in the Draft Beach Point Wastewater Flow Characterization Memorandum.

For nutrient analysis and flow characterization for treatment alternatives that do not include connecting to the Provincetown collection system, water meter records were used to establish average annual flows. The average annual water flow for Beach Point, based on data from water meter records provided by the Provincetown Water Department from 2017 – 2022, is 39,823 gallons per day (gpd). The difference in Title 5 flows and water meter readings is due to seasonality. This value was multiplied by a water to wastewater conversion factor of 0.9 (consistent with the MEP project), to calculate an average annual wastewater flow of 35,800 gpd. At an average wastewater flow of 35,800 gpd (based on water meter readings) and an average effluent total nitrogen (TN) concentration from a conventional Title 5 system of 26.25 mg/L the estimated amount of nitrogen from Beach Point wastewater is 3.56 kg/day.

Using the 35,800 gpd average daily wastewater flow from water meter records and a maximum daily flow of 143,300 gpd from Title 5 data, the peak-to-average ratio at the Provincetown WWTF is 4:1. Maintaining the 150,000 gpd Title 5 flow allowance that Provincetown planning currently incorporates would allow for a 4.5% future flow allowance for the 20-year planning period.

3.1 Nitrogen Reduction Goals

The Cape Cod Commission (CCC) 208 Plan establishes a methodology to estimate preliminary nitrogen reduction allowances for coastal estuaries that require nitrogen management to restore water quality but have not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for

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the system. For these watersheds the CCC 208 Plan assumes a 25% reduction allowance in existing nitrogen as an interim target reduction goal. There are no reduction goals or thresholds for areas outside of coastal watersheds. Based on the CCC methodology and Truro's contribution to the Provincetown Harbor watershed (7% according to the 2017 CCC Watershed Report), the reduction goal using the CC planning allowance is 0.79 kg-N/day. The remaining nitrogen load in the Provincetown Harbor watershed is contributed by Provincetown.

4. Conceptual Cost Estimate Development

Preliminary level capital costs were developed for the alternatives outlined in this memo. The costs presented are planning level total estimated project costs with allowances for construction costs including:

- 30 percent construction contingency
- 10 percent engineering design
- 2 percent fiscal/legal/permitting/administrative costs
- 15 percent construction administration and Resident Project Representative (RPR) costs
- 8 percent police detail costs for linear work

Because of the conceptual nature of this evaluation, a 30 percent construction contingency is carried as no detailed design has been performed and no survey has been performed. During final design a reduced contingency will be carried for variability in the bidding climate, project changes before bidding, easements, residential property restoration, and change orders due to unforeseen conditions. Project costs are presented in 2024 dollars. Once a construction timeframe is known, project costs should be adjusted to the mid-point of construction.

The following assumptions were used to develop the conceptual project cost estimates:

- Construction costs were estimated based on unit costs from recent Cape Cod construction bids.
- Anticipated costs to acquire any privately owned land for pump stations were not included in the conceptual cost estimates.
- The construction cost estimate includes estimated costs for linear infrastructure only within the road right-of-way, not on private property. No allowance was carried for sewer lateral installations from the property line to the house for each anticipated connection. Lateral installation costs are typically incurred by a property owner (not the Town).
- Installation of grinder pumps required for a low-pressure system are not included in the cost estimate (the cost estimates include procurement of the pumps only – it is assumed that private homeowners are responsible for installation costs).
- Estimated costs assume that no hazardous materials or other materials that require special handling were encountered.
- Due to the shallow groundwater in this area, dewatering costs were estimated for the entire collection system installation for each centralized collection alternative.
- Full width mill and overlay road restoration was estimated for road restoration.

Engineer's opinions of probable project costs for infrastructure recommended as part of a multi-year planning project are typically initially developed as part of the planning process. As the project progresses, it is critical that these initial estimates are updated and refined at each stage of the planning and design process to accurately reflect items that may affect the cost estimates. Items that may affect cost estimates may include, but are not limited to:

- Changes in bidding climate and tariffs.

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- Design changes resulting from future law, regulation, or code changes.
- Design changes resulting from industry or manufacturer advances, updates, or changes.
- Unknown conditions discovered during field investigations during design (borings, survey, etc.).
- Design decisions regarding proprietary equipment/sole sourcing of equipment.
- Recommendations from Value Engineer.

It is recommended that the engineer's opinion of probable project costs presented in this memorandum continue to be refined and updated at each major stage of the design process and prior to construction financing.

5. No Action Alternative

Under the "No Action Alternative" no all-inclusive improvements would be made to modify the on-site wastewater infrastructure in the Beach Point area. However, improvements to on-lot treatment would continue to be made on a case-by-case basis where substandard systems are identified. Existing regulations would still be enforced. This would include the conversion of existing cesspools to Title 5 or I/A systems, in accordance with the Truro Board of Health regulations. Water quality monitoring in the Provincetown Harbor watershed shows evidence of water quality impacts due to excess nitrogen. Without addressing the watershed's needs, Truro could be at risk of losing its natural and economic resources, including declines in fin-fishing and shell-fishing habitats, declines in property values, algal blooms in coastal embayments, potential beach and shell-fishing closures and potential declines in tourism as the aesthetic impacts of excessive nitrogen loading continue to impair the Town's water resources. With the anticipated rise in sea-level, conventional septic systems are at a greater risk of being submerged and not functioning properly. Property owners will be responsible for infrastructure on their property, and the Town will be responsible for road infrastructure.

6. Centralized Collection and Treatment Alternatives

The stretch of land comprising Beach Point is approximately 2.5 miles long with relatively flat terrain, with elevations ranging from 7 ft to 15 ft. The area also has a shallow ground water table. This makes for some unique considerations for collection system design and construction. The following discussion assumes all wastewater from Beach Point will be conveyed to a pump station in Provincetown which is approximately 700 feet from the boundary between Beach Point and Provincetown.

Three types of sewer systems were considered for Beach Point:

- Gravity Sewers
- Low Pressure Sewers with Grinder Pumps
- Vacuum Sewers

To be consistent with Provincetown's methodology, the Title 5 flow of 143,300 gpd, or an average day wastewater flow of 86,000 gpd will be assumed as described in section 3.

6.1 Collection System Alternatives

The collection system alternative considers centralized treatment at the Provincetown Wastewater Treatment Plant with effluent discharge in Provincetown.

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6.2 Gravity Sewers

The most prevalent type of collection system in general use is a gravity sewer. This type of system involves the installation of sewers at a constant downhill gradient. The sewer line is designed at a slope sufficient to maintain a velocity within the sewer line that ensures that solids stay suspended within the waste stream. The minimum size of a typical sanitary sewer main is 8-inches. The pipe size increases proportionally with the expected wastewater flow. The sewer is installed at a constant slope until its depth becomes so great that a sewage pump station is needed to "lift" the flow to a wastewater treatment plant or to another gravity sewer. In flat terrain, several pump stations may be required before the flow is pumped to a treatment facility.

In most situations, homes along a gravity sewer connect into the system with gravity service connections from the building to the collector sewer. Houses that are below the street elevation may require the use of small pumps and a small diameter force main (1 to 2 inches) for discharging to the collector sewer.

The installation cost and ease of construction of a gravity sewer depends upon the topography within a particular area and on specific soil types. In areas where topography is consistently increasing or decreasing, the sewers can be installed close to minimum depth (which is typically 4 feet in New England so that the pipe is located below anticipated frost depth). In very hilly areas, deep sewers and/or pump stations may be required. This can significantly increase construction costs when compared with other alternatives. The table below summarizes the advantages and disadvantages or gravity sewers.

Table 2 Advantages and Disadvantages of Gravity Sewers

Advantages	Disadvantages
- A properly designed and installed gravity sewer requires little maintenance. - A gravity system can be easily expanded to serve additional areas. Additional capacity can be provided to accept future flow without affecting performance. - The potential for odors in a properly designed gravity sewer is low. - A gravity system is reliable since it is not dependent upon electrical power for operation. When pump stations are used on collector sewers, electrical generators are provided to supply power during a power outage. - Less space is required on the customers' lots as the gravity sewer does not require a grinder pump station or vacuum valve vault (as required for the other two types of collection systems).	- Gravity sewers are installed at a constant slope, and thus can require deep excavations as the topography changes. Construction with trenchless technologies is generally difficult as constant grades are required. Construction is generally disruptive to traffic patterns and surface infrastructure, as they are often located within the paved roadway to avoid conflicts with water and gas utilities that are typically located closer to the shoulder(s) of the road. - Pump stations are required to transport the sewage out of low points in topography. - Feasibility may be limited by availability of appropriate/available pump station locations. - Capital and operation and maintenance costs increase with each pump station required. - Pump stations tend to increase the potential for odor emissions. - Improper installation techniques could result in infiltration (clean water entering the collection system) and exfiltration (raw wastewater leaving the collection system).

Sewer diameter is dictated by Massachusetts requirements that minimum gravity sewer diameter in public road rights-of-way be 8-inches.

Based on TR-16 requirements, the following guidelines were used to develop a conceptual layout for a gravity collection system at Beach Point:

- Pipe slope minimum: 0.4%, or 0.004 ft/ft assuming 8-inch sewers
- Manholes at every junction and every 400 ft
- Minimum drop of 0.10 ft between manhole inlet and outlet
- Minimum cover: 5 ft
- Maximum cover: 10 ft

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Based on the above design parameters, a preliminary calculation was performed to determine the feasibility of gravity sewers along Shore Road via gravity pipe. Based on the relatively flat topography, a maximum stretch of 2,500 LF of gravity pipe would be able to run along Shore Road between pump stations. This would require approximately 6 pump stations along the 2.5-mile (13,200 ft) road.

Additionally, due to the low ground elevation, if gravity pipe were installed, it would go below the groundwater table and require dewatering during installation which would add significant cost to the project.

6.3 Low-Pressure Sewers

A low-pressure sewer system requires the installation of a grinder pump to serve each building. Wastewater flows from each property by gravity into a pump chamber, where the sewage is shredded and pumped into a pressure sewer, eventually discharging to a gravity main or directly to a pump station or treatment facility. This type of technology has become more widely used over the past 20 years and is particularly suited to areas where there is a need to minimize excavation depths.

The typical pressure in this type of system is 5 to 40 pounds per square inch (psi). Typically, systems can be expanded to serve additional homes; however, there are design limitations, and the overall expansion capability tends to be less than that of a gravity sewer.

When connecting pressure sewer lines to a gravity line or directly to a pump station, odor control for larger systems may be required at the discharge point to mitigate odors created in the pressure sewer pipe. Also, manholes at the discharge point should be protected from corrosion resulting from high hydrogen sulfide concentrations.

For Beach Point, the low-pressure force main would be 1 ½ inches at the southeast end increasing to 4-inches closer to the Provincetown boundary. The pipe typically would be HDPE tubing.

Table 3 Advantages and Disadvantages of Low-Pressure Sewers

Advantages	Disadvantages
– The collection main is installed at a relatively shallow depth and is independent of grade changes. This allows shallower excavation, lower piping installation costs, and less overall disruption to the area due to a shorter construction period. – A pressure sewer can serve areas of hilly terrain or marginal slope. – The pressure sewer piping (beyond the pumping chamber) is not susceptible to infiltration, unlike gravity sewers. – The shredding action of the pump eliminates the need for a larger size collection system. Pressure sewers tend to be much smaller diameter than a typical sanitary sewer, ranging from 1-1/4 inch to 6 inches, depending upon the expected design flow. – The pressure sewer mains (at shallower depths than gravity) are easier to locate in road shoulders to minimize construction in roads where space is available. – Some portion of pressure sewers could be installed with trenchless technologies, thus reducing general disruptions experienced during construction. – Homes with generators can maintain operation of their pumps as long as their home electrical system is set up to accommodate the load (this is becoming more common with the larger number of power outages in recent years).	– Each building in the system would have to be equipped with a pump unit, which increases operation and maintenance requirements. Towns that operate their own systems typically have to maintain an inventory of pumps/parts for these units to minimize disruption of services; otherwise, it becomes the homeowner's responsibility to have their system maintained. – Each pump unit is dependent upon electrical power for proper operation; since the pumps are located at individual homes, municipal backup electrical power is typically not provided. Storage capacity is typically built into each pump chamber (capacity depends on manufacturer). However, in a prolonged power outage, it would be possible for the wastewater flow to exceed this capacity and backup into the structures. This can be mitigated by providing electrical connections on each pump unit to allow a service crew to connect a portable generator and pump out each unit during times of prolonged power outage. Another option is to install a larger capacity unit or a dual tank system, thus providing more storage. – This system is more sensitive to seasonal flow conditions than a gravity sewer. In areas with extreme seasonal fluctuations, minimum flow conditions must be carefully quantified to be sure the sewage flow can properly travel through the system. If inadequate flow exists, solids can harden within the sewer and cause blockages. This concern can be mitigated through proper design.

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Advantages	Disadvantages
	– Some customers may need to upgrade their electrical system, which might not have the capacity for the additional load. – Training would be required to familiarize operating staff with maintenance of the pumps and pressure sewers. – Ownership considerations need to be clearly defined early in the selection and design process. Costs for systems will depend on who owns, operates, and maintains the grinder pump. Easements may also be required to address maintenance and emergency power issues. – Odors can be released at the point of discharge into a gravity sewer or pump station, especially during low flow periods. – Grinder pumps take up space on the customer's property and in the case of Beach Point, many of the properties are relatively small.

A major decision with grinder pumps is who purchases and owns the grinders pumps - the customer or municipal sewer system. A hybrid approach can also be used where the municipality purchases the initial pump and then the customer takes ownership including any repairs or replacements.

For the purpose of estimating the number of grinder pumps required, we assumed that most of the parcels have a low enough number of dwellings that they could be handled by one grinder pump. For instance, one E1 grinder station can handle up to nine homes and up to 24 with factory approval. The vast majority of parcels in Beach Point contain less than 9 residences. Thus, we have assumed that for 128 parcels there would be 150 grinder pump stations required to allow for a few parcels that have too many residences for one grinder station.

6.4 Vacuum Sewers

A typical vacuum sewer system consists of a central vacuum station (CVS), valve pits and the sewer piping and one or more standard wastewater pump stations which are typically constructed in the same building as the CVS. Each customer would have a vacuum valve pit, which consists of the storage sump, the vacuum valve, and associated piping. The valves are operated on pressure differentials and do not require a power source.

Typically, a vacuum sewer system is designed with a maximum static loss of 13 feet and a maximum friction loss of 5 feet in any single flow path to a vacuum pump station.

Most problems affecting vacuum sewers are related to failures in the opening/closing mechanism of the valve. When the valve fails to open this may result in the accumulation of wastewater in the collection chamber and potentially backup into the building.

Each customer's valve pit needs an air intake pipe that typically extends 2-feet above ground level.

A vacuum system would be more efficient for a collection system in a grid rather than homes all on one long straight line as is the case for Beach Point. This is because of the need to run the vacuum pipe at a minimum 0.2% slope and then to raise the elevation of the pipe at intervals to provide necessary upward sloping pipe while keeping the upward elevation gain below the maximum static head of 13 feet.

While the layout and sizing of a vacuum system is best done by the equipment supplier, for the purposes of this evaluation we are assuming the CVS/sewage pump station will be located near the halfway point of the 13,200 feet of Shore Road to be sewered in Beach Point. The CVS would draw wastewater from both directions and then a pump station would pump wastewater back in the northwest direction through a 6 or 8-inch force main to the Provincetown pump station, a distance of approximately 7,300 feet. For most of this distance, there would be two pipes running in parallel, the vacuum pipe and the force main.

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One advantage of the system is the lower cost of facilities constructed on each customer's property. For the low-pressure sewer, the estimated cost is $10,000 for each grinder pump station and for the vacuum sewer the cost is $5,000 for each vacuum valve pit in 2024 dollars.

Each vacuum valve vault can handle up to four homes. For the purpose of estimating the number of vacuum valve vaults required we assumed that most of the parcels have a low enough number of dwellings that they could be handled by one vacuum vault. Thus, we have assumed that for 128 parcels there would be 150 vacuum valve vaults stations to allow for a few parcels that have too many residences for one vacuum valve vault.

6.5 Pumping Beach Point Wastewater to Provincetown WWTF

The Towns of Truro and Provincetown have initiated preliminary discussions on a potential regional wastewater solution for the Beach Point Study Area. The Town of Provincetown has included a preliminary allocation for Truro to connect to Provincetown's collection system (through the future Phase 6B expansion of Provincetown's collection system). The allocation for Truro flow that has been used in Provincetown's planning efforts is 150,000 gpd, based on Title 5 flow estimates (maximum day flows). Provincetown has also indicated that average annual flows at the existing Provincetown Wastewater Treatment Facility (WWTF) are typically approximately 60% of Title 5 flows.

There is an existing Provincetown pump station near the border of Truro that could be used to pump Beach Point wastewater to the Provincetown WWTF. The distance between the Provincetown/Truro border and the pump station is approximately 700 feet.

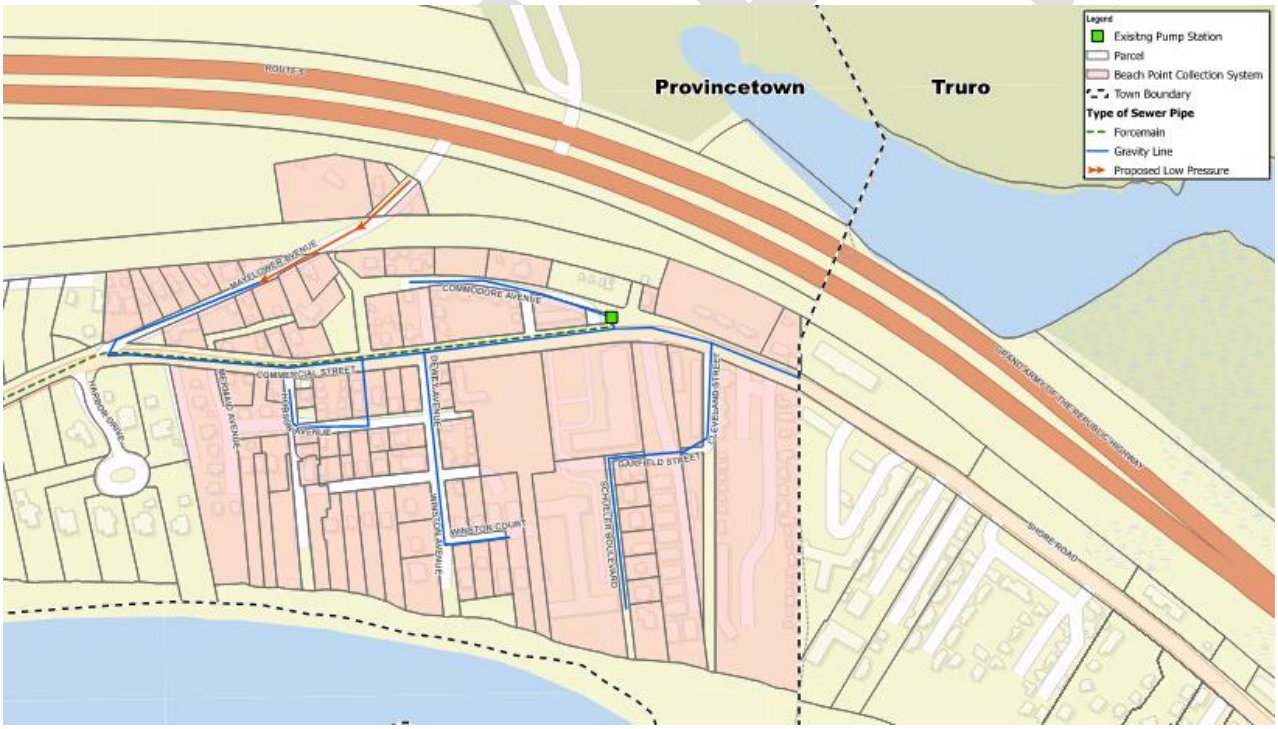


Figure 1 Provincetown Existing Pump Station Location

In addition to costs for sewage collection within Beach Point, there will be capital cost payments to Provincetown for sewage capacity, WWTF upgrades and pump station and force main upgrades.

As of February 8, 2024, the following is our understanding of the capital contributions from Truro to Provincetown:

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Table 4 Estimated Project Costs and Truro Responsibility

Component	Estimated Project Costs (2024$)	Truro Responsibility
Wastewater Treatment Facility	$24 M	Based on flow (25%)
Recharge Facilities	$1 M	Based on Flow (25%)
Collection System Infrastructure and Pumping Station Upgrades	$5 M	100%
Subtotal	$30 M	$11.3 M

Notes:

1. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

In addition to these costs, Provincetown has indicated they would assess a "Treatment Cost." This "Treatment Cost", that would represent Truro's share of the cost of using a portion of the existing Provincetown facilities. The treatment costs would be assessed by Provincetown and provided to Truro. At this time, a placeholder of $2 million was recommended through discussions with Provincetown.

In addition to these costs, Truro would be responsible for their own collection system costs. If Provincetown and Truro were to create a wastewater district, the towns could then explore if Provincetown's design/build legislation would apply to Truro and to verify whether a design/build/operate venture would be applicable for this project.

The conceptual total project costs are shown in the following table:

Table 4 Conceptual Project Costs for Collection System Including Provincetown Capital Contribution (2024 Dollars)

Collection System Alternative	Truro Collection System Project Costs[2,3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[6]	Truro Contribution to Provincetown Capacity Costs[6]	Total Project Costs
Gravity	$26.1 M	N/A[1]	$11.3 M	$2 M	$39.4 M
Low Pressure	$8.8 M	$1.5 M	$11.3 M	$2 M	$23.6 M
Vacuum	$13.5 M	$0.8 M	$11.3 M	$2 M	$27.6 M

Notes:

1. Houses that are adjacent to a gravity sewer but are located at a lower elevation than the sewer will require a small pump and small diameter force main to connect to the system.
2. Total Project Costs include allowances for construction costs including: a 30% construction contingency, 10% engineering design allowance, 2% fiscal/legal/permitting and administrative costs allowance, 15% construction administration and Resident Project Representative (RPR) costs allowance and 8% police detail allowance.
3. Conceptual cost estimates were developed based on a conceptual layout of the system alternatives. No surveys have been conducted as part of this project.
4. Cost estimates do not include the cost of final restoration of private property or the cost of attaining easements.
5. Full width mill and overlay road restoration costs were estimated for road restoration.
6. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

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7. On-Site Wastewater Treatment Alternatives

This section describes an on-site wastewater treatment alternative to replace the existing on-lot septic systems with a system that will provide a higher level of nitrogen treatment. The on-site alternative evaluated for the Beach Point area is the development of an Innovative Alternative (I/A) treatment system Program.

7.1 Innovative On-Lot Treatment Systems

Implementation of an on-lot Innovative Alternative (I/A) treatment system program could potentially eliminate the need to provide sewers in Beach Point. There are multiple types of I/A systems already constructed in the Town of Truro as listed in the following table:

Table 7 I/A Systems in Truro

I/A Type	No. in Truro	MassDEP Approval
MicroFast	16	Remedial Use
FAST	2	General Use
Advantex	22	General Use (AX20)
BioClere	2	General Use
NitROE	2	Provisional use
Septitech	1	General Use
Other	20	

I/A systems can be utilized as an on-site wastewater management strategy, particularly in low-density areas where centralized wastewater treatment through sewer collection is not cost-effective. As of March 2022, the lowest approved total nitrogen effluent concentration for a MassDEP General Use I/A system is 19 mg/L. The Massachusetts Estuaries Project assumes an average effluent total nitrogen concentration from a conventional Title 5 system of 26.25 mg/L.

A summary table of I/A technologies approved for use in Massachusetts can be found at the following link:

https://www.mass.gov/doc/summary-table-of-innovativealternative-technologies-approved-for-use-in-massachusetts/download

Not all I/A systems are designed to reduce appreciable levels of nitrogen. However, several nitrogen-reducing I/A systems are currently in the Provisional Use stage, including the Nitrex system (which has a provisional effluent total nitrogen goal of 10 mg/L) and NitROE system (which has a provisional effluent total nitrogen goal of 11 mg/L). A provisional use system must have at least 50 installations operating for three years prior to applying for a General Use approval. Performance data collected during the 3-year period is evaluated by MassDEP as part of the General Use application.

As there are two “provisional use” technologies that can produce a total nitrogen of 11 mg/L, this alternative assumes Truro would adopt a nitrogen standard of 11 mg/l for either all of Beach Point or for those systems that require improvements. This report evaluates NitROE and Nitrex systems.

NitROE System: This system is installed in series between a Title 5 system septic tank and a soil absorption system constructed to and operating in accordance with state regulations to accommodate design flows of less than 2,000 gpd. The system is comprised of two-unit processes which are sequentially performed in two different chambers. The first chamber is aerated, via an external air pump and airline header/hose arrangement, to achieve both organic carbon reduction along with the biological conversion of ammonia-N to nitrate-N. From the aeration chamber, the wastewater then flows by gravity into a denitrification chamber where, in the presence of natural organics from wood chips, bacteria mediate the conversion of nitrate-N to inert N gas that exits to the atmosphere via the Title 5 system vent piping. Depending on design flow and availability of local tank structures, the sequential aeration and denitrification process steps can be performed in the same single tank, which is NitROE® 2KS WWTS, or each process

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could be performed in its own separate tank with the overall NitROE® WWTS comprised of multiple tank combinations, which is NitROE® 2KM WWTS.

Gravity moves wastewater through the tanks so that the only piece of mechanical equipment is an air pump, which operates from beneath a faux rock.

Scott Horsley recently (11/09/2023) received detailed cost quotes for the installation of a NitROE system in Truro from John Smith of KleanTu/NitROE. Competitive bids for the system ranged from $42,300 to $82,175. This cost is for a full system replacement including septic tank, NitROE treatment system, and soil absorption system/leaching field. The costs of a system upgrade will be considerably less where the existing septic tank and/or soil absorption system can be maintained. If the septic tank and leach field meet Title 5 requirements, and only the NitROE equipment is needed, the estimated cost is $18,000 for the NitROE system installed.

NITREX System: This system uses a patented nitrate-reactive media that converts nitrate to inert nitrogen gas (denitrification). The NITREX reactive media is contained in a buried concrete tank. Raw wastewater is gravitationally fed through the treatment module. For septic tank applications, an oxidative pre-treatment step is required to convert ammonium to nitrate before the NITREX™ filter can perform the reductive denitrification step. This pre-treatment is similar to that for the NitROE system which uses an aeration chamber. The low nitrate effluent from the NITREX filter is then discharged to the leach field or adsorption bed.

For a typical residential septic system installation (3–4-bedroom home) the NITREX filter will cost approximately $4,200 - $5,000 (plus shipping and local installation costs). The pretreatment system materials costs are typically $8,000 - $12,000. With installation usually $4,000 - $6,000, a complete NITREX system cost would be $16,000 - $22,000. Using a cost from the middle of the range of $18,000, the NITREX system cost would be similar to that for the NitROE system. It is assumed that a full system replacement (septic tank, NITREX and leach field) would cost approximately the same as that for the NitROE system which is $42,000.

Reference for cost data: http://lombardoassociates.com/nitrex.php

Per the above discussions, we have assumed that the cost for an on-lot NitROE system is similar to that for a NITREX system which is $18,000 for equipment and installation of the nitrogen removal system and $42,000 for a full on-lot system construction. Because the costs of the two systems are very similar, an allowance of $42,000 for a full system and $18,000 for just the IA system equipment was used for the installation of either system.

Assuming that all 128 parcels have entire replacement including septic tank, NitROE or NITREX system and leach field, with a cost of $42,000 each, the total cost would be $5.4 million. If the septic tank and leach field meet Title 5 requirements, and only the NitROE equipment is needed, the estimated cost is $18,000 per lot for a total cost of $2.3 million.

Determining the scope of work (full system replacement vs. NitROE or NITREX system only) would require a detailed inspection of each property. Accounting for the high density of homes along Shore Road and the number of cesspools in Beach Point, there could be many full system replacements required. A likely outcome is that some parcels will require full replacement of on-lot facilities while others would require installation of the NitROE system only, meaning that the cost will be somewhere between the $2.3 million and $5.4 million discussed above.

Given the nitrogen reduction goal of 0.79 kg-N/day, approximately 81% of the existing systems cesspools or Title 5 systems in the portion of Beach Point within the Provincetown Harbor Watershed would need to convert to a provisional I/A system. This is equivalent to approximately 58% of systems within the Beach Point Study Area. The cost associated with replacing approximately 58% of Beach Point's systems with IA systems is between $1.3 million and $3.1 million (2024 dollars), depending on the individual site improvements required. This estimate needs to be refined by inventorying individual property improvements required, space availability, flow per system and budgetary costs from the I/A system suppliers. For instance, there could be economies of scale by targeting commercial customers as the fixed cost per system would be less than that for a single family residence.

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Because I/A systems have to be regularly maintained to keep them working properly, both state regulations and local boards of health require that each system be inspected periodically. At the very least, an inspection must be done at least once per year; however, MassDEP or the local board of health can require that inspections occur more frequently. When an I/A system is newly installed, the owners are usually required to have the system inspected and sampled much more frequently. Inspection and testing requirements are outlined in the approvals for each type of technology.

System owners must have a maintenance contract with a Certified Wastewater Operator specifically licensed in Massachusetts in place for the life of the system. The manufacturer or distributor of an I/A system should be able to provide customers with names of Certified Operators trained to maintain their systems.

Plans for operation and maintenance, monitoring, and testing must be submitted to the local Board of Health (and in some cases to MassDEP) for approval prior to start-up of the system. Inspection and sampling must be performed in accordance with the technology or system approval issued by the local Board of Health or DEP.

Certified Operators must use the MassDEP-approved Inspection and O&M Form and technology-specific checklist to record inspection results. System owners are responsible for the form being submitted to their local Board of Health and in some cases to MassDEP.

Table 8 Significant Annual Costs (2024 Dollars)

Significant Annual Cost	Cost
Operation and Maintenance contract[1]	$1,200.00
Electricity costs	$350.00
Total Annual Cost to Operate	**$1,550.00**

Notes:

1. Operation and maintenance costs include effluent sampling costs (which are $400)

Source: https://www.chatham-ma.gov/DocumentCenter/View/349/Innovative-Alternative-Onsite-Septic-Systems-for-the-Removal-of-Nitrogen-in-Barnstable-County-PDF?bidId=

7.1.1 Beach Point I/A Program Alternative Analysis

Advantages and potential challenges of implementing an I/A program at Beach Point are summarized in Table 9.

Table 9 Beach Point I/A Program Advantages and Potential Challenges

Advantages	Potential Challenges
An I/A Program would provide a Truro controlled solution which would not require coordination and negotiation with neighboring communities.	I/A systems may be difficult to site on small lots. Based on a site plan prepared by J.M. O'Reilly and Associates dated 2023 and prepared for a NitROE system in Truro, the land requirement for a septic tank, NitROE tank and leaching chamber was 450 ft^2. The space for a NitROE tank only was about 70 ft^2, not including space needed for excavation. The Beach Point Study Area has multiple lots less than 0.25 acres.
An I/A Program could be phased based on triggers outlined in Board of Health regulations revisions, which would spread out the anticipated project costs for the infrastructure.	Title 5 requires a minimum of 4-feet of separation between the top of maximum high groundwater elevation and the bottom of the soil absorption system. Portions of the Beach Point Study Area are anticipated to have depths to water less than 4-feet and would require raised systems.
	The entire Beach Point Study Area is within the FEMA Base Flood (1 percent annual chance or 100 year flood zone). A portion of the Beach Point Study Area is in a VE Zone, which is defined as a Special Flood Hazard Area subject to high velocity wave action. Title 5 does not allow for new septic tanks or absorption systems to be installed in Velocity Zones

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Advantages	Potential Challenges
	(only replacements of existing systems are allowable with restrictions – for example increases in design flows are not allowable). Title 5 requires on-site systems in Velocity Zones to be elevated above the velocity zone, where feasible.
	Vulnerabilities associated with required minimum depths to groundwater and flood zones.Both are anticipated to increase with climate change.

7.2 Cost Estimates for Project Alternatives

The following table shows cost estimates for the alternatives outlined in this report. The operation and maintenance cost estimates include individual lot electrical costs for grinder pumps, vacuum valves and I/A systems, which typically are paid for by private homeowners. As described above, the cost for I/A systems is conceptual and will need to be refined based individual on-lot conditions. The I/A cost estimate assumes treatment for all of Beach Point; however, as discussed above, it may be possible to install I/A systems in only the portion of Beach Point that is tributary to the Provincetown Harbor Watershed, if the primary purpose of the program is nitrogen management in Provincetown Harbor.

The cost estimates do not include sewage rates from Provincetown for monthly or quarterly customer sewage generation or potential costs associated with a Responsible Management Entity (RME) for operation of the I/A program. Cost estimates are presented as total project costs and do not include any anticipated grant or principal forgiveness opportunities available to the different alternatives.

Table 10 Conceptual Project Costs for Collection System Including Provincetown Capital Contribution (2024 Dollars)[7]

Collection System Alternative	Truro Collection System Project Costs[2,3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[8]	Truro Contribution to Provincetown Capacity Costs[8]	Total Project Costs	Total Annual O&M	20 Year Net Present Worth[6]
Centralized Gravity System	$26.1 M	N/A[1]	$11.3 M	$2 M	$39.4 M	$1.1 M	$53.1 M
Centralized Low Pressure System	$8.8 M	$1.5 M	$11.3 M	$2 M	$23.6 M	$0.4 M	$27.4 M
Centralized Vacuum System	$13.5 M	$0.8 M	$11.3 M	$2 M	$27.6 M	$0.5 M	$33.7 M
I/A Program (Full Replacement of Systems	$5.4 M	N/A	N/A	N/A	$5.4 M	$0.6 M	$12.7 M

Notes:

1. Houses that are adjacent to a gravity sewer but are located at a low elevation than the sewer will require a small pump and small diameter force main to connect to the system.
2. Total Project Costs are high level planning costs and include allowances for construction costs including: a 30% construction contingency, 10% engineering design allowance, 2% fiscal/legal/permitting and administrative costs allowance, 15% construction administration and Resident Project Representative (RPR) costs allowance and 8% police detail allowance.
3. Conceptual cost estimates were developed based on a conceptual layout of the system alternatives. No surveys have been conducted as part of this project.
4. Cost estimates do not include the cost of final restoration of private property or the cost of attaining easements.
5. Full width mill and overlay road restoration costs were estimated for road restoration.

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Collection System Alternative	Truro Collection System Project Costs[2,3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[8]	Truro Contribution to Provincetown Capacity Costs[8]	Total Project Costs	Total Annual O&M	20 Year Net Present Worth[6]

6. Net present worth analysis assumes a 5% annual factor for inflation and a 20 year lifespan for equipment.
7. Cost estimates are presented in May 2024 dollars (ENR = 13532.44). Once a project schedule has been established cost estimates should be adjusted to the anticipated midpoint of construction.
8. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

DRAFT

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GHD

Appendix B

Draft Noons Property Evaluation

Technical Memorandum

February 06, 2024

To	Emily Beebe, Town of Truro MA	**Contact No.**	508-364-2799
Copy to	[Enter text]	**Email**	marc.drainville@ghd.com
From	Marc Drainville PE, BCEE, LEED AP Julia Khrakovsky	**Project No.**	12603461
Project Name	Truro CWMP		
Subject	Draft Noons Property Evaluation – rev0		

1. Introduction

The Town of Truro is currently developing a Comprehensive Wastewater Management Plan (CWMP) to quantify wastewater management and nitrogen management needs in Truro and to develop a Recommended Plan to address the identified needs for a 20-year planning period.

The Noons Property (attachment 1), which consists of 2 Sand Pit Road and 9 Noons Drive has been identified as a potential site for a new greenfield wastewater treatment facility. The Property is approximately 55.9 acres, with the 2 Sand Pit Road parcel contributing 38.7 acres, and the 9 Noons Drive parcel contributing 17.2 acres. The purpose of this memorandum is to analyze and screen the Noons Property as a potential wastewater treatment facility and effluent discharge site.

2. Site Analysis

2.1 Property Size and Location

The initial factors that drew attention to this site are the large property size and proximity to the areas to be sewered. As mentioned above, the property is approximately 55.9 acres. This property has enough space for treatment and recharge while also supporting secondary uses, such as residential or commercial developments. The centrality of the site makes it conducive to receive flows from the southern portion of Truro in the Pamet River Watershed to achieve 25% nitrogen reduction in the watershed (using the Cape Cod Commission 25% nitrogen removal recommended prior to development of a target maximum nitrogen load for the watershed).

2.2 Sensitive Receptors

The initial screening of this site included a sensitive receptors analysis. Table 1 below shows the sensitive receptors analyzed and their presence on the site.

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Table 1 Sensitive Receptors Analysis Summary

Sensitive Receptor	Presence on Noons Property
Zone II Well Head Protection Area	Partial presence
Underground Storage Tanks	Not present
Areas of Critical Environmental Concern	Not present
NHESP Habitats	Not present
Open Space	Not present
DEP Wetlands	Not present
FEMA Flood Hazards	Not present
Mass Historic Commission Inventory (Points and Areas)	Not present

As identified in the table above, the only sensitive receptor identified on the Noons Property is a Zone II Wellhead Protection Area. The Zone II area covers approximately 420,000 SF on the western side of the 2 Sand Pit Road parcel. Discharging in a Zone II may trigger a lengthy permitting process. To mitigate this impact, any proposed effluent discharge would be sited on a portion of the site that is not in the Zone II area.

The site is adjacent to a parcel that contains a pond. The adjacent parcel is classified as a 0.2% annual chance flood hazard and DEP wetland. The conditions of this parcel will be considered when siting effluent recharge facilities.

2.3 Subsurface Conditions

In May 2023, a Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation report was developed by The Horsley Witten Group to assess the subsurface conditions of the proposed site. The Horsley Group investigations considered the “subject property” to include 9 Noons Drive and a 27-acre portion of 2 Sand Pit Road. The portion of 2 Sand Pit Road that was not included is the area identified as a Zone II.

Approximately 80 percent of the Property is cleared and utilized as a sandpit, with the remaining 20 percent currently undeveloped and wooded. Minimal additional clearing is anticipated for future wastewater infrastructure developments.

The topography of the site slopes towards the west northwest with elevations significantly varying from 10 ft to 110 ft above mean sea level. Underlying soils are classified as Carver, Freetown, and Pits. The soil descriptions are included in Table 2.

Table 2 Soils Description

Soil Name	Classification	Infiltration Rate
Carver	Coarse sands	High
Freetown	Much	Very slow
Pits	Modified area, soil type not provided	Not provided

The depth to groundwater at the Noons Property is another benefit of this site. Three groundwater monitoring wells were drilled to determine the depth to groundwater. Due to the varying topography, the depth to groundwater ranges from 28 ft to 72 ft. Groundwater flows towards the southwest and mean groundwater level is 4.36 ft. The three monitoring well boring logs indicated primarily fine to coarse sands.

As reported in the Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation, nine soil samples and four groundwater samples were tested for the following: per and polyfluoroalkyl substances (PFAS), volatile organic compounds (VOCs), semi-volatile organic compounds, Massachusetts Contingency

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Plan (MCP) 14 metals, extractable petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs). With the exception of PFAS detected in groundwater, no other analytes were detected above the applicable MCP Reportable Concentrations. PFAS impacts are related to an unknown source that is located upgradient of the site. The Noons Property may be eligible for Downgradient Property Status Pursuant to 310 CMR 40.0180, which recognizes that individuals whose property has been affected by contamination from an upgradient or upstream source may not be able to meet the requirements of the MCP because they do not control the source of contamination. The DEP suspends deadlines for Tier Classification and Comprehensive Response Actions as well as annual compliance fees for properties with Downgradient Property Status.

11 test pits were excavated to a maximum depth of ten feet below grade. Soil samples were submitted to a Massachusetts certified laboratory for PFAS, VOCs, SVOCs, MCP 14 metals, VOCs, Extractable Petroleum Hydrocarbons (EPH), PAHs, and PCBs. Select MCP 14 metals were detected in all nine soil samples, EPH was detected in two soil samples, and PAHs were detected in three soil samples above the laboratory reporting limit for the RCS-1 category (which includes soil samples obtained within 500 feet of a residential dwelling unit).

Based on the analytical results described above, a reportable release of oil and/or hazardous materials (OHM) has occurred at the property and is consistent with the notification requirements of 310 CMR 40.0315 (Releases which Require Notification within 120 days).

3. Future Evaluations

Prior to being able to assess the viability of the site for wastewater uses, additional evaluations will need to be conducted to ensure the site conditions are conducive to wastewater treatment and effluent recharge. A groundwater model will need to be developed to assess potential for effluent recharge. Because groundwater mounding could be a permitting challenge, simulations will be run to predict maximum mounds given Truro's conditions. The groundwater model will also be used to characterize anticipated treated effluent migration to groundwater to surface water bodies. Additionally, a phosphorus attenuation evaluation should be conducted to assess potential phosphorus impacts to down-gradient freshwater bodies, including Great Swamp.

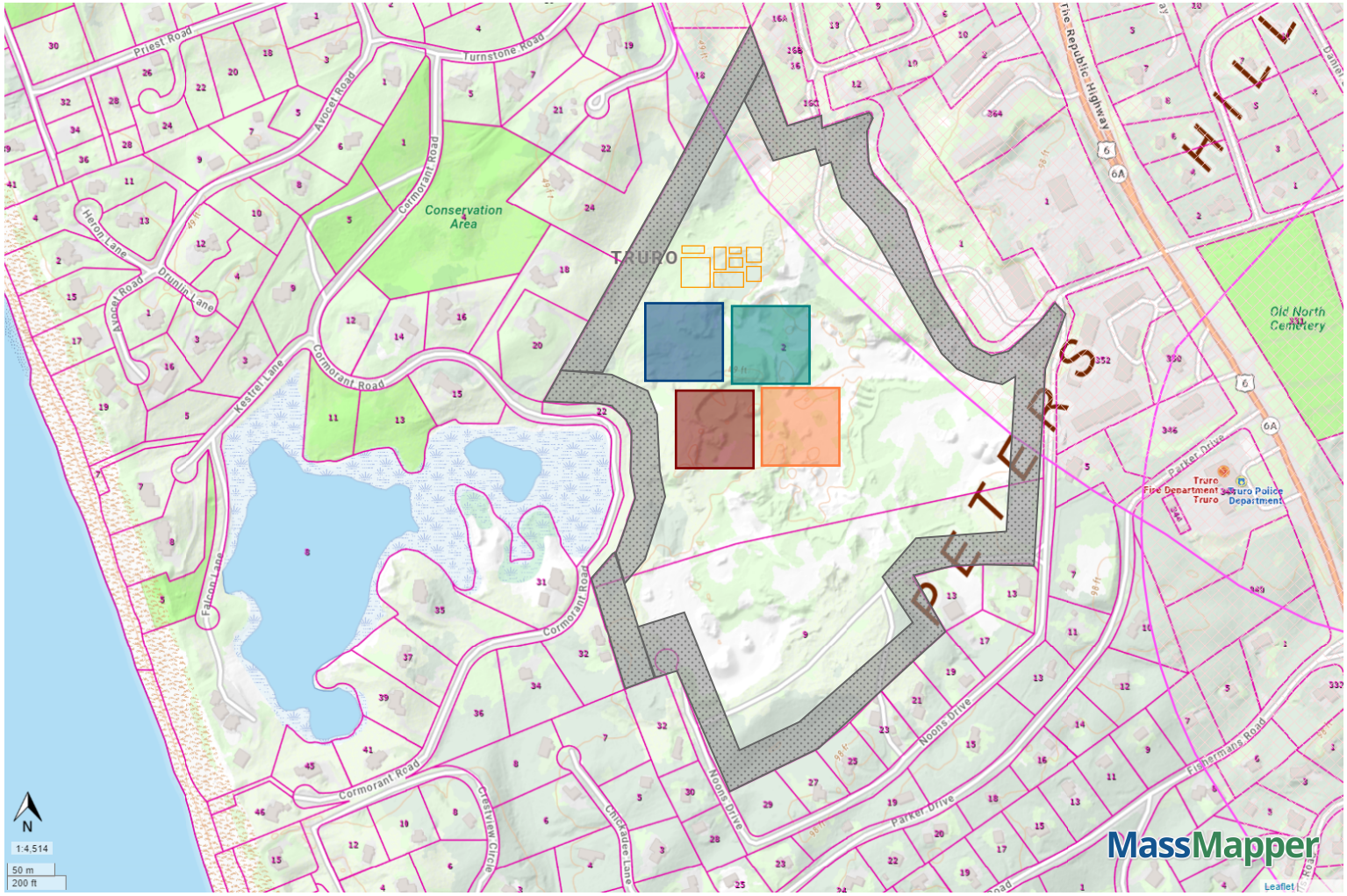
Additional consideration should be given to grading and site access. Due to the sites highly varying topography, a significant amount of grading may be required. The site may be accessed on the 2 Sand Pit Rd parcel via Sand Pit Rd, or on the 9 Noons Dr parcel via Noons Dr.

Due to the presence of OHM on the site and PFAS in groundwater, additional evaluations may need to be performed to understand the impacts and permitting processes. The MassDEP shall be notified of the release or threat of release of OHM in accordance with 310 CMR 40.0300, Notification of Releases and Threats of Release of Oil and Hazardous Material; Identification and Listing of Oil and Hazardous Material

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Attachment 1

Initial Conceptual Layout



Zone IIs

Property Tax Parcels

Scale:

0.354 in = 200 ft

Capacity for sewer area A1

Capacity for sewer areas A1 & A2

Capacity for sewer areas A1, A2, & A3

Capacity for sewer areas A1, A2, A3, A4, & A5

Attachment 2

Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A, Unit 1 • Sandwich, MA • 02563
Phone - 508-833-6600 • Fax - 508-833-3150 • *www.horsleywitten.com*

ASTM Phase I Environmental Site Assessment and Phase II Limited Subsurface Investigation

Sand Pit and Undeveloped Property

2 Sand Pit Road and 9 Noons Drive

Truro, Massachusetts

May 2023



Prepared by:
Horsley Witten Group, Inc.

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PHASE I ENVIRONMENTAL SITE ASSESSMENT AND
PHASE II LIMITED SUBSURFACE INVESTIGATION
Sand Pit and Undeveloped Property
2 Sand Pit Road and 9 Noons Drive
Truro, Massachusetts

EXECUTIVE SUMMARY

The Horsley Witten Group ("HW") has completed this Phase I Environmental Site Assessment ("Phase I") and Phase II Limited Subsurface Investigation (Phase II LSI) documenting the observed conditions of the sand pit/undeveloped property located on a portion of 2 Sand Pit Road and 9 Noons Drive in Truro, Massachusetts (the "Subject Property").

The Subject Property consists of the following areas:

- An approximate 27-acre portion of the 38.73-acre parcel located at 2 Sand Pit Road and identified by the Truro Assessor as parcel 39-107; and
- The 17.2-acre parcel located at 9 Noons Drive and identified by the Truro Assessor as parcel 39-108.

Refer to Figures 1 and 2 for regional location and general layout of the Subject Property, respectively.

The Subject Property is located within a mixed commercial and residential area of Truro. Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded. Several piles (Photo log, Appendix A) of asphalt millings, sand, mulch (made from local landscaped debris brought to the Subject Property), shells, and aggregate are stored throughout the cleared areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the soil piles. No visual or olfactory indication of a significant release of oil and/or hazardous materials (OHM) was observed on the ground surface in the vicinity of the piles.

As indicated on Figure 3, four areas at the Subject Property are rented to local fisherman for the storage (photo log, Appendix A) of lobster traps, boats and other fishing related gear (i.e., rope and nets typically stored in plastic 55-gallon drums). According to Ms. Linda Noons-Rose (Owner of the Subject Property), boat maintenance is not permitted in the rented areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the

rented areas. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the rented areas.

A pile of utility poles (Photo log, Appendix A, and Figure 3) was observed on the ground surface. Utility poles are typically treated with various coatings such as creosote, pentachlorophenol, and various metals to preserve the wood. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the utility poles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the utility poles.

Several pieces of equipment including excavators, loaders, dump trucks and spare part vehicles were observed in the northern portion of the Subject Property (photo logs, Appendix A). No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the equipment or spare part vehicles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the equipment or spare part vehicles.

A horse obstacle area is located in the northwestern portion of the Subject Property (Figure 3). The obstacles include several empty plastic 55-gallon barrels that the horses jump over. The horses live in a stable located to the northeast and off the Subject Property. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the barrels. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the barrels.

The Subject Property is abutted to the north by residences and commercial properties including a store and motel. The Subject Property is abutted to the south by residences with Noons Drive beyond. The Subject Property is abutted to the east by residences and commercial properties including Pleasant View Autobody and John F. Noons trucking with Route 6 and Noons Drive beyond. The Subject Property is abutted to the west by residences and Great Swamp with Cormorant Road beyond.

There are no buildings at the Subject Property and vehicle maintenance and fueling are completed at the property to the east (not on the Subject Property). No OHM was observed at the Subject Property. Utilities at the Subject Property include a private water well (approximately 80 feet deep, Photo Log, Appendix A and Figure 3) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds. The well was reported by the Subject Property owner as no longer in use.

No records relating to the storage, usage or releases of OHM at the Subject Property were reported to HW or on file at the Town of Truro Board of Health, Fire Department, Building Department, Conservation Commission, Planning Department or Town Clerk.

As indicated on the document titled *Settlement of Land Use Agreement*, dated August 27, 2013, Appendix B, The Subject Property has been used as sand pit since the 1950's for the excavation of sand/soil. Abutters have alleged that target shooting has historically occurred at the Subject Property. According to the Owner, "target shooting was occasionally conducted into sand piles that have long since been removed from the Subject Property". Target practice ceased at the Subject Property prior to August 27, 2013.

In February 2023, HW completed a Phase II Limited Subsurface Investigation (LSI) to determine if a release of OHM had occurred at the Subject Property. The Phase II LSI included the collection of nine soil samples and four groundwater samples for laboratory analysis. The laboratory analysis included per and polyfluoroalkyl substances (PFAS), volatile organic compounds (VOCs), semi-volatile organic compounds, Massachusetts Contingency Plan (MCP) 14 metals, extractable petroleum hydrocarbons, polynuclear aromatic hydrocarbons (PAHs), and/or polychlorinated biphenyls (PCBs).

As indicated on Tables 1 and 2, with the exception of PFAS detected in groundwater, no other analytes were detected above the applicable MCP Reportable Concentrations for category S-1 soils or GW-1 groundwater. Refer to Figure 3 for sampling locations. Additional details regarding the Phase II LSI are set forth in Section 7.

Several releases of OHM have occurred at sites located within a 1.0-mile radius of the Subject Property. Based on the regulatory status, distance from the Subject Property, and/or groundwater flow direction, these release sites appear unlikely to significantly impact the Subject Property.

Based on HW's review and interpretation of reasonably ascertainable information and observations made during the Subject Property reconnaissance, HW offers the following regarding Recognized Environmental Conditions ("RECs"), Historical Recognized Environmental Conditions ("HRECs") Controlled Recognized Environmental Conditions ("CRECs"), and Business Environmental Risks ("BERs"):

- The following RECs as defined in Section 1.1 were identified at the Subject Property:
    - The Phase II LSI concluded that groundwater at the Subject Property is impacted with PFAS above the applicable Reportable Concentration for category GW-1 groundwater. PFAS was not detected in any of the soil samples collected at the Subject Property above the laboratory Reporting Limit or the applicable Reportable Concentration for category S-1 soils. Considering that the analytical data and groundwater flow direction support the conclusion that the PFAS impacts are related to an unknown

source located hydraulically upgradient of the Subject Property, the Subject Property appears to be eligible for Downgradient Property Status Pursuant to 310 CMR 40.0180.

It should be noted that drinking water is not provided to the Subject Property. Consideration should be made for connection to the municipal drinking water supply in the future to limit groundwater pre-treatment and laboratory testing requirements should groundwater at the Subject Property be utilized.

- No Historical Recognized Environmental Conditions ("HRECs") as defined in Section 1.1 were identified at the Subject Property;
- No Controlled Recognized Environmental Conditions ("CRECs") as defined in Section 1.1 were identified at the Subject Property; and
- No Business Environmental Risks ("BERs") as defined in section 1.1 were identified at the Subject Property.

1.0 INTRODUCTION

HW has completed this Phase I in conformance with the scope and limitations of the ASTM International Publication E1527−21 on behalf of the Town of Truro (the "Client"). This report documents the results of a Phase I and Phase II LSI of the sand pit/undeveloped property located on a portion of 2 Sand Pit Road and 9 Noons Drive in Truro, Massachusetts.

The Phase I was performed in accordance with the guidelines set forth in the ASTM International Publication E1527−21, and the elements of "All Appropriate Inquiries" ("AAI") within Code of Federal Regulations 40 C.F.R. Part 312, established by the Small Business Liability Relief and Brownfields Revitalization Act of 2002 ("Brownfields Amendments") and Comprehensive Environmental Response, Conservation, and Liability Act of 1980 ("CERCLA"). The United States Environmental Protection Agency ("EPA") has determined that ASTM International E1527−21is consistent with the requirements of and may be used to comply with the provisions of AAI.

HW's evaluation of the Subject Property was performed using standard protocols and technical judgment within the scope of services of this assignment. Conclusions and/or opinions are based on the conditions observed at the time of the Subject Property visit. Past conditions that could not be observed were established based on reasonably available and attainable documents and accounts from personnel contacted.

1.1 Purpose and Scope of Work

The objective of the Phase I was to identify RECs associated with current and historic use of the Subject Property, the physical conditions of adjacent grounds, and present operational practices. ASTM E1527−21defines RECs as: "(1) the presence of hazardous substances or petroleum products in, on, or at the subject property due to a release to the environment; (2) the likely presence of hazardous substances or petroleum products in, on, or at the subject property due to a release or likely release to the environment; or (3) the presence of hazardous substances or petroleum products in, on, or at the subject property under conditions that pose a material threat of a future release to the environment. A de minimis condition is not a recognized environmental condition.". Opinions regarding RECs at the Subject Property are based upon the work described herein.

If applicable, the Phase I will also identify HRECs, CRECs, and BERs. ASTM Publication E1527−21defines these as follows:

- HRECs: "a previous release of hazardous substances or petroleum products affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities and meeting unrestricted use criteria established by the applicable regulatory authority or authorities without subjecting the subject property to any controls (for example, activity and use limitations or other property use limitations)."

- CRECs: "recognized environmental condition affecting the subject property that has been addressed to the satisfaction of the applicable regulatory authority or authorities with hazardous substances or petroleum products allowed to remain in place subject to implementation of required controls (for example, activity and use limitations or other property use limitations)."

- BERs: "a risk which can have a material environmental or environmentally-driven impact on the business associated with the current or planned use of commercial real estate, not necessarily related to those environmental issues required to be investigated in this practice."

1.2 Detailed Scope of Services

The following Phase I Scope of Work was completed during this assessment:

- Reconnaissance to observe and document present conditions at the Subject Property and on the portions of abutting properties visible from the Subject Property and/or right-of-way for indications of RECs;
- Reconnaissance of the general vicinity of the Subject Property from the right-of-

way, within approximately a 500-foot radius of the Subject Property, for indications of RECs (i.e., potential off-site contaminant source areas);

- Interviews with the designated Subject Property contact and local regulatory agencies to document current and former operations and uses of the Subject Property. Subject Property personnel interviewed as part of the assessment included:
    - Ms. Linda Noons-Rose, Subject Property Owner
- Review of available environmental reports and other relevant documents regarding previously conducted assessments and/or investigations of the Subject Property (if available);
- Review of relevant federal, state, and local regulatory files, records, and databases to identify RECs, HRECs, CRECs, and BERs at the Subject Property;
- Contact with local regulatory agencies to request information regarding the environmental and regulatory history of the Subject Property;
- General review of environmental conditions including geology, hydrology, topography, wetlands, flood plains; and
- Preparation of this report to summarize the findings of the Phase I.

1.3 Significant Assumptions

While this Phase I provides an overview of potential environmental concerns, both past and present, it is limited by the availability of information at the time of the assessment. It is possible that unreported disposal of waste or illegal activities impairing the environmental status of the Subject Property may have occurred which could not be identified. The conclusions regarding environmental conditions that are presented in this Phase I are based on a scope of work authorized by the Client.

1.4 Limitations and Exceptions

The Phase I has been prepared in accordance with generally accepted environmental methodologies referred to in ASTM E1527−21 and contains all the limitations inherent in these methodologies. No other warranties, expressed or implied, are made as to the professional services provided under the terms of our contract and included in this report. The conclusions of this Phase I are based in part, on information provided by others. The possibility remains that unexpected environmental conditions may be encountered at the Subject Property in locations not specifically investigated. Should such an event occur, HW must be notified to determine if modifications to our conclusions are necessary.

The substance, content, and findings of documents and/or other deliverables made to the Client including but not limited to reports, data, memorandums, and facsimiles, are for the sole use of the Client. No reliance on the data or findings contained in these deliverables may be extended to any third party without the express written consent of HW. Any unauthorized use or distribution of HW's work shall be at the Client and recipient's sole risk and without liability to HW.

This Phase I and Phase II LSI describe conditions observed at the Subject Property at the time of the Subject Property reconnaissance only. HW makes no conclusions regarding areas of the Subject Property that were inaccessible or obstructed from view during the reconnaissance.

The information presented in this report is based on HW's observations in the field at the time of the Subject Property reconnaissance, a review of reasonably ascertainable documents and data, interviews with certain designated personnel, and a review of available agency files as referenced herein. HW does not warrant or guarantee the accuracy, completeness, and/or current status of the information contained in the environmental record sources for this Phase I. Such information is the product of independent investigation by parties other than HW and/or information maintained by government agencies. Therefore, no representation concerning agency records, other than those described herein, is expressed or implied.

The scope of this Phase I and Phase II LSI did not include determining the current compliance status of the Subject Property regarding all environmental regulations and/or permitting requirements. Any comments in the report regarding compliance with environmental regulations are provided for the Client and should not be considered as a thorough review of all environmental regulatory requirements.

This Phase I was a limited and non-exclusive assessment that was intended to evaluate whether reasonably ascertainable information reveals the evidence of RECs, HRECs, CRECs, and BERs as defined by ASTM E1527−21.

HW did not assess for the non-scope considerations identified in Section X6 of ASTM E1527-21 unless otherwise noted including but not limited to testing or analysis to determine the presence of asbestos containing materials ("ACM"), radon, mold, lead-based paint, lead in drinking water, or PCBs in building materials at the Subject Property. Any comments in the report regarding these substances or materials are limited to the obvious presence of certain miscellaneous materials that are readily accessible and apparent, are provided for the Client's information only, and cannot be used to determine the actual presence of the contaminants and/or compliance with applicable regulations. Further, studies of indoor air quality, regulatory compliance, occupational health and safety, and wetlands, which require specialized expertise, were not requested and were

not included as part of this study. As a result, without a comprehensive sampling and analysis program or implementation of services beyond the original scope of work, certain potential conditions may not be revealed.

Any qualitative or quantitative information regarding the Subject Property that was not available to HW at the time of this Phase I may result in a modification of the representations made in this report.

HW interviewed the Client about the Subject Property including the six questions included on the User Questionnaire identified in Section X3 of ASTM E1527-21. The six questions include the presence of Environmental liens, Activity and Use Limitations, specialized knowledge or experience, relationship of the purchase price to the fair market value, commonly known or reasonably ascertainable information, the degree of obviousness of the presence or likely presence of contamination and the ability to detect contamination by appropriate investigation at the Subject Property. Information about the Subject Property obtained from the Client has been incorporated into this report. A copy of the User Questionnaire is included in Appendix C.

The following limitations and exceptions to ASTM E1527−21 associated with the Phase I are set forth below:

- HW did not obtain any historical information prior to 1889 for the Subject Property;
- HW did not interview historic occupants or owners of the Subject Property. The Subject Property was utilized as a sand pit at the time of reconnaissance;
- HW did not evaluate the purchase price of the Subject Property in relation to the fair market value;
- Observations of select areas of the Subject Property were limited due to the presence of dense vegetation and material piles (i.e., soil, mulch, asphalt millings and/or aggregate;
- Current title records were obtained on-line from the Barnstable County Registry of Deeds; and
- Activity and Use Limitations (AUL) were searched for on-line using the Massachusetts Department of Environmental Protection ("MassDEP") Activity and Use Limitation searchable sites database. Additionally, the Client was unaware of any AULs implemented at the Subject Property.

None of the limitations and exceptions documented above are considered a significant data gap. Information provided by others is assumed to be accurate and complete.

1.5 Special Terms and Conditions

No special terms or conditions were included in the Phase I or Phase II LSI.

1.6 User Reliance

This report may be distributed and relied upon by the Client, its successors, and assignees. Reliance on the information and conclusions in this report by any other person or entity is not authorized without the written consent of HW.

2.0 SUBJECT PROPERTY DESCRIPTION

2.1 LOCATION AND LEGAL DESCRIPTION

The Subject Property is identified by the Town of Truro Assessor's Office as follows:

Address	Town of Provincetown Assessor's ID	Land Area (Acres)
2 Sand Pit Road	39-107-0	38.73*
9 Noons Drive	39-108-0	17.2

* It should be noted that only a 27-acre portion of this parcel is included in the Subject Property as indicated on Figure 2.

Refer to Figures 1 and 2 for regional location and general layout of the Subject Property, respectively.

2.2 SUBJECT PROPERTY AND VICINITY GENERAL CHARACTERISTICS

The Subject Property is located within a mixed commercial and residential area of Truro. Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded.

The Subject Property is abutted to the north by residences and commercial properties including a store and motel. The Subject Property is abutted to the south by residences with Noons Drive beyond. The Subject Property is abutted to the east by residences and commercial properties including Pleasant View Autobody and John F. Noons trucking with Route 6 and Noons Drive beyond. The Subject Property is abutted to the west by residences and Great Swamp with Cormorant Road beyond.

2.2.1 TOPOGRAPHY

According to the EDR Radius Map™ Report (the "EDR Report"), published by Environmental Data Resources Inc. ("EDR"), the topography of the Subject Property slopes towards the west northwest with an elevation of 46 feet above mean sea level. A topographical map is included as Figure 1.

2.2.2 SOILS/GEOLOGY

According to the Commonwealth of Massachusetts Bureau of Geographical Information ("MassGIS"), soils underlying the Subject Property are classified as Carver, Freetown and Pits (Figure 4). According to the EDR Report, Carver soils are classified as coarse sands with high infiltration rates and Freetown is muck with very slow infiltration rates. Pits are areas which have been modified and soil type and infiltration rates are not given.

2.2.3 Hydrology and Constraints

According to the MassGIS Existing Constraints data layer, the Subject Property is located within an EPA Sole Source Aquifer and a medium yield aquifer. A portion of the property is located within a MassDEP Wellhead Zone II Area (Figure 5). As indicated in Section 7.0, depth to groundwater varies from approximately 36 to 82 feet below grade and flows in a southwesterly direction as indicated on Figure 3.

2.2.4 Wetlands

According to the MassGIS Existing Constraints Data layer, wetlands are located within 500 feet west of the Subject Property (Figure 5).

2.2.5 Areas of Critical Environmental Concern

According to the MassGIS Areas of Critical Environmental Concern ("ACEC") data layer, there are no ACECs within 500 feet of the Subject Property. ACECs are places in Massachusetts that receive special recognition because of the quality, uniqueness, and significance of their natural and cultural resources (Figure 5). These areas are identified and nominated at the community level and are reviewed and designated by the Massachusetts Secretary of Energy and Environmental Affairs.

2.2.6 Surface Water Bodies

The nearest surface water body is Great Swamp which is located approximately 300 feet west of the Subject Property (Figure 1).

2.2.7 Flood Plains

According to the Mass GIS Flood Zone Map (Figure 5), the Subject Property is located within an area designated as Zone X (area of minimal flood hazard) and an area of 0.2% Annual Chance of Flooding immediately west of the Subject Property.

2.2.8 Potential for Radon Gas

According to the U.S. Environmental Protection Agency's ("EPA") Map of Radon Zones for Massachusetts (https://www.epa.gov/sites/production/files/2014-08/documents/massachusetts.pdf), Barnstable County is considered to have a moderate potential for the presence of indoor radon gas, with the most common concentration range being 2 Pico Curies per liter (pCi/L) to 4 pCi/L).

2.3 Current Use of the Property

The Subject Property is currently a sand pit and commercial property utilized by the trucking/site development contractor, John F. Noons.

2.4 Descriptions of Structures, Roads, Other Improvements on the Subject Property

Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded. Several piles (Photo log, Appendix A) of asphalt millings, sand, mulch (made from local landscaped debris brought to the Subject Property), shells, and aggregate are stored throughout the cleared areas.

There are no buildings at the Subject Property and vehicle maintenance and fueling are completed at the property to the east (not on the Subject Property). No OHM was observed at the Subject Property. Utilities at the Subject Property include a private water well (approximately 80 feet deep, Photo Log, Appendix A) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds. The well was reported by the Subject Property Owner as no longer in use.

2.5 Current Use of Adjoining Properties

The Subject Property is abutted to the north by residences and commercial properties including a store and motel. The Subject Property is abutted to the south by residences with Noons Drive beyond. The Subject Property is abutted to the east by residences and commercial properties including Pleasant View Autobody and John F. Noons trucking with Route 6 and Noons Drive beyond. The Subject Property is abutted to the west by residences and Great Swamp with Cormorant Road beyond.

3.0 USER PROVIDED INFORMATION

3.1 Land Title Records

Chains of title were established based on information from the property field card obtained from the Town of Truro Assessor's Department and on-line records available from the Barnstable County Registry of Deeds. Ownership for the Subject Property is as follows:

- The Estate of Donald Noons, Book 279 Page 34, dated February 8, 2007 (2 Sand Pit Road).

- The Estate of Donald Noons, Book 10833 Page 307, dated February 8, 2007 (9 Noons Drive).

Copies of the Town of Truro Assessor's Office property field card and deed references are included in Appendix B.

3.2 Environmental Liens or Activity and Use Limitations

Pursuant to the guidelines set forth in the ASTM International Publication E1527 – 21, it is the user's responsibility to search for environmental liens and AULs. Neither the study nor the user identified any environmental liens or Activity and Use Limitations associated with the Subject Property.

3.3 Specialized Knowledge

No other specialized knowledge of RECs or other potential environmental concerns were reported by the Client.

3.4 Commonly Known or Reasonably Ascertainable Information

Information provided in the Phase I is based on interviews with Subject Property contacts and research of local, state, and federal databases. Commonly known or reasonably ascertainable information was utilized in conducting background research for the Subject Property but was not relied upon to support the findings, opinions, or conclusions of the Study.

3.5 Valuation Reduction for Environmental Issues

No property valuation reduction relating to environmental concerns was identified or reported by the Client to HW.

3.6 Owner, Property Manager and Occupant Information

According to the Town of Truro Assessor's Office, the Estate of Donald W Noons is the current owners of the Subject Property. At the time of reconnaissance, approximately 80 percent of the Subject Property was cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded. HW was escorted by the current Owner, Ms. Linda Noons-Rose, who manages the sand pit operations conducted at the Subject Property.

3.7 Reason for Performing the Study

The Phase I and Phase II LSI was performed for due diligence purposes by the Client in anticipation of purchasing the Subject Property.

4.0 Records Review

To evaluate environmental conditions at and abutting the Subject Property, federal, state, and local information resources were reviewed. Initial screening of regulatory records was conducted by obtaining an EDR Report. A copy of the EDR Report dated January 19, 2023 is included as Appendix C.

HW staff also performed a review of available files and/or contacted personnel at the Town of Truro Assessor's Office, Town Clerk, Fire Department, Conservation Commission, Planning Department, Board of Health, and Building Department regarding underground storage tanks (USTs), above ground storage tanks (ASTs) and the storage, usage and/or release(s) of OHM at the Subject Property.

4.1 STANDARD ENVIRONMENTAL RECORD SOURCES

NPL (Superfund)

The National Priorities List ("NPL") is a listing of confirmed disposal sites identified by the EPA that are a priority for cleanup under the Superfund Program. The NPL is a subset of Comprehensive Environmental Response Compensation and Liability Information System ("CERCLIS") maintained by the EPA. No NPL sites were identified within a 1.0-mile radius of the Subject Property.

Delisted NPL

Delisted NPL sites are no longer active under the Superfund Program. An archived status indicates that EPA has determined that no further steps are required at a site to protect human health or the environment. The area within a 0.5-mile radius of the Subject Property was searched for Delisted NPL sites. Based on a review of the listings obtained from the EDR Report, there are no Delisted NPL sites located within the 0.5-mile search radius.

CERCLA-SEMS

CERCLA-Superfund Enterprise Management System ("SEMS") tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program. The area within a 0.5-mile radius of the Subject Property was searched for CERCLA-SEMS sites. Based on a review of the listings obtained from the EDR Report, there were no CERCLA-SEMS sites located within a 0.5-mile radius of the Subject Property.

SEMS-ARCHIVE

SEMS-Archive tracks sites that are no longer active under the Superfund Program. An archived status indicates that to the best of EPA's knowledge, site assessment has been completed and EPA has determined no further steps will be taken to list the site on the NPL. The area within a 0.5-mile radius of the Subject Property was searched for SEMS-Archive sites. Based on a review of the listings obtained from the EDR Report, there is one SEMS-Archive site located within the 0.5-mile search radius. The identified SEMS-

Archive site is Watts Service CTR/S Hollow Wellfield located at 372 Route 6, approximately 1,424 feet north, northeast of the Subject Property. The site is listed as no further remedial action planed and does not qualify for the NPL based on exiting information; however, it is associated with a release (RTN 4-170) as a result of a leaking underground storage tank (LUST) and is discussed in additional detail below. This site does not qualify for the National Priority List (NPL) based on existing information.

RCRA Corrective Action (CA) Sites with Known Contamination

Based on a review of the EDR Report, there are no Resource Conservation and Recovery Act ("RCRA") CA site listed within 1.0-mile of the Subject Property.

Federal RCRA Generators

Resource Conservation and Recovery Act ("RCRA") - Large Quantity Generators (LQGs)

Based on a review of the EDR Report, there are no RCRA-LQG site located within 0.25-miles of the Subject Property.

RCRA-Small Quantity Generators (SQGs)

Based on a review of the EDR Report, there are no RCRA-SQG site located within 0.25-miles of the Subject Property.

RCRA-Very Small Quantity Generators (VSQGs)

Based on a review of the EDR Report, there is one RCRA-VSQG site located within 0.25-miles of the Subject Property. The identified RCRA-VSQG site is Tow Boat US Provincetown/Chatham/Bass River located at 352 Route 6, approximately 596 feet east of the Subject Property. According to the EDR Report, the site has not received any violation notices.

RCRA Treatment, Storage, and Disposal (TSD) Sites for Hazardous Materials

Based on a review of the EDR Report, there are no RCRA TSD sites listed within 0.5-miles of the Subject Property.

State Landfills and Solid Waste Disposal Facilities (SWL)

Based on a review of the EDR Report, there are no active SWL sites listed within 0.5-miles of the Subject Property.

State List of Leaking Aboveground Storage Tanks (LAST)

Based on a review of the EDR Report, there is one LAST site listed within 0.5-miles of the Subject Property. The identified LAST site is identified as North Truro Post Office. Details regarding the release site are set forth below.

North Truro Post Office **2,363 feet north**
34 Shore Road **RTN: 4-11029**

According to the report titled *Response Action Outcome Statement* dated July 1995 and Immediate Response Action (IRA) Completion Statement dated August 1995, both prepared by EMCON, a release of approximately 190 gallons of No 2. fuel oil occurred from an above-ground storage tank (AST) at the site. Response actions included removing the AST, excavation of 160-cubic yards of contaminated soil, extraction of 3,700-gallons of petroleum impacted groundwater and the collection of soil and groundwater samples for laboratory analysis. Groundwater at the site was determined to flow in a northwesterly direction. The reports concluded that levels of OHM at the site have been remediated to background and that a condition of No Significant Risk of harm to health, safety, public welfare and the environment has been achieved. Considering the regulatory status, distance, and the groundwater flow direction, the release associated with RTN 4-11029 is unlikely to significantly impact the Subject Property.

State List of Leaking Underground Storage Tanks (LUST)

Based on a review of the EDR Report, there is one LUST site listed within a 0.5-mile radius of the Subject Property. The identified LUST site is Watts Service Ctr/R Hollow Wellfield. Details regarding the release site are set forth below.

Watts Service Ctr/S Hollow Wellfield **1,424 feet north northeast**
372 Route 6 **RTN: 4-170**

According to the letter report titled *Field Investigation Services Report* dated December 1996 and prepared by ABB Environmental Services, Inc., an "old leaking gasoline tank" was removed from the site in 1978 and at the request of the MassDEP, the former tank location was assessed to determine if a release of OHM has occurred. Response actions included the collection of soil and groundwater samples for laboratory analysis. Groundwater was determined to flow in a northeasterly direction. The MassDEP subsequently issued a response action outcome indicating that a permanent solution has been achieved at the site and a level of No Significant Risk exists. Considering the regulatory status and the groundwater flow direction, the release associated with RTN 4-170 is unlikely to significantly impact the Subject Property.

State Registered Underground Storage Tank (UST)

Based on a review of the EDR Report, there are no State Registered USTs at the Subject Property or within 0.25-miles of the Subject Property.

State Registered Above Ground Storage Tank (AST)

Based on a review of the EDR Report, there are no State Registered ASTs at the Subject Property or listed within 0.25-miles of the Subject Property.

Emergency Response Notification System Files

The Emergency Response Notification System ("ERNS") database includes incidents reported to the National Response Center for the Subject Property only. These incidents include chemical spills, accidents involving chemicals (such as fires or explosions), oil spills, transportation accidents that involve oil or chemicals, releases of radioactive materials, sightings of oil sheens on bodies of water, terrorist incidents involving chemicals, incidents where illegally dumped chemicals have been found, and drills intended to prepare responders to handle these kinds of incidents. The National Response Center is operated by the U.S. Coast Guard and has become the central point of contact used for the reporting of many different kinds of incidents involving hazardous materials. The Subject Property is not identified as an ERNS site.

State and Tribal Brownfields

The Brownfields Act of 1998 established significant liability relief and financial incentives to spur the redevelopment of Brownfields, while ensuring that MassDEP standards are met. According to the EDR Report, there are no State and Tribal Brownfields sites listed within 0.5-miles of the Subject Property.

State Institutional Control/Engineering Control Registries Sites (INST/ECR)

According to the EDR Report, there is one INST/ECR site listed within 0.5-miles of the Subject Property. The site is identified as South Highland Road Landfill. Details regarding the release site is set forth below.

South Highland Road Landfill **2,548 feet east, northeast**
Highland Rd **RTN: 4-897**

According to the report titled *Phase IV As-Built and Final Inspection Report* dated April 2005 and prepared by East Cape Engineering, Inc., this release site was previously operated as a municipal open burn dump from 1940 until 1964. Investigation and

response actions included test pits, groundwater monitoring and soil sampling, and ultimately an engineered barrier was used to cap the former dump. The cap consisted of sand fill, obtained from the Subject Property, Claymax 200 liner, organic material, and hydroseed. Groundwater was not substantially impacted and an AUL was implemented to limit contact with soil and to maintain a level of No Significant Risk. Considering the regulatory status, distance, at that groundwater was not significantly impacted, the release associated with RTN 4-897 is unlikely to significantly impact the Subject Property.

4.1.1 STATE-LISTED SITES

State-and Tribal-equivalent CERCLA and/or Hazardous Waste Facilities (SHWS)

HW reviewed information from the EDR Report, dated January 19, 2023, and the MassDEP website to gather information, including documented releases of OHM at the Subject Property and surrounding properties. The Subject Property is not listed as a release site. According to the EDR Report, seven State-equivalent SHWS release sites with documented releases of OHM were identified within a 1.0-mile radius of the Subject Property. Details regarding select release sites are set forth below.

Roadway – Vehicle Accident **628 feet east**
In Front 350 Route 6 **RTN: 4-20912**

According to the report titled *Immediate Response Action Completion Statement* dated January 2008 and prepared by Bennett O'Reilly, Inc., approximately 35 gallons of diesel fuel was released onto the asphalt paved roadway on the northbound lane of Route 6. Response actions included the application of absorbents, catch basin cleaning and soil sample collection. Groundwater was reportedly not impacted by the release. A Method 1 Risk Assessment determined that a level of "No Significant Risk" exists for the site. Considering the extent of the release and that groundwater was not reportedly impacted, the release associated with RTN 4-20912 is unlikely to significantly impact the Subject Property.

WTP So. Hollow Wellfield **2,852 feet northeast**
11 South Hollow Road **RTN: 4-18962**

According to the report titled *Immediate Response Action Completion* dated May 2005 and prepared by Bennett O'Reilly, Inc., a release of 5-8 gallons of Potassium Hydroxide (KOH) occurred to the ground surface and interior walls, as a result of a failure in the fill line from a tank. Response actions included the recovery and removal of approximately 75+/- gallons of KOH and safety shower rinse water, soil excavation and sampling, and additional spraying, containerizing, and disposal of the corrosive liquid. A Method 1 Risk

Assessment determined that the site has reached a level of "No Significant Risk". Considering the extent of the release and that groundwater was not reportedly impacted, the release associated with RTN 4-18962 is unlikely to significantly impact the Subject Property.

4.2 Additional Environmental Records

RCRA NonGEN/NLR

RCRA NonGen/NLRs are facilities, which do not presently generate hazardous waste or are no longer regulated under RCRA. Based on a review of these records, there is one RCRA NonGen/NLR site listed within 0.25-miles of the Subject Property. The identified RCRA NonGen/NLR site is Provincetown Water located at the Junction of Route 6 and 6A, approximately 1,043 feet east, northeast of the Subject Property. According to the EDR Report, the site has not received any violation notices.

Hazardous Waste Generator (HW GEN)

A HW GEN is a generator of hazardous waste and waste oil that registered or notified MassDEP. Based on a review of these records, there is one HW GEN site located within 0.25-miles of the Subject Property. The identified HW GEN site is Tow Boat US located at 352 Route 6, approximately 596 feet east of the Subject Property. According to the EDR Report, the site has not received any violation notices.

4.2.1 Municipal Records

Readily available records relating to the past and present use of the Subject Property were obtained from select municipal offices provided by the Client (the Town of Truro). Information gathered is presented below and copies of relevant information are available in Appendix B.

Truro Assessor's Office

The Subject Property is identified by the Town of Truro Assessor's Office as follows:

Address	Town of Provincetown Assessor's ID	Land Area (Acres)
2 Sand Pit Road	39-107-0	38.73*
9 Noons Drive	39-108-0	17.2

* It should be noted that only a 27-acre portion of this parcel is included in the Subject Property as indicated on Figure 2.

Assessor cards obtained from the Town of Truro Assessor's Office are located in Appendix B.

Truro Fire Department

According to the Town of Truro, there are records relating to the Subject Property at the Fire Department.

Truro Board of Health

According to the Town of Truro, there are records relating to the Subject Property at the Board of Health.

Truro Town Clerk

According to the Town of Truro, there are records relating to the Subject Property at the Town Clerk.

Truro Building Department

Records obtained from the Truro Building Department included the document titled *Settlement of Land Use Agreement*, dated August 27, 2013, Appendix B. This document detailed the use of the Subject Property as a sand pit since the 1950's for the excavation of sand/soil. Abutters have alleged that target shooting has historically occurred at the Subject Property. According to the Owner, "target shooting was occasionally conducted into sand piles that have long since been removed from the Subject Property". Target practice ceased at the Subject Property prior to August 27, 2013. Other files included in the record were not related to the current or historic use of OHM at the Subject Property.

Truro Planning Department

According to the Town of Truro, there are records relating to the Subject Property at the Planning Department.

Truro Conservation Commission

According to the Town of Truro, there are records relating to the Subject Property at the Conservation Commission.

4.3 HISTORICAL RESEARCH

Sanborn Fire Insurance Maps

According to EDR, the Subject Property is located within an unmapped area. A copy of the EDR Report including the Sanborn Fire Insurance Map report dated December 19, 2022, is included as Appendix C.

USGS Topographical Maps

USGS topographic maps dated 1889, 1898, 1944, 1948/1949, 1958, 1972, 1977, 2012, 2015, and 2018 were reviewed. The 1889 and 1898 depict an unimproved road transecting the Subject Property in an east/west direction and then centrally to the north. No buildings are depicted on the Subject Property. The 1944 through 1958 maps depict the unimproved road transecting the property in an east/west direction. No buildings are indicated on the Subject Property. The Subject Property is labeled as "Sandpit" in the 1972 topographical map. The 1977 map is depicted as an aerial and does not show topography. A roadway (Sand Pit Road) is depicted as transecting the northeast portion and the southern portion (Noons Drive) of the Subject Property on the 2012 and 2018 maps. A copy of the EDR Report including topographical maps dated December 19, 2022 is included as Appendix C.

Aerial Photographs

Aerial Photographs dated 1938, 1952, 1960, 1971, 1977, 1985, 1991, 1995, 2010, 2014, and 2018 were reviewed. The 1938 aerial photograph depicts the Subject Property as mostly vegetated with the exception of some roads/paths and several localized cleared areas. The 1952 aerial indicates substantial clearing of vegetation has occurred in the central portion of the Subject Property. The 1960 and 1971 aerial photograph depicts a majority of the Subject Property has been cleared. The 1977 through 2018 aerial depict a clearing in the central portion of the Subject Property. What appear to be soil stockpiles and containers/vehicles are evident in the 1985 through 2018 aerial photographs. Due to the scale and quality of the aerials, addital features of the Subject Property are not discernable. A copy of the EDR Report including aerial photographs dated December 20, 2022 is included as Appendix C.

City Directories

City Directories dated 1984, 1989, 1992, 1995, 2000, 2005, 2010, 2014, and 2017 were reviewed for the Subject Property. The Subject Property address of 2 Sand Pit Road was not included in any of the city directories reviewed.

4.4 Historical Use Research for Adjoining Properties

Topographic maps and aerial photographs depict the area surrounding the Subject Property developed with roads as early as 1889 and with structures in 1938. More substantial developments, including both commercial and residential properties, appear in the aerial maps between 1971 and 2010. Due to the scale and quality of the aerial photographs, addital features of the adjoining properties are not discernable.

4.5 Previous Investigations/Assessments

HW was not provided with any previous investigations or assessments.

5.0 Subject Property Reconnaissance

The purpose of the Subject Property reconnaissance was to observe and document features and conditions at the Subject Property and in the immediately surrounding areas. Emphasis was placed on observing any conditions that indicate the potential for RECs. Select photographs of the Subject Property are included as Appendix A.

5.1 Methodology and Limiting Conditions

On January 18, 2023, Bryan Massa of HW conducted a Subject Property reconnaissance during daylight hours. The purpose of the reconnaissance was to visually and/or physically observe features and conditions at the Subject Property and within the surrounding areas with particular focus on areas that may be the cause of RECs, such as OHM storage areas. Mr. Massa was escorted by the Owner and Client. Questions regarding the Subject Property were answered by the Owner. Observations of the Subject Property in select areas were limited due to dense wooded areas and dense vegetation. A copy of Mr. Massa's resume is included in Appendix B.

5.2 General Subject Property Observations

The Subject Property is located within a mixed commercial and residential area of Truro. Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded.

5.2.1 Structures and Other Improvements at the Subject Property

With the exception of a shed used to cover a water well (approximately 80 feet deep, Photo Log, Appendix A) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds and that is reported by the Subject Property Owner as no longer in use, no structures or improvements were observed at the Subject Property during the reconnaissance.

5.2.2 ROADS

Several unpaved roads transect the Subject Property that are used for the sand pit operation. Access to the Subject Property is from Sand Pit Road and Noons Drive.

5.2.3 STRONG, PUNGENT, OR NOXIOUS ODORS AND THEIR SOURCES

No strong, pungent, or noxious odors were observed at the Subject Property during the reconnaissance.

5.2.4 POOL OF LIQUID

No pools of liquid were observed at the Subject Property during the reconnaissance.

5.2.5 DRUMS, TOTES, AND INTERMEDIATE BULK CONTAINERS

As indicated on Figure 3, four areas at the Subject Property are rented to local fisherman for the storage (photo log, Appendix A) of lobster traps, boats and other fishing related gear (i.e., rope and nets typically stored in plastic 55-gallon drums). According to the Subject Property Owner, boat maintenance and not permitted in rented areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the rented areas. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the rented areas.

A horse obstacle area (Figure 3) is located in the northwestern portion of the Subject Property. The obstacles include several empty plastic 55-gallon barrels that the horses jump over. The horses live in a stable located to the northeast and off the Subject Property. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the barrels. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the barrels.

Additionally, as indicated in Section 7.0, testing of the soil at the Subject Property for various contaminants of concern (COCs) including PFAS, VOCs, SVOCs, EPH, MCP 14 metals, PAHs and/or PCBs, did not detect any COCs in soil above the applicable regulatory thresholds.

5.2.6 HAZARDOUS SUBSTANCES AND PETROLEUM PRODUCTS

A pile of utility poles (Photo log, Appendix A) was observed on the ground surface at the location indicated on Figure 3. Utility poles are typical treated with various coatings such as creosote, pentachlorophenol, and various metals to preserve the wood. No stressed vegetation (with the exception of typical weather-related stresses) or stained

soil was observed in the vicinity of the utility poles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the utility poles.

Several pieces of equipment including excavators, loaders, dump trucks and spare part vehicles were observed in the northern portion of the Subject Property as depicted on the photo logs, Appendix A. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the equipment or spare part vehicles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the equipment or spare part vehicles.

No other indications of OHM were observed at the Subject Property. Additionally, as indicated in Section 7.0, testing of the soil at the Subject Property for various COCs including PFAS, VOCs, SVOCs, EPH, MCP 14 metals, PAHs and/or PCBs, did not detect any COCs in soil above the applicable regulatory thresholds.

5.2.7 STORAGE TANKS

No storage tanks were observed at the Subject Property during the reconnaissance.

5.2.8 FLOOR DRAINS AND SUMPS

No floor drains or sumps were observed at the Subject Property during the reconnaissance.

5.2.9 PITS, PONDS, AND LAGOONS

The Subject Property is an active sand pit where native soil is mined for resale purposes. No ponds or lagoons were observed at the Subject Property during the reconnaissance.

5.2.10 STAINED SOIL AND STRESSED VEGETATION

No stained soil or stressed vegetation (with the exception of typical weather-related stresses) was observed at the Subject Property during the reconnaissance.

Several piles (Photo log, Appendix A) of asphalt millings, sand, mulch (made from local landscaped debris brought to the Subject Property), shells, and aggregate are stored throughout the cleared areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the soil piles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the piles. Additionally, testing of the soil at the Subject Property for various COCs) including PFAS, VOCs, SVOCs, EPH, MCP 14 metals, PAHs and/or PCBs, did not detect any COCs in soil above the applicable regulatory thresholds.

5.2.11 PCB Containing Items

No indication of transformers, capacitors or light ballasts were identified at the Subject Property. The hydraulic equipment utilized at the Subject Property for sand pit operations is unlikely to contain PCBs. Additionally, testing of the surface soil as detailed in Section 7.0 did not detect any PCBs above the laboratory reporting limits.

5.2.12 Solid Waste

No indication of significant solid waste disposal was observed on the ground surface at the Subject Property.

5.2.13 Subject Property Utilities

Utilities at the Subject Property include a private water well (approximately 80 feet deep, Photo Log, Appendix A) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds. The well was reported by the Subject Property Owner as no longer in use.

5.3 Interior Observations

With the exception of a shed used to cover a water well (approximately 80 feet deep, Photo Log, Appendix A) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds and that is reported by the Subject Property Owner as no longer in use, no structures or improvements were observed at the Subject Property during the reconnaissance.

5.4 Exterior Observations

- The Subject Property is located within a mixed commercial and residential area of Truro. Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded. Several piles (Photo log, Appendix A) of asphalt millings, sand, mulch (made from local landscaped debris brought to the Subject Property), shells, and aggregate are stored throughout the cleared areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the soil piles. No visual or olfactory indication of a significant release OHM was observed on the ground surface in the vicinity of the piles.

- As indicated on Figure 3, four areas at the Subject Property are rented to local fisherman for the storage (photo log, Appendix A) of lobster traps, boats and other fishing related gear (i.e., rope and nets typically stored in plastic 55-gallon drums). According to the Subject Property Owner, boat maintenance and not permitted in rented areas. No stressed vegetation (with the exception of typical

weather-related stresses) or stained soil was observed in the vicinity of the rented areas. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the rented areas.

- A pile of utility poles (Photo log, Appendix A) was observed on the ground surface at the location indicated on Figure 3. Utility poles are typically treated with various coatings such as creosote, pentachlorophenol, and various metals to preserve the wood. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the utility poles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the utility poles.

- Several pieces of equipment including excavators, loaders, dump trucks and spare part vehicles were observed in the northern portion of the Subject Property as depicted on the photo logs, Appendix A. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the equipment or spare part vehicles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the equipment or spare part vehicles.

- A horse obstacle area (Figure 3) is located in the northwestern portion of the Subject Property. The obstacles include several empty plastic 55-gallon barrels that the horses jump over. The horses live in a stable located to the northeast and off the Subject Property. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the barrels. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the barrels.
- The Subject Property is abutted to the north by residences and commercial properties including a store and motel. The Subject Property is abutted to the south by residences with Noons Drive beyond. The Subject Property is abutted to the east by residences and commercial properties including Pleasant View Autobody and John F. Noons trucking with Route 6 and Noons Drive beyond. The Subject Property is abutted to the west by residences and Great Swamp with Cormorant Road beyond.
- A photo log of observations is included in Appendix A.

5.5 Adjoining Properties and the Surrounding Area

Surrounding properties include Pleasant View Autobody, John F. Noons trucking/site development, a motel, store, residences, and wooded land. No visual observations of RECs were observed on these properties from the right-of-way.

6.0 OWNER/OPERATOR/OCCUPANT INTERVIEWS

6.1 OWNER OR OPERATOR INTERVIEWS

On January 18, 2023, HW conducted a reconnaissance of the Subject Property. The following people associated with the Subject Property were interviewed:

- Ms. Linda Noons-Rose, Owner of the Subject Property

Information provided by the Subject Property contact is included in other sections of this report. A user questionnaire completed by the Client is included in Attachment B.

6.2 LOCAL GOVERNMENT OFFICIALS INTERVIEWS

The Client (Town of Truro) provided records when available from the Assessor's Office, Fire Department, Board of Health, Town Clerk, Planning Department, Conservation Commission, and the Building Department to review records associated with the Subject Property. Details concerning the municipal records review is set forth above.

6.3 INTERVIEWS WITH OTHERS

No other interviews were conducted in connection with this Phase I report.

7.0 PHASE II LIMITED SUBSURFACE INVESTIGATION

HW completed a Phase II LSI at the request of the Client to determine if a reportable release of OHM consistent with the MCP has occurred as a result of the following:

- The historic operation of the Subject Property as a sand pit where off-site soils were potentially brought onto the Subject Property and then sold.
- The potential for lead impacts related to the historic use of portions of the Subject Property for target shooting.
- The potential for wood treatment chemicals to have leached from stockpiled utility poles to the subsurface.
- The potential for incidental spillage from several pieces of equipment including excavators, loaders, dump trucks, boats and spare part vehicles over the last 70 years.
- The potential for groundwater to be impacted from historic operations at the Subject Property or from an unknown off-site source.

Details of the Phase II LSI are presented below.

7.1 Selection of Applicable Soil and Groundwater Thresholds

The Massachusetts Contingency Plan (MCP) identifies two reporting categories for soil (RCS-1 and RCS-2) and two for groundwater (RCGW-1 and RCGW-2). Details for each reporting category is set forth below.

Soil Reporting Categories

The MCP defines RCS-1 as soil samples obtained:

- *At or within 500 feet of a residential dwelling, a residentially-zoned property, school, playground, recreational area or park; or*
- *Within the geographic boundaries of a groundwater resource area categorized as RCGW- 1 in 310 CMR 40.0362(1)(a).*

The MCP defines RCS-2 as soil samples:

- *That are not obtained from category RCS-1 areas.*

Groundwater Reporting Categories

The MCP defines RCGW-1 as groundwater samples obtained:

- *within a Current Drinking Water Source Area; or*
- *within a Potential Drinking Water Source Area.*

The MCP defines RCGW-2 as groundwater samples:

- *That are not obtained from category RCGW-1 areas.*

Considering that the Subject Property is located with 500-feet of a residential dwelling and is located within a Current or Potential Drinking Water Source Area, RCS-1 and RCGW-1 are the appropriate reporting categories for the Subject Property.

7.2 Test Pit Advancement

On February 2, 2023, 11 test pits were excavated at the Subject Property (TP-1 through TP-11) to a maximum depth of ten feet below grade at the locations indicated on Figure 3. Soil samples were continuously collected in 2-foot intervals and field screened for total organic vapors (TOV) using a photoionization detector (PID) using the jar headspace method. TOV PID values ranged from less than the detection limit of the equipment (<0.1 parts per million volume ppmv] to a maximum of 2.3 ppmv.

While no significant visual or olfactory evidence of a release of OHM was noted in any of the test pit locations, trace evidence of plastic, brick and/or wood debris were identified in TP-5 (4-6 feet below grade) and TP-6 (0.5 to 2 feet below grade and 4 to 6 feet below grade). Groundwater was not encountered in any of the test pits. Test pit logs are included in Appendix D.

7.3 Soil Boring Advancement

Between February 10 and 15, 2023 three soil borings were advanced at the Subject Property (SB-1 through SB-3) to a maximum depth of 77 feet below grade at the locations indicated on Figure 3. Soil samples were continuously collected in 2-foot intervals and field screened for TOV with a PID using the jar headspace method. TOV PID values ranged from less than the detection limit of the equipment (<0.1 ppmv) to a maximum of 0.6 ppmv.

No significant visual or olfactory evidence of a release of OHM was noted in any of the boring locations. Groundwater was encountered in the borings at depths ranging from 28 to 72 feet below grade. Soil boring logs are included in Appendix D

7.4 Monitoring Well Construction

Soil borings SB-1 through SB-3 (Figure 3) were completed as permanent groundwater monitoring wells MW-1 through MW-3, respectively. The monitoring wells were constructed of 2-inch diameter PVC casing with 10 feet of 0.010-inch slotted screen positioned to roughly bi-sect the groundwater table. Prior to sampling, depth to groundwater was determined using a water level and the monitoring wells were developed with a submersible pump.

The monitoring wells were then purged of five well volumes with a peristaltic pump utilizing low flow sampling methodologies. After purging was complete, groundwater samples were collected in laboratory provided sample containers and placed on ice under chain of custody procedures. Groundwater samples collected for VOCs were collected with a disposable bailer, and groundwater samples for dissolved metals analysis were field filtered with a 0.45-micron filter prior to preservation.

HW returned to the Subject Property on February 22, 2023 to survey the location and elevation of the wells. Based on the survey data, groundwater was determined to flow in a southwesterly direction as indicated on Figure 3.

7.5 Laboratory Results for Soil Samples

During test pit excavation, soil samples were selected based on a combination of factors including visual/olfactory observations, TOV PID and/or representative depth and

surficial distribution. Soil samples were submitted to a Massachusetts certified laboratory for PFAS, VOCs, SVOCs, MCP 14 metals, VOCs, EPH, PAHs, and/or PCBs. Soil boring logs and test pit logs are included in Appendix D and the location of the soil borings and test pits are included on Figure 3. Details of the soil laboratory results are set forth below.

PFAS

PFAS was not detected above the laboratory reporting limit in any of the four soil samples submitted for analysis. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

VOCs

VOCs were not detected above the laboratory reporting limit in any of the two soil samples submitted for analysis. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

SVOCs

SVOCs were not detected above the laboratory reporting limit in any of the two soil samples submitted for analysis. All laboratory reporting limits were below the applicable RCS-1 threshold with the exception of biphenyl. biphenyl is not a contaminant of concern, and the elevated laboratory reporting limit is not considered a concern. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

MCP 14 Metals

Select MCP 14 metals were detected in all nine soil samples above the laboratory reporting limit and below the applicable RCS-1. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

EPH

EPH was detected in two of the nine soil samples above the laboratory reporting limit and below the applicable RCS-1. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

PAHs

PAHs were detected in three of the nine soil samples above the laboratory reporting limit and below the applicable RCS-1. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

PCBs

PCBs were not detected above the laboratory reporting limit in any of the two soil samples submitted for analysis. All laboratory reporting limits were below the applicable RCS-1 threshold. Tabulated soil analytical data is included on Table 1, and the laboratory analytical report is included in Appendix E.

7.6 Laboratory Results for Groundwater

SB-1 through SB-3 were completed as permanent 2-inch diameter groundwater monitoring well MW-1 through MW-3, respectively. Groundwater samples were submitted to a Massachusetts certified laboratory for PFAS, VOCs, SVOCs, MCP 14 metals, VOCs, EPH, PAHs, and/or PCBs. Monitoring well construction logs are included in Appendix D and the location of the monitoring wells are included on Figure 3. Details of the groundwater laboratory results are set forth below.

PFAS

PFAS was detected above the laboratory reporting limit in all three groundwater samples submitted for laboratory analysis and above the RCGW-1 threshold in sample MW-1. All laboratory reporting limits were below the applicable RCGW-1 threshold. Tabulated groundwater analytical data is included on Table 2 and the laboratory analytical report is included in Appendix E.

To verify the detection of PFAS in groundwater sample MW-1, the sample was recollected one month later and reanalyzed by the laboratory for PFAS. The sample contained a similar concentration of PFAS that was above the RCGW-1.

VPH

VPH was not detected above the laboratory reporting limit in any of the three groundwater samples submitted for laboratory analysis. All laboratory reporting limits were below the applicable RCGW-1 threshold. Tabulated groundwater analytical data is included on Table 2 and the laboratory analytical report is included in Appendix E.

VOCs

VOCs were not detected above the laboratory reporting limit in any of the three groundwater samples submitted for laboratory analysis. With the exception of 1,2-dibromoethane and 1,4-dioxane, all laboratory reporting limits were below the applicable RCGW-1 threshold. Considering no petroleum related VOCs or chlorinated solvents were detected in any of the groundwater samples submitted for laboratory analysis, the elevated laboratory reporting limit for 1,2-dibromoethane and 1,4-dioxane are not considered a concern. Tabulated groundwater analytical results are included on Table 2 and the laboratory analytical report is included in Appendix E.

Dissolved MCP 14 Metals

Dissolved barium was detected in two of the three groundwater samples submitted for laboratory analysis above the laboratory reporting limit and below the applicable RCGW-1. All laboratory reporting limits were below the applicable RCGW-1 threshold. Tabulated groundwater analytical data is included on Table 2 and the laboratory analytical report is included in Appendix E.

EPH

EPH was not detected above the laboratory reporting limit in any of the three groundwater samples submitted for laboratory analysis. All laboratory reporting limits were below the applicable RCGW-1 threshold. Tabulated groundwater analytical data is included on Table 2 and the laboratory analytical report is included in Appendix E.

PAHs

PAHs were not detected above the laboratory reporting limit in any of the three groundwater samples submitted for laboratory analysis. All laboratory reporting limits were below the applicable RCGW-1 threshold. Tabulated groundwater analytical data is included on Table 2 and the laboratory analytical report is included in Appendix E.

7.7 CONCLUSION OF THE LSI

Based on the analytical results documented above, a reportable release of OHM consistent with MCP has occurred at the Subject Property. The release is consistent with the notification requirements of 310 CMR 40.0315 “Releases which Require Notification within 120 days”. As indicated above, the Subject Property does not have a drinking water well, there a no known drinking water wells located within 500 feet and as indicated on Figure 3, the Subject Property is not located within a Zone I.

Pursuant to 310 CMR 40.0331, the following persons shall notify the MassDEP in accordance with 310 CMR 40.0300 of a release or threat of release of OHM:

- The owner or operator of a vessel or a site from or at which there is or has been a release or threat of release of oil and/or hazardous material;

- Any person who at the time of storage or disposal of any hazardous material owned or operated any site at or upon which such hazardous material was stored or disposed of and from which there is or has been a release or threat of release of hazardous material;

- Any person who by contract, agreement, or otherwise, directly or indirectly, arranged for the transport, disposal, storage or treatment of hazardous material to or in a site or vessel from or at which there is or has been a release or threat of release of hazardous material;

- Any person who, directly or indirectly, transported any hazardous material to transport, disposal, storage or treatment vessels or sites from or at which there is or has been a release or threat of release of such material;

- Any person who otherwise caused or is legally responsible for a release or threat of release of oil and/or hazardous material from a site or vessel;

- Any fiduciary who holds title to or possession of a site or vessel from or at which there is or has been a release or threat of release of oil and/or hazardous material;

- Any secured lender who holds title to or possession of a site or vessel from or at which there is or has been a release or threat of release of oil and/or hazardous material;

- Any agency of the Commonwealth or any public utility company that owns a right of way that is a site from or at which there is or has been a release or threat of release of oil and/or hazardous material; and

- Any person otherwise required to notify the Department of a release or threat of release pursuant to M.G.L. c. 21E.

Based on the notification requirements above, the Client would become a person required to notify within 120 days of taking ownership of the Subject Property. Considering that PFAS was not detected in any of the soil samples collected at the Subject Property above the laboratory Reporting Limit and that the analytical data and groundwater flow direction support the conclusion that the PFAS impacts are related to an unknown source located hydraulically upgradient of the Subject Property, the Subject

Property appears to be eligible for Downgradient Property Status Pursuant to 310 CMR 40.0180.

It should be noted that drinking water is not provided to the Subject Property. Consideration should be made for connection to the municipal drinking water supply in the future to limit groundwater pre-treatment and laboratory testing requirements should groundwater at the Subject Property be utilized for consumption.

8.0 FINDINGS AND OPINIONS

- HW has completed this Phase I and Phase II LSI documenting the observed conditions of the sand pit/undeveloped property located on a portion of 2 Sand Pit Road and 9 Noons Drive in Truro, Massachusetts.

- The Subject Property is located within a mixed commercial and residential area of Truro. Approximately 80 percent of the Subject Property is cleared and utilized as a sandpit with the remaining 20 percent undeveloped and wooded. Several piles (Photo log, Appendix A) of asphalt millings, sand, mulch (made from local landscaped debris brought to the Subject Property), shells, and aggregate are stored throughout the cleared areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the soil piles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the piles.

- As indicated on Figure 3, four areas at the Subject Property are rented to local fisherman for the storage (photo log, Appendix A) of lobster traps, boats and other fishing related gear (i.e., rope and nets typically stored in plastic 55-gallon drums). According to Ms. Linda Noons-Rose (Owner of the Subject Property), boat maintenance is not permitted in the rented areas. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the rented areas. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the rented areas.

- A pile of utility poles (Photo log, Appendix A, and Figure 3) was observed on the ground surface. Utility poles are typically treated with various coatings such as creosote, pentachlorophenol, and various metals to preserve the wood. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the utility poles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the utility poles.

- Several pieces of equipment including excavators, loaders, dump trucks and spare part vehicles were observed in the northern portion of the Subject

Property (photo logs, Appendix A). No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the equipment or spare part vehicles. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the equipment or spare part vehicles.

- A horse obstacle area is located in the northwestern portion of the Subject Property (Figure 3). The obstacles include several empty plastic 55-gallon barrels that the horses jump over. The horses live in a stable located to the northeast and off the Subject Property. No stressed vegetation (with the exception of typical weather-related stresses) or stained soil was observed in the vicinity of the barrels. No visual or olfactory indication of a significant release of OHM was observed on the ground surface in the vicinity of the barrels.

- The Subject Property is abutted to the north by residences and commercial properties including a store and motel. The Subject Property is abutted to the south by residences with Noons Drive beyond. The Subject Property is abutted to the east by residences and commercial properties including Pleasant View Autobody and John F. Noons trucking with Route 6 and Noons Drive beyond. The Subject Property is abutted to the west by residences and Great Swamp with Cormorant Road beyond.

- There are no buildings at the Subject Property and vehicle maintenance and fueling are completed at the property to the east (not on the Subject Property). No OHM was observed at the Subject Property. Utilities at the Subject Property include a private water well (approximately 80 feet deep, Photo Log, Appendix A and Figure 3) that was reportedly used for dust suppression and to rinse dirt off of vehicle truck beds. The well was reported by the Subject Property owner as no longer in use.

- No records relating to the storage, usage or releases of OHM at the Subject Property were reported to HW or on file at the Town of Truro Board of Health, Fire Department, Building Department, Conservation Commission, Planning Department or Town Clerk.

- As indicated on the document titled *Settlement of Land Use Agreement*, dated August 27, 2013, Appendix B, The Subject Property has been used as sand pit since the 1950's for the excavation of sand/soil. Abutters have alleged that target shooting has historically occurred at the Subject Property. According to the Owner, "target shooting was occasionally conducted into sand piles that have long since been removed from the Subject Property". Target practice ceased at the Subject Property prior to August 27, 2013.

- In February 2023, HW completed a Phase II Limited Subsurface Investigation (LSI) to determine if a release of OHM had occurred at the Subject Property. The Phase II LSI included the collection of nine soil samples and four groundwater samples for laboratory analysis. The laboratory analysis included PFAS, VOCs, SVOCs, VPH, MCP 14 metals, EPH, PAHs, and/or PCBs.

- As indicated on Tables 1 and 2, with the exception of PFAS detected in groundwater, no other analytes were detected above the applicable MCP Reportable Concentrations for category S-1 soils or GW-1 groundwater. Refer to Figure 3 for sampling locations. Additional details regarding the Phase II LSI are set forth in Section 7 including details on the required MassDEP release notification requirements.

- Several releases of OHM have occurred at sites located within a 1.0-mile radius of the Subject Property. Based on the regulatory status, distance from the Subject Property, and/or groundwater flow direction, these release sites appear unlikely to significantly impact the Subject Property.

9.0 CONCLUSION

HW offers no opinion on unreported releases which may have occurred on or adjacent to the Subject Property, releases that occurred prior to reliable documentation of releases, or releases for which no additional records or information was readily available.

9.1 RECOGNIZED ENVIRONMENTAL CONDITIONS

HW has performed a Phase I Environmental assessment in general conformance with the scope and limitations of ASTM International E 1527-21 of the Subject Property. Any exceptions to this practice are described in Section 1.4. This assessment has revealed no evidence of the Recognized Environmental Conditions in connection with the Subject Property with the exception of the following:

- The Phase II LSI concluded that groundwater at the Subject Property is impacted with PFAS above the applicable Reportable Concentration for category GW-1 groundwater. PFAS was not detected in any of the soil samples collected at the Subject Property above the laboratory Reporting Limit or the applicable Reportable Concentration for category S-1 soils. Considering that the analytical data and groundwater flow direction support the conclusion that the PFAS impacts are related to an unknown source located hydraulically upgradient of the Subject Property, the Subject Property appears to be eligible for Downgradient Property Status Pursuant to 310 CMR 40.0180.

It should be noted that drinking water is not provided to the Subject Property. Consideration should be made for connection to the municipal drinking water supply in the future to limit groundwater pre-treatment and laboratory testing requirements should groundwater at the Subject Property be utilized.

9.2 Historical Recognized Environmental Conditions

HW has performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM International E 1527-21 of the Subject Property. Any exceptions to this practice are described in Section 1.4. This assessment has revealed no evidence of Historical Recognized Environmental Conditions in connection with the Subject Property.

9.3 Controlled Recognized Environmental Conditions

HW has performed a Phase I Environmental Site Assessment in general conformance with the scope and limitations of ASTM International E 1527-21 of the Subject Property. Any exceptions to this practice are described in Section 1.4. This assessment has revealed no evidence of controlled Recognized Environmental Conditions in connection with the Subject Property.

9.4 Business environmental risk

This assessment has revealed no evidence of Business Environmental Risk in connection with the Subject Property except for the following:

- Several releases of OHM have occurred at sites located within a 1.0-mile radius of the Subject Property. Based on the regulatory status, distance from the Subject Property, and/or groundwater flow direction, these release sites appear unlikely to significantly impact the Subject Property.

10.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONALS

I declare that to the best of my professional knowledge and belief, I meet the definition of *Environmental Professional* as defined in Code of Federal Regulations 40 C.F.R. 312.10, and, I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the Subject Property. I have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 C.F.R. 312.

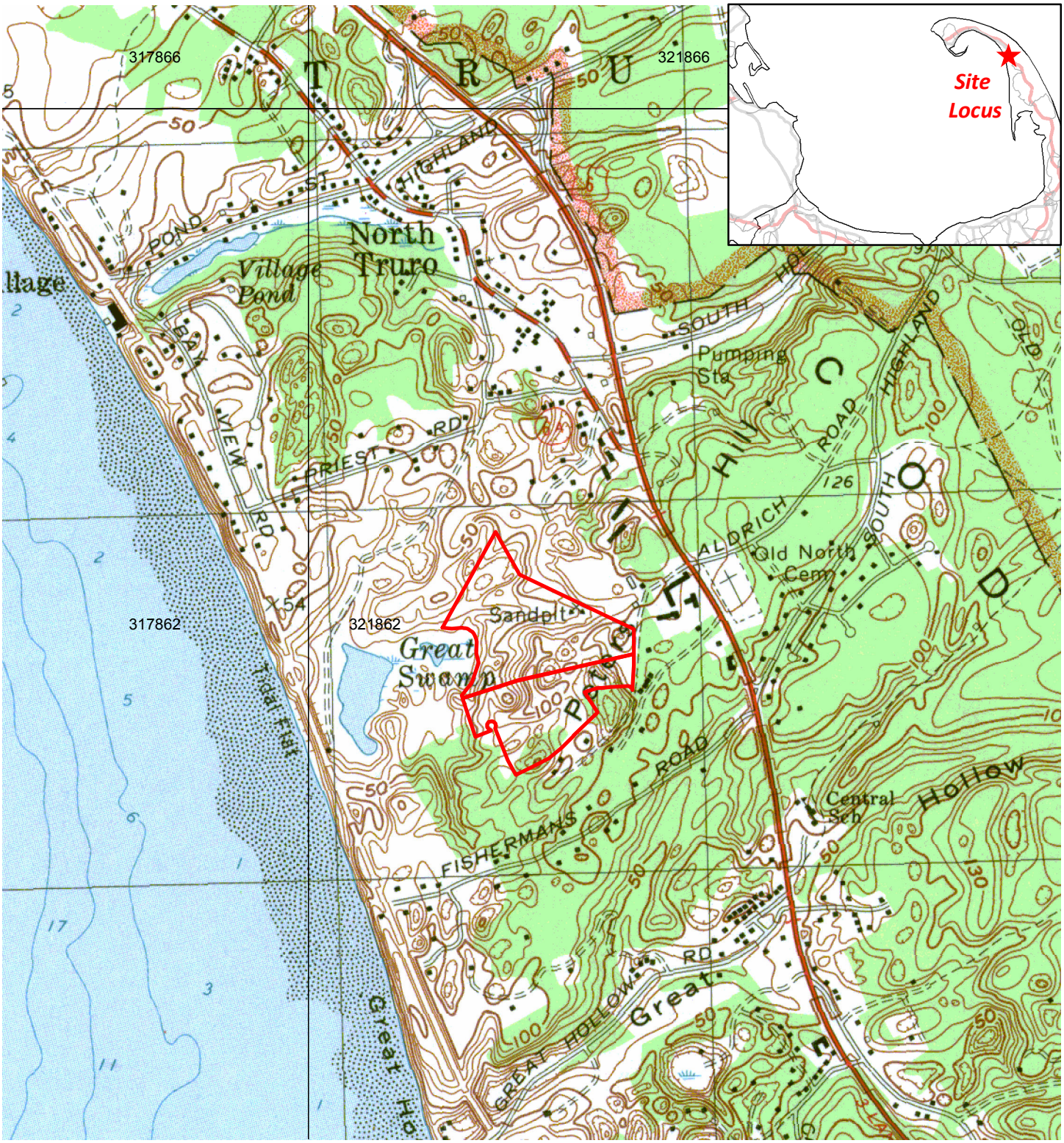


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Bryan Massa, LSP
Senior Environmental Professional

FIGURES

Figure 1 – USGS Locus
Figure 2 – Aerial Photograph
Figure 3 – Sample Locations and Groundwater Contour
Figure 4 – Soil Survey Map
Figure 5 – Existing Constraints
Figure 6 – FEMA's National Flood Hazard Layer



Document Path: H:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\USGS_Locus 2023.mxd

Legend

Subject Property

**2016 NAIP imagery service*

N

0 1,250

1" = 1,250 feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

USGS Locus
2 Sand Pit Road and
9 Noons Drive
Truro, MA

Date: 1/19/2023 Figure 1

**Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services*



Document Path: H:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\Aerial 2023.mxd

Legend

Subject Property

*2021 NAIP imagery service

N

0 375

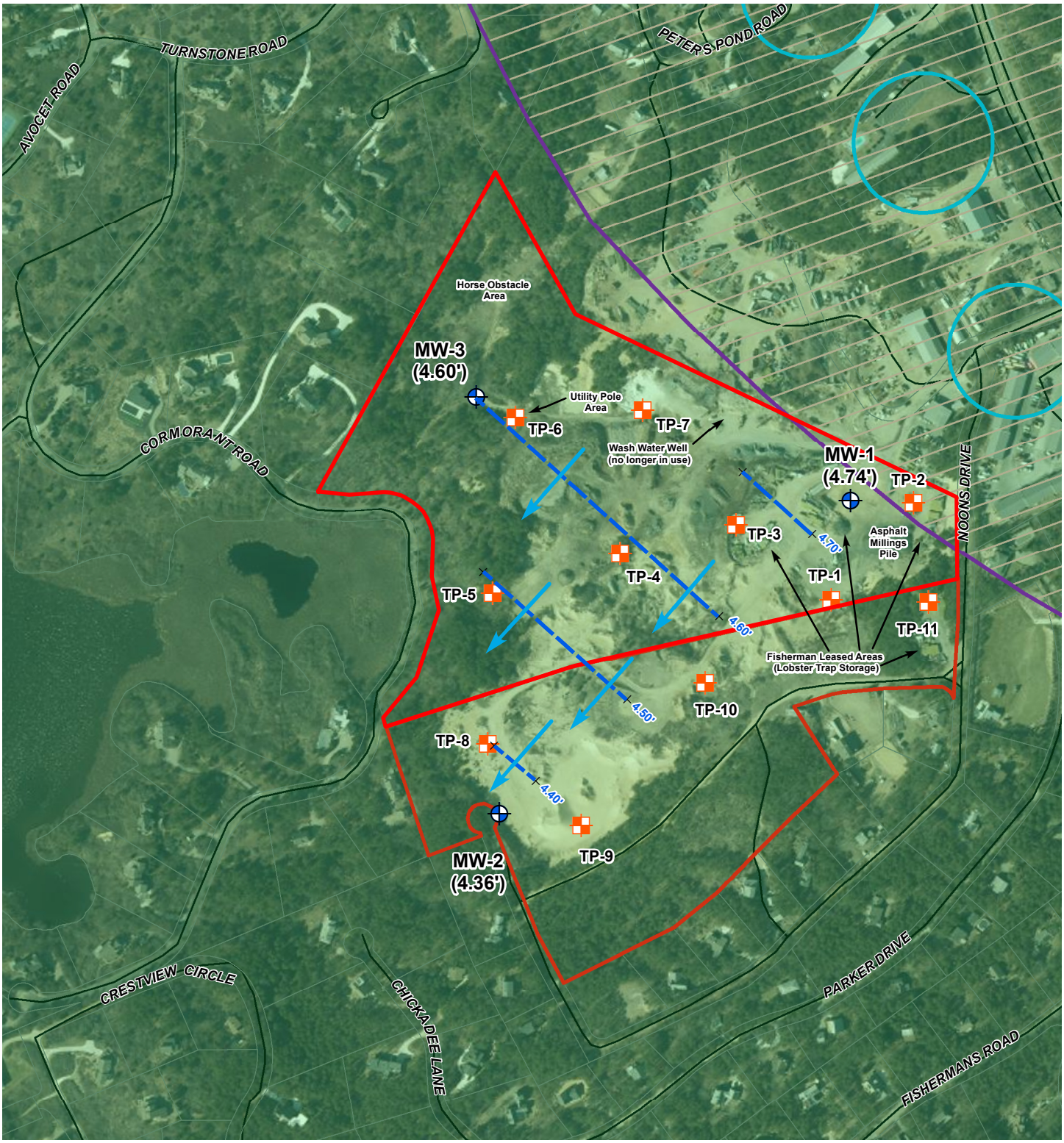
1" = 375 feet

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Aerial Photograph
2 Sand Pit Road and
9 Noons Drive
Truro, MA

Date: 1/19/2023 Figure 2

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Document Path: H:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\Sample Locations_GW.mxd

Legend

- Subject Property
- Parcels
- Test Pits
- Groundwater Monitoring Wells
- 4.40' Groundwater Contour
- (4.36') Groundwater Elevation Based on a Level Survey and Depth to Groundwater Gauging Completed on 3/22/2023
- Groundwater Flow Direction
- DEP Approved Zone I
- DEP Approved Zone II
- Medium Yield Aquifer

*2021 NAIP imagery service

N

0 375

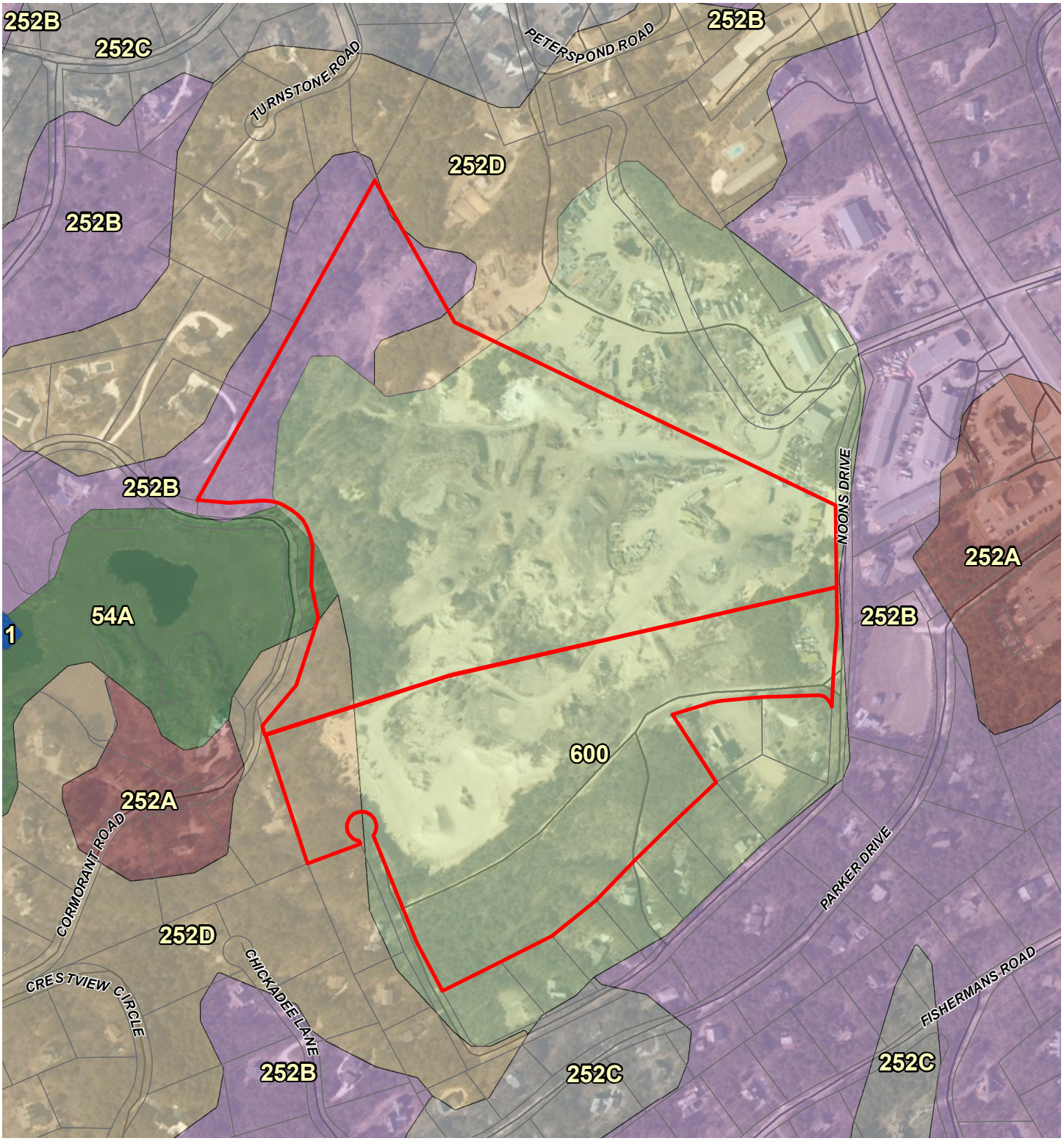
1" = 375 feet

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Sample Locations and Groundwater Contour Map
2 Sand Pit Road and
9 Noons Drive
Truro, MA

Date: 5/3/2023 Figure 3

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Document Path: H:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\NRSC Soils 2023.mxd

**2021 NAIP imagery service*

Legend

- Subject Property 9 Noons
- Parcels

Barnstable County Soils

MUSYM, compname, hydgrp

- 1, Water, <Null>
- 252A, Carver, A
- 252B, Carver, A
- 252C, Carver, A
- 252D, Carver, A
- 54A, Freetown, D
- 600, Pits, <Null>

N

0 375

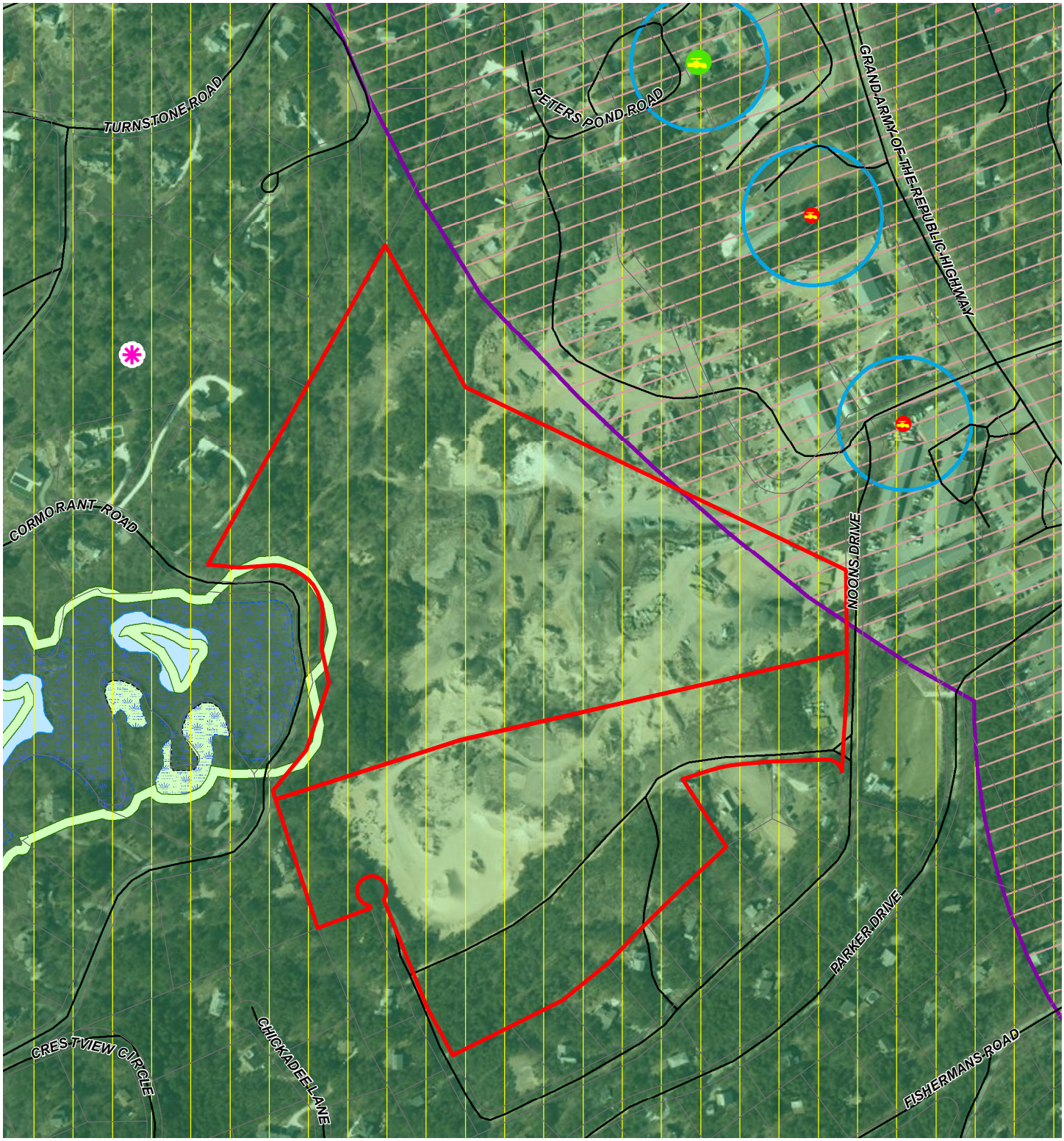
1" = 375 feet

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Soil Survey Map
2 Sand Pit Road and
9 Noons Drive
Truro, MA

Date: 1/19/2023 Figure 4

**Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services*



Document Path: K:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\Existing Constraints 2023.mxd

Legend

- Subject Property
- Parcels
- Potential Vernal Pools
- Community Groundwater Source
- Non-Community Groundwater Source
- DEP Approved Zone I
- DEP Approved Zone II

DEP Wetlands

- Marsh/Bog
- Wooded marsh
- Cranberry Bog
- Open Water

NHESP

- Priority Habitats of Rare Species
- Estimated Habitats of Rare Wildlife

Aquifers

- Medium Yield Aquifer
- Sole Source Aquifer

*2021 NAIP imagery service

N

0 250 feet

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Existing Constraints
2 Sand Pit Road and
9 Noons Drive
Truro, MA

Date: 5/3/2023

Figure 5

*Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Document Path: H:\Projects\2022\22129 Sand Pit Road Truro\GIS\Maps\FEMA.mxd

**2021 NAIP imagery service*

Legend

- Subject Property 9 Noons
- Parcels

FEMA National Flood Hazard Layer

Flood Zone Designations

- VE: High Risk Coastal Area
- X: 0.2% Annual Chance of Flooding

N

0 450

1" = 450 feet

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508-833-6600 • horsleywitten.com

FEMA's National Flood Hazard Layer
2 Sand Pit Road and
9 Noons Drive, Truro, MA

Date: 1/19/2023 Figure 6

**Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services*

TABLES

Table 1- Soil Analytical Results
Table 2- Groundwater Analytical Results

Table 1 - Soil Analytical Results
Sand Pit Road, Truro MA

Sample Designation			TP-2 (2-4')	TP-3 (0-2')	TP-5 (0-2')	TP-5 (6-8')	TP-6 (0-2')	TP-8 (2-4')	TP-9 (0-2')	TP-10 (6-8)	TP-11 (0-2')
Sample Date			2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023
Sample Depth			2-4'	0-2'	0-2'	6-8'	0-2'	2-4'	0-2'	6-8'	0-2'
TOV PID			0.3	0.1	0.2	0.3	0.3	2.3	0.1	0.1	0.1
Soil Standards		MCP RCS-1	Sample Results								
PFAS											
Perfluorobutanoic acid (PFBA)	µg/kg	NA	0.19 U	NS	0.19 U	NS	0.18 U	NS	0.17 U	NS	NS
Perfluorobutanesulfonic acid (PFBS)	µg/kg	NA	0.17 U	NS	0.16 U	NS	0.15 U	NS	0.15 U	NS	NS
Perfluoropentanoic acid (PFPeA)	µg/kg	NA	0.16 U	NS	0.16 U	NS	0.15 U	NS	0.15 U	NS	NS
Perfluorohexanoic acid (PFHxA)	µg/kg	NA	0.17 U	NS	0.16 U	NS	0.16 U	NS	0.15 U	NS	NS
8:2 Fluorotelomersulfonic acid (8:2FTS A)	µg/kg	NA	0.21 U	NS	0.2 U	NS	0.19 U	NS	0.19 U	NS	NS
4:2 Fluorotelomersulfonic acid (4:2FTS A)	µg/kg	NA	0.17 U	NS	0.17 U	NS	0.16 U	NS	0.16 U	NS	NS
6:2 Fluorotelomer sulfonate (6:2 FTS)	µg/kg	NA	0.24 U	NS	0.23 U	NS	0.22 U	NS	0.21 U	NS	NS
Perfluorodecanesulfonic acid (PFDS)	µg/kg	NA	0.23 U	NS	0.22 U	NS	0.21 U	NS	0.2 U	NS	NS
Perfluoroundecanoic acid (PFUnA)	µg/kg	NA	0.16 U	NS	0.16 U	NS	0.15 U	NS	0.14 U	NS	NS
Perfluoroheptanoic acid (PFHpA)	µg/kg	0.5	0.16 U	NS	0.15 U	NS	0.15 U	NS	0.14 U	NS	NS
Perfluorohexanesulfonic acid (PFHxS)	µg/kg	0.3	0.22 U	NS	0.21 U	NS	0.2 U	NS	0.2 U	NS	NS
Perfluorononanoic acid (PFNA)	µg/kg	0.32	0.16 U	NS	0.16 U	NS	0.15 U	NS	0.15 U	NS	NS
Perfluorooctanoic acid (PFOA)	µg/kg	0.72	0.16 U	NS	0.15 U	NS	0.15 U	NS	0.14 U	NS	NS
Perfluorooctane sulfonate (PFOS)	µg/kg	NA	0.29 U	NS	0.29 U	NS	0.27 U	NS	0.26 U	NS	NS
Perfluorodecanoic Acid (PFDA)	µg/kg	0.3	0.17 U	NS	0.17 U	NS	0.16 U	NS	0.15 U	NS	NS
Sum of Six	µg/kg	NA	ND	NS	ND	NS	ND	NS	ND	NS	NS
Total PFAS	µg/kg	NA	ND	NS	ND	NS	ND	NS	ND	NS	NS
Volatile Organic Compounds (VOCs)											
1,1,1,2-Tetrachloroethane	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,1,1-Trichloroethane	mg/kg	30	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,1,2,2-Tetrachloroethane	mg/kg	0.005	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
1,1,2-Trichloroethane	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,1-Dichloroethane	mg/kg	0.4	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,1-Dichloroethylene	mg/kg	3	NS	NS	<0.0044	NS	NS	<0.0043	NS	NS	NS
1,1-Dichloropropene	mg/kg	500	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2,3-Trichlorobenzene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2,3-Trichloropropane	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2,4-Trichlorobenzene	mg/kg	2	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2,4-Trimethylbenzene	mg/kg	1,000	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2-Dibromo-3-chloropropane (DBCP)	mg/kg	10	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2-Dibromoethane (EDB)	mg/kg	0.1	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
1,2-Dichlorobenzene	mg/kg	9	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2-Dichloroethane	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,2-Dichloropropane	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,3,5-Trimethylbenzene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,3-Dichlorobenzene	mg/kg	3	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,3-Dichloropropane	mg/kg	500	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
1,4-Dichlorobenzene	mg/kg	0.7	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
1,4-Dioxane	mg/kg	0.2	NS	NS	<0.11	NS	NS	<0.11	NS	NS	NS
2,2-Dichloropropane	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
2-Butanone (MEK)	mg/kg	4	NS	NS	<0.044	NS	NS	<0.043	NS	NS	NS
2-Chlorotoluene	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
2-Hexanone (MBK)	mg/kg	100	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
4-Chlorotoluene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
4-Methyl-2-pentanone (MIBK)	mg/kg	0.4	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
Acetone	mg/kg	6	NS	NS	<0.11	NS	NS	<0.11	NS	NS	NS
Benzene	mg/kg	2	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Bromobenzene	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Bromochloromethane	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Bromodichloromethane	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Bromoform	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Bromomethane	mg/kg	0.5	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS
Carbon Disulfide	mg/kg	100	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS
Carbon Tetrachloride	mg/kg	5	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Chlorobenzene	mg/kg	1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Chlorodibromomethane	mg/kg	0.005	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
Chloroethane	mg/kg	100	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
Chloroform	mg/kg	0.2	NS	NS	<0.0044	NS	NS	<0.0043	NS	NS	NS
Chloromethane	mg/kg	100	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS
cis-1,2-Dichloroethylene	mg/kg	0.1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
cis-1,3-Dichloropropene	mg/kg	0.01	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
Dibromomethane	mg/kg	500	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Dichlorodifluoromethane	mg/kg	1,000	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
Diethyl Ether	mg/kg	100	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
Diisopropyl Ether	mg/kg	100	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
Ethylbenzene	mg/kg	40	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Hexachlorobutadiene	mg/kg	30	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Isopropylbenzene	mg/kg	1,000	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
m+p Xylene	mg/kg	NA	NS	NS	<0.0044	NS	NS	<0.0043	NS	NS	NS
Methyl tert Butyl Ether	mg/kg	0.1	NS	NS	<0.0044	NS	NS	<0.0043	NS	NS	NS
Methylene Chloride	mg/kg	0.1	NS	NS	<0.022	NS	NS	<0.022	NS	NS	NS
Naphthalene	mg/kg	4	NS	NS	<0.0044	NS	NS	<0.0043	NS	NS	NS
n-Butylbenzene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
n-Propylbenzene	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
o-Xylene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
p-Isopropyltoluene	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
sec-Butylbenzene	mg/kg	NA	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Styrene	mg/kg	3	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
tert-Amyl Methyl Ether (TAME)	mg/kg	NA	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
tert-Butyl Ethyl Ether (TBEE)	mg/kg	NA	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
tert-Butylbenzene	mg/kg	100	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Tetrachloroethylene	mg/kg	1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Tetrahydrofuran	mg/kg	500	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS
Toluene	mg/kg	30	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
trans-1,2-Dichloroethylene	mg/kg	1	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
trans-1,3-Dichloropropene	mg/kg	0.01	NS	NS	<0.0011	NS	NS	<0.0011	NS	NS	NS
Trichloroethylene	mg/kg	0.3	NS	NS	<0.0022	NS	NS	<0.0022	NS	NS	NS
Trichlorofluoromethane	mg/kg	1,000	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS
Vinyl Chloride	mg/kg	0.7	NS	NS	<0.011	NS	NS	<0.011	NS	NS	NS

Table 1 - Soil Analytical Results
Sand Pit Road, Truro MA

Sample Designation			TP-2 (2-4')	TP-3 (0-2')	TP-5 (0-2')	TP-5 (6-8')	TP-6 (0-2')	TP-8 (2-4')	TP-9 (0-2')	TP-10 (6-8)	TP-11 (0-2')
Sample Date			2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023
Sample Depth			2-4'	0-2'	0-2'	6-8'	0-2'	2-4'	0-2'	6-8'	0-2'
TOV PID			0.3	0.1	0.2	0.3	0.3	2.3	0.1	0.1	0.1
Soil Standards		MCP RCS-1	Sample Results								
Semivolatile Organic Compounds (SVOCs)											
1,2,4-Trichlorobenzene	mg/kg	2	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
1,2-Dichlorobenzene	mg/kg	9	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
1,2-Diphenylhydrazine	mg/kg	NA	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
1,3-Dichlorobenzene	mg/kg	3	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
1,4-Dichlorobenzene	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,4,5-Trichlorophenol	mg/kg	4	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,4,6-Trichlorophenol	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,4-Dichlorophenol	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,4-Dimethylphenol	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,4-Dinitrophenol	mg/kg	3	NS	NS	<0.72	NS	<0.7	NS	NS	NS	NS
2,4-Dinitrotoluene	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2,6-Dinitrotoluene	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2-Chloronaphthalene	mg/kg	1,000	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2-Chlorophenol	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2-Methylnaphthalene	mg/kg	0.7	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
2-Methylphenol	mg/kg	500	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
2-Nitrophenol	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
3,3-Dichlorobenzidine	mg/kg	3	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
3/4-Methylphenol	mg/kg	500	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
4-Bromophenylphenylether	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
4-Chloroaniline	mg/kg	1	NS	NS	<0.72	NS	<0.7	NS	NS	NS	NS
4-Nitrophenol	mg/kg	100	NS	NS	<0.72	NS	<0.7	NS	NS	NS	NS
Acenaphthene	mg/kg	4	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Acenaphthylene	mg/kg	1	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Acetophenone	mg/kg	1,000	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Aniline	mg/kg	1,000	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Anthracene	mg/kg	1,000	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Benzo(a)anthracene	mg/kg	7	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Benzo(a)pyrene	mg/kg	2	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Benzo(b)fluoranthene	mg/kg	7	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Benzo(g,h,i)perylene	mg/kg	1,000	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Benzo(k)fluoranthene	mg/kg	70	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Biphenyl	mg/kg	0.05	NS	NS	**<0.073**	NS	**<0.071**	NS	NS	NS	NS
Bis(2-chloroethoxy)methane	mg/kg	500	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Bis(2-chloroethyl)ether	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Bis(2-chloroisopropyl)ether	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Bis(2-Ethylhexyl)phthalate	mg/kg	90	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Butylbenzylphthalate	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Chrysene	mg/kg	70	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Dibenz(a,h)anthracene	mg/kg	0.7	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Dibenzofuran	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Diethylphthalate	mg/kg	10	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Dimethylphthalate	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Di-n-butylphthalate	mg/kg	50	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Di-n-octylphthalate	mg/kg	1,000	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Fluoranthene	mg/kg	1,000	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Fluorene	mg/kg	1,000	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Hexachlorobenzene	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Hexachlorobutadiene	mg/kg	30	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Hexachloroethane	mg/kg	0.7	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Indeno(1,2,3-cd)pyrene	mg/kg	7	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Isophorone	mg/kg	100	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Naphthalene	mg/kg	4	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Nitrobenzene	mg/kg	500	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Pentachlorophenol	mg/kg	3	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Phenanthrene	mg/kg	10	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Phenol	mg/kg	1	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Pyrene	mg/kg	1,000	NS	NS	<0.19	NS	<0.18	NS	NS	NS	NS
Pyridine	mg/kg	500	NS	NS	<0.37	NS	<0.36	NS	NS	NS	NS
Metals											
Antimony	mg/kg	20	<1.8	<1.7	<1.8	<1.8	<1.7	<2.0	<1.7	<1.7	<1.6
Arsenic	mg/kg	20	<3.6	<3.4	<3.6	<3.6	<3.4	<4.0	<3.4	<3.4	<3.2
Barium	mg/kg	1,000	8.2	2.2	7.2	9.8	6.2	9.6	2.3	3.6	2.1
Beryllium	mg/kg	90	0.19	<0.17	<0.18	0.22	0.17	0.27	<0.17	<0.17	<0.16
Cadmium	mg/kg	70	<0.36	<0.34	<0.36	<0.36	<0.34	<0.40	<0.34	<0.34	<0.32
Chromium	mg/kg	100	6.5	1.4	3	6.1	5.4	6	1.7	1.7	3.1
Lead	mg/kg	200	4.5	5.0	8.3	6.4	3.4	3	1.2	1.4	1.6
Mercury	mg/kg	20	<0.028	0.041	<0.028	<0.027	<0.026	<0.031	<0.026	<0.027	<0.026
Nickel	mg/kg	600	3.5	0.74	1.9	2.8	3	4	1.8	2.4	3.1
Selenium	mg/kg	400	<3.6	<3.4	<3.6	<3.6	<3.4	<4.0	<3.4	<3.4	<3.2
Silver	mg/kg	100	<0.36	<0.34	<0.36	<0.36	<0.34	<0.40	<0.34	<0.34	<0.32
Thallium	mg/kg	8	<1.8	<1.7	<1.8	<1.8	<1.7	<2.0	<1.7	<1.7	<1.6
Vanadium	mg/kg	400	6.9	2.0	4	8.9	6.7	7.4	2.6	2.5	3.7
Zinc	mg/kg	1,000	47	3.8	14	9.7	8.9	11	5.8	6.6	6.8

Table 1 - Soil Analytical Results
Sand Pit Road, Truro MA

Sample Designation			TP-2 (2-4')	TP-3 (0-2')	TP-5 (0-2')	TP-5 (6-8')	TP-6 (0-2')	TP-8 (2-4')	TP-9 (0-2')	TP-10 (6-8)	TP-11 (0-2')
Sample Date			2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023	2/2/2023
Sample Depth			2-4'	0-2'	0-2'	6-8'	0-2'	2-4'	0-2'	6-8'	0-2'
TOV PID			0.3	0.1	0.2	0.3	0.3	2.3	0.1	0.1	0.1
Soil Standards		MCP RCS-1	Sample Results								
Extractable Petroleum Hydrocarbons											
C9-C18 Aliphatics	mg/kg	1,000	<11	<11	<11	<11	<11	<12	<10	<11	<10
C19-C36 Aliphatics	mg/kg	3,000	<11	<11	<11	<11	<11	<12	<10	<11	<10
C11-C22 Aromatics	mg/kg	1,000	<11	13	15	<11	<11	<12	<10	<11	<10
Polycyclic Aromatic Hydrocarbons											
2-Methylnaphthalene	mg/kg	0.7	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Acenaphthene	mg/kg	4	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Naphthalene	mg/kg	4	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Phenanthrene	mg/kg	10	<0.11	0.22	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Acenaphthylene	mg/kg	1	<0.11	0.18	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Anthracene	mg/kg	1,000	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Benzo(a)anthracene	mg/kg	7	<0.11	0.21	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Benzo(a)pyrene	mg/kg	2	<0.11	0.23	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Benzo(b)fluoranthene	mg/kg	7	<0.11	0.39	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Benzo(g,h,i)perylene	mg/kg	1,000	<0.11	0.18	0.14	0.17	<0.11	<0.12	<0.10	<0.11	<0.10
Benzo(k)fluoranthene	mg/kg	70	<0.11	0.14	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Chrysene	mg/kg	70	<0.11	0.29	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Dibenzo(a,h)Anthracene	mg/kg	0.7	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Fluoranthene	mg/kg	1,000	<0.11	0.46	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Fluorene	mg/kg	1,000	<0.11	<0.11	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Indeno(1,2,3-cd)Pyrene	mg/kg	7	<0.11	0.2	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Pyrene	mg/kg	1,000	<0.11	0.46	<0.11	<0.11	<0.11	<0.12	<0.10	<0.11	<0.10
Polychlorinated Biphenyls (PCBs)											
PCB 1016	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1221	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1232	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1242	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1248	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1254	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1260	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1262	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS
PCB 1268	mg/kg	1	NS	NS	<0.088	NS	<0.085	NS	NS	NS	NS

Notes:
1. µg/kg = Micrograms per kilogram
2. mg/kg = Milligrams per kilogram
3. MCP = Massachusetts Contingency Plan
4. RCS-1 = The Reportable Concentration for category S-1 soils as documented in the 2019 MCP
5. **Bold** indicates concentration exceeds applicable Method 1 Standard.
6. **Bold and underlined** concentrations were Not Detected but reporting limits exceed Method 1 standard
7. < = Not detected by the laboratory above the reporting limit. Laboratory reporting limit shown.
8. U = Not detected by the laboratory above the method detection limit. Laboratory method detection limit shown.
9. TOV PID = Total Organic Vapors, Photoionization Detector Calibrated to Benzene
10. ND = Not Detected
11. NA = Not Applicable
12. NS = Not Sampled
13. Sum of six includes estimated values and does not include non-detects (U or <). SUM of Six PFAS includes *PFUnA,* PFHpA, PFHxS, PFNA, PFOA, PFOS AND PFDA.
14. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

Table 2 - Groundwater Analytical Results
Sand Pit Road, Truro MA

Sample Designation			MW-1		MW-2	MW-3
Sample Date			2/15/2023	3/15/2023	2/15/2023	2/15/2023
Depth to Water (ft)			73.34	73.13	52.35	28
Total Well Depth (ft)			82.0	82.0	60.64	36.35
Groundwater Standards		MCP RCGW-1	Sample Results			
Per- and Polyfluoroalkyl Substances						
Perfluorobutanoic acid (PFBA)	µg/L	NA	0.0059	0.00548	0.00234	0.00576
Perfluoroheptanesulfonic Acid (PFHpS)	µg/L	NA	0.00511	0.00362	0.000628 U	0.000646 U
Perfluorobutanesulfonic acid (PFBS)	µg/L	NA	0.0109	0.00962	0.000336 J	0.00112 J
Perfluoropentanoic acid (PFPeA)	µg/L	NA	0.005	0.006	0.00105 J	0.000372 U
Perfluorohexanoic acid (PFHxA)	µg/L	NA	0.0158	0.0203	0.00128 J	0.000308 U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	µg/L	NA	0.00118 U	0.00107 U	0.00111 U	0.00114 U
Perfluoropentanesulfonic Acid (PFPeS)	µg/L	NA	0.0106	0.013	0.000224 U	0.000237 J
4:2 Fluorotelomersulfonic acid (4:2FTS A)	µg/L	NA	0.000441 U	0.000399 U	0.000413 U	0.000424 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	µg/L	NA	0.0013 U	0.00118 U	0.00122 U	0.00125 U
Perfluorodecanesulfonic acid (PFDS)	µg/L	NA	0.000956 U	0.000865 U	0.000895 U	0.00092 U
Perfluoroundecanoic acid (PFUnA)	µg/L	NA	0.000254 U	0.000229 U	0.000238 U	0.000244 U
Perfluoroheptanoic acid (PFHpA)	µg/L	NA	0.0326	0.0438	0.00113 J	0.000212 U
Perfluorohexanesulfonic acid (PFHxS)	µg/L	NA	0.0488	0.0332	0.0008 J	0.00129 J
Perfluorononanoic acid (PFNA)	µg/L	NA	0.00062 J	0.000791 J	0.000285 U	0.000293 U
Perfluorooctanoic acid (PFOA)	µg/L	NA	0.00918	0.00936	0.00151 J	0.000639 J
Perfluorooctane sulfonate (PFOS)	µg/L	NA	0.248	0.238	0.00046 U	0.000473 U
Perfluorodecanoic Acid (PFDA)	µg/L	NA	0.000296 U	0.000268 U	0.000278 U	0.000286 U
Sum of Six	µg/L	0.02	**0.3392**	**0.325151**	0.00344	0.001929
Total PFAS	µg/L	NA	0.39297	0.383511	0.008446	0.009046
Volatile Petroleum Hydrocarbons						
C5-C8 Aliphatics	µg/L	300	<100	NS	<100	<100
C9-C12 Aliphatics	µg/L	700	<100	NS	<100	<100
C9-C10 Aromatics	µg/L	50,000	<100	NS	<100	<100
Target Volatile Organic Compounds						
Benzene	µg/L	5	<2	NS	<2	<2
Ethylbenzene	µg/L	700	<2	NS	<2	<2
Methyl tert-Butyl Ether	µg/L	70	<3	NS	<3	<3
Naphthalene	µg/L	140	<4	NS	<4	<4
Toluene	µg/L	1,000	<2	NS	<2	<2
o-Xylene	µg/L	NA	<2	NS	<2	<2
P,M-Xylene	µg/L	NA	<2	NS	<2	<2
Volatile Organic Compounds (VOCs)						
1,1,1,2-Tetrachloroethane	µg/L	5	<1	NS	<1	<1
1,1,1-Trichloroethane	µg/L	200	<1	NS	<1	<1
1,1,2,2-Tetrachloroethane	µg/L	2	<1	NS	<1	<1
1,1,2-Trichloroethane	µg/L	5	<1	NS	<1	<1
1,1-Dichloroethane	µg/L	70	<1	NS	<1	<1
1,1-Dichloroethylene	µg/L	7	<1	NS	<1	<1
1,1-Dichloropropene	µg/L	5,000	<2	NS	<2	<2
1,2,3-Trichlorobenzene	µg/L	NA	<2	NS	<2	<2
1,2,3-Trichloropropane	µg/L	1,000	<2	NS	<2	<2
1,2,4-Trichlorobenzene	µg/L	70	<2	NS	<2	<2
1,2,4-Trimethylbenzene	µg/L	10,000	<2	NS	<2	<2
1,2-Dibromo-3-chloropropane (DBCP)	µg/L	100	<2	NS	<2	<2
1,2-Dibromoethane (EDB)	µg/L	0.02	**<2**	NS	**<2**	**<2**
1,2-Dichlorobenzene	µg/L	600	<1	NS	<1	<1
1,2-Dichloroethane	µg/L	5	<1	NS	<1	<1
1,2-Dichloroethane, Total	µg/L	5	<1	NS	<1	<1
1,2-Dichloropropane	µg/L	3	<1	NS	<1	<1
1,3,5-Trimethylbenzene	µg/L	NA	<2	NS	<2	<2
1,3-Dichlorobenzene	µg/L	100	<1	NS	<1	<1
1,3-Dichloropropane	µg/L	NA	<2	NS	<2	<2
1,3-Dichloropropane, Total	µg/L	NA	<0.4	NS	<0.4	<0.4
1,4-Dichlorobenzene	µg/L	5	<1	NS	<1	<1
1,4-Dioxane	µg/L	0.3	**<250**	NS	**<250**	**<250**
2,2-Dichloropropane	µg/L	NA	<2	NS	<2	<2
2-Butanone (MEK)	µg/L	4,000	<5	NS	<5	<5
2-Hexanone (MBK)	µg/L	1,000	<5	NS	<5	<5

Table 2 - Groundwater Analytical Results
Sand Pit Road, Truro MA

Sample Designation			MW-1		MW-2	MW-3
Sample Date			2/15/2023	3/15/2023	2/15/2023	2/15/2023
Depth to Water (ft)			73.34	73.13	52.35	28
Total Well Depth (ft)			82.0	82.0	60.64	36.35
Groundwater Standards		MCP RCGW-1	Sample Results			
VOCs-Continued						
4-Methyl-2-pentanone (MIBK)	µg/L	350	<5	NS	<5	<5
Acetone	µg/L	6,300	<5	NS	<5	3
Benzene	µg/L	5	<0.5	NS	<0.5	<0.5
Bromobenzene	µg/L	1,000	<2	NS	<2	<2
Bromochloromethane	µg/L	NA	<2	NS	<2	<2
Bromodichloromethane	µg/L	3	<1	NS	<1	<1
Bromoform	µg/L	4	<2	NS	<2	<2
Bromomethane	µg/L	7	<2	NS	<2	<2
Carbon Disulfide	µg/L	1,000	<2	NS	<2	<2
Carbon Tetrachloride	µg/L	2	<1	NS	<1	<1
Chlorobenzene	µg/L	100	<1	NS	<1	<1
Chlorodibromomethane	µg/L	2	<1	NS	<1	<1
Chloroethane	µg/L	1,000	<2	NS	<2	<2
Chloroform	µg/L	50	<1	NS	0	<1
Chloromethane	µg/L	1,000	<2	NS	<2	<2
cis-1,2-Dichloroethylene	µg/L	20	<1	NS	<1	<1
cis-1,3-Dichloropropene	µg/L	0.4	<0.4	NS	<0.4	<0.4
Dibromomethane	µg/L	5,000	<2	NS	<2	<2
Dichlorodifluoromethane	µg/L	10,000	<2	NS	<2	<2
Diethyl Ether	µg/L	1,000	<2	NS	<2	<2
Diisopropyl Ether	µg/L	1,000	<2	NS	<2	<2
Ethylbenzene	µg/L	700	<1	NS	<1	<1
Hexachlorobutadiene	µg/L	0.6	<0.6	NS	<0.6	<0.6
Isopropylbenzene	µg/L	10,000	<2	NS	<2	<2
m+p Xylene	µg/L	NA	<2	NS	<2	<2
Methyl tert Butyl Ether	µg/L	70	<2	NS	<2	<2
Methylene Chloride	µg/L	5	<2	NS	<2	<2
Naphthalene	µg/L	140	<2	NS	<2	<2
n-Butylbenzene	µg/L	NA	<2	NS	<2	<2
n-Propylbenzene	µg/L	1,000	<2	NS	<2	<2
o-Chlorotoluene	µg/L	1,000	<2	NS	<2	<2
o-Xylene	µg/L	NA	<1	NS	<1	<1
p-Chlorotoluene	µg/L	NA	<2	NS	<2	<2
p-Isopropyltoluene	µg/L	1,000	<2	NS	<2	<2
sec-Butylbenzene	µg/L	NA	<2	NS	<2	<2
Styrene	µg/L	100	<1	NS	<1	<1
tert-Butylbenzene	µg/L	1,000	<2	NS	<2	<2
tert-Amyl Methyl Ether (TAME)	µg/L	NA	<2	NS	<2	<2
tert-Butyl Ethyl Ether (TBEE)	µg/L	NA	<2	NS	<2	<2
Tetrachloroethylene	µg/L	5	<1	NS	<1	<1
Tetrahydrofuran	µg/L	5,000	<2	NS	8.6	2.5
Toluene	µg/L	1,000	<1	NS	<1	<1
trans-1,2-Dichloroethylene	µg/L	80	<1	NS	<1	<1
trans-1,3-Dichloropropene	µg/L	0.5	<0.4	NS	<0.4	<0.4
Trichloroethylene	µg/L	5	<1	NS	<1	<1
Trichlorofluoromethane	µg/L	10,000	<2	NS	<2	<2
Vinyl Chloride	µg/L	2	<1	NS	<1	<1
Xylenes, Total	µg/L	3,000	<1	NS	<1	<1
Dissolved Metals						
Antimony	µg/L	6	<4	NS	<4	<4
Arsenic	µg/L	10	<5	NS	<5	<5
Barium	µg/L	2,000	45	NS	13	<10
Beryllium	µg/L	4	<0.5	NS	<0.5	<0.5
Cadmium	µg/L	4	<4	NS	<4	<4
Chromium	µg/L	100	<10	NS	<10	<10
Lead	µg/L	10	<10	NS	<10	<10
Mercury	µg/L	2	<0.2	NS	<0.2	<0.2
Nickel	µg/L	100	<25	NS	<25	<25
Selenium	µg/L	50	<10	NS	<10	<10
Silver	µg/L	7	<7	NS	<7	<7
Thallium	µg/L	2	<1	NS	<1	<1
Vanadium	µg/L	30	<10	NS	<10	<10
Zinc	µg/L	900	<50	NS	<50	<50

Table 2 - Groundwater Analytical Results
Sand Pit Road, Truro MA

Sample Designation			MW-1		MW-2	MW-3
Sample Date			2/15/2023	3/15/2023	2/15/2023	2/15/2023
Depth to Water (ft)			73.34	73.13	52.35	28
Total Well Depth (ft)			82.0	82.0	60.64	36.35
Groundwater Standards		MCP RCGW-1	Sample Results			
Extractable Petroleum Hydrocarbons						
C9-C18 Aliphatics	µg/L	700	<100	NS	<100	<100
C19-C36 Aliphatics	µg/L	14,000	<100	NS	<100	<100
C11-C22 Aromatics	µg/L	200	<100	NS	<100	<100
Polycyclic Aromatic Hydrocarbons						
2-Methylnaphthalene	µg/L	10	<0.4	NS	<0.4	<0.4
Acenaphthene	µg/L	20	<0.4	NS	<0.4	<0.4
Naphthalene	µg/L	140	<0.4	NS	<0.4	<0.4
Phenanthrene	µg/L	40	<0.4	NS	<0.4	<0.4
Acenaphthylene	µg/L	30	<0.4	NS	<0.4	<0.4
Anthracene	µg/L	30	<0.4	NS	<0.4	<0.4
Benzo(a)anthracene	µg/L	1	<0.4	NS	<0.4	<0.4
Benzo(a)pyrene	µg/L	0.2	<0.2	NS	<0.2	<0.2
Benzo(b)fluoranthene	µg/L	1	<0.4	NS	<0.4	<0.4
Benzo(g,h,i)perylene	µg/L	20	<0.4	NS	<0.4	<0.4
Benzo(k)fluoranthene	µg/L	1	<0.4	NS	<0.4	<0.4
Chrysene	µg/L	2	<0.4	NS	<0.4	<0.4
Dibenzo(a,h)Anthracene	µg/L	0.5	<0.4	NS	<0.4	<0.4
Fluoranthene	µg/L	90	<0.4	NS	<0.4	<0.4
Fluorene	µg/L	30	<0.4	NS	<0.4	<0.4
Indeno(1,2,3-cd)Pyrene	µg/L	0.5	<0.4	NS	<0.4	<0.4
Pyrene	µg/L	20	<0.4	NS	<0.4	<0.4

Notes:
1. µg//L = micrograms per liter.
2. **Bold** indicates concentration exceeds applicable Method 1 Standard.
3. **Bold and underlined** concentrations were Not Detected but reporting limits exceed Method 1 standard
4. MCP = Massachusetts Contingency Plan
5. RCGW-1 = The Reportable Concentration for category GW-1 groundwater as documented in the 2019 MCP
6. < = Not detected by the laboratory above the reporting limit. Laboratory reporting limit shown.
7. U = Not detected by the laboratory above the method detection limit. Laboratory method detection limit shown.
8. J = Concentration is an estimated value between the laboratory method detection limit and reporting limit.
9. ND = Not Detected
10. NA = Not Applicable.
11. NS = Not Sampled.
12. Sum of six includes estimated values and does not include non-detects (U or <). SUM of Six PFAS includes *PFUnA,* PFHpA, PFHxS, PFNA, PFOA, PFOS AND PFDA.
13. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

APPENDIX A

SUBJECT PROPERTY PHOTOGRAPHS

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 1: Vehicle storage area.



Photo 2: Utility pole area.

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 3: Mulch/yard waste processing area.



Photo 4: Mulch pile.

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 5: General sandpit area.



Photo 6: General wooded area.

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 7: Barrels used as obstacles for horses.



Photo 8: General sandpit area.

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 9: General sandpit area.



Photo 10: Typical fisherman equipment storage area.

Photo Log – 2 Sandpit Road and 9 Noons Drive



Photo 11: Typical fisherman equipment storage area.



Photo 12: Pump house for former dust control/equipment rinsing well.

Photo Log – Sand Pit Test Pits, Truro Test Pit

#1: Located near asphalt piles.







Test Pit #2: Located near asphalt piles and lobster traps.









Test Pit #3: Located near trailers.







Test Pit #4: Located near trailers.





Test Pit #5: Located on western edge of property along treeline.





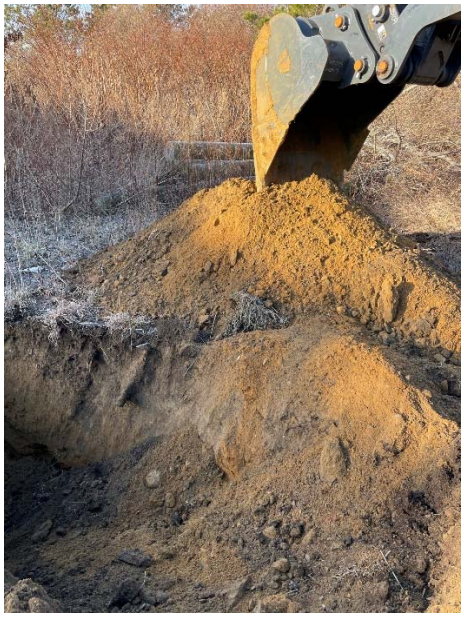








Test Pit #6: Located on northern portion of property, near wooden poles.

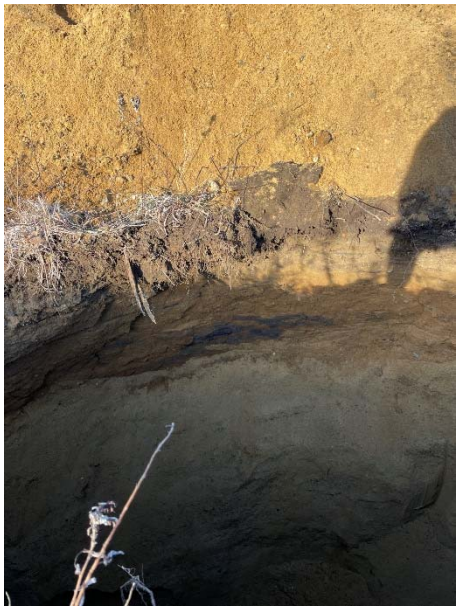












Test Pit #7: Located on northeastern portion of property, near shell pile.







Test Pit #8: Located on western portion of property, near Noons Drive.



Test Pit Grave

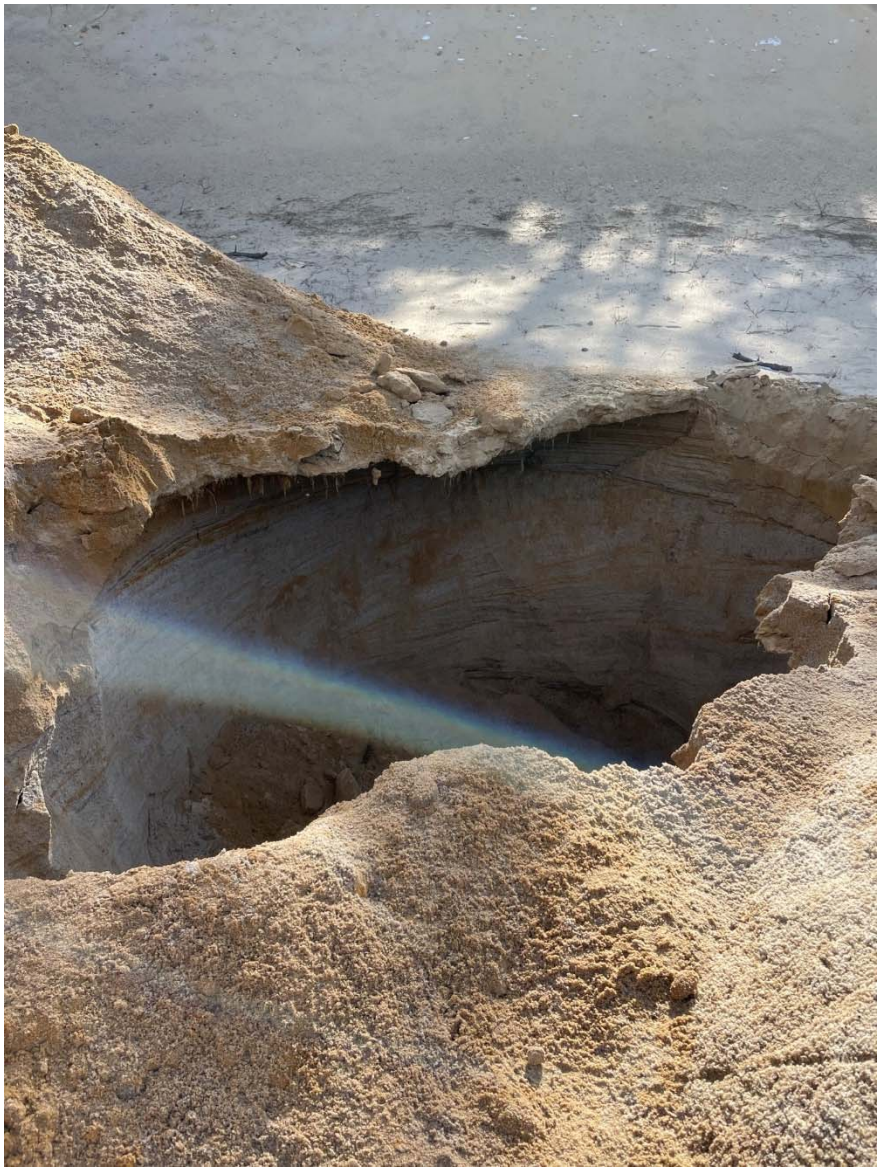




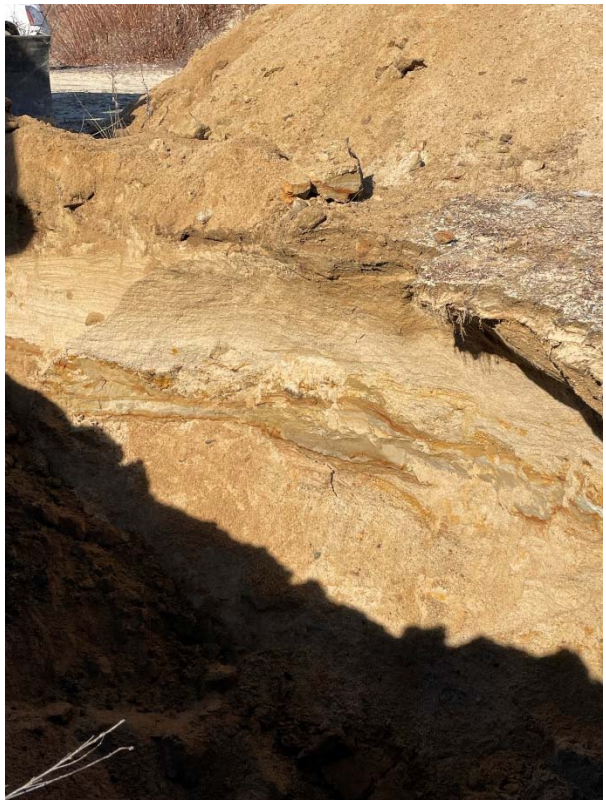




Test Pit #9: Located on southern portion of property, near sand piles.



Test Pit #10: Located in the eastern portion of the property, adjacent to access road.



Test Pit #11: Located on southeastern portion of property, on plateau near Noons Drive.









APPENDIX B

SUPPORTING DOCUMENTS

- Town of Truro Assessor's Records
- Deed Information
- Settlement and Land Use Agreement
- User Questionnaire
- Resume of Environmental Professional

Key: 1234 **Town of TRURO - Fiscal Year 2023** 9/1/2022 6:23 pm SEQ #: 1,222

LEGAL

CURRENT OWNER	PARCEL ID	LOCATION
NOONS DONALD W ESTATE OF PO BOX 23 NO TRURO, MA 02652-0023	39-107-0	2 SAND PIT RD

TRANSFER HISTORY	DOS	T	SALE PRICE	BK-PG (Cert)
NOONS DONALD W ESTATE OF	02/08/2007	99		279-034+
NOONS DONALD W	06/13/1979	99		279-034+
NOONS JOHN F (HEIR OF JOA	04/20/1905	99		279-034+

CLASS	CLASS%	DESCRIPTION	BN ID	BN	CARD
4100	100	SAND/GRAVEL		1	1 of 2

PMT NO	PMT DT	TY	DESC	AMOUNT	INSP	BY	1st	%
06-SS16	01/01/2007	50	SPLIT SUB				100	100
05-SS21	12/31/2005	50	SPLIT SUB				100	100
87-178	10/21/1987	3	REPAIR/REMOD	5,000	12/31/1987		100	100

LAND

CD	T	AC/SF/UN	Nbhd		Infl1		Infl2		ADJ BASE	SAF	Infl3		Lpi		VC	CREDIT AMT	ADJ VALUE
103	S	33,750	RT6	1.00	1	1.00	1	1.00	270,000	1.00	80	0.80	C01	0.90			209,240
303	A	37.955	RT6	1.00	1	1.00	1	1.00	11,475	1.00	50	0.50	C01	0.90			435,530

TOTAL	38.730 Acres	ZONING	GR6	FRNT	0

Nbhd	ROUTE 6
Infl1	NO ADJ
Infl2	NO ADJ

NOTE

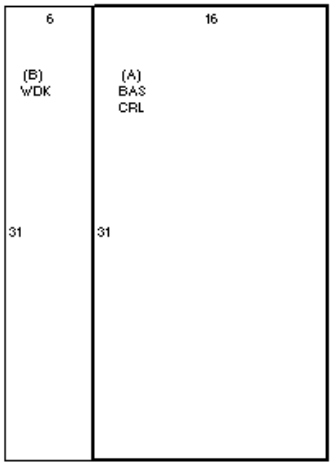
ASSESSED	CURRENT	PREVIOUS
LAND	644,800	586,000
BUILDING	74,400	67,100
DETACHED	2,100	2,100
OTHER	171,000	154,500
TOTAL	**892,300**	**809,700**

DETACHED

TY	QUAL		COND		DIM/NOTE	YB	UNITS	ADJ PRICE	RCNLD
SHM	G	1.18	A-	0.70	8X12		96	18.10	1,200
SHM	A	1.00	A	0.75	8X10		80	15.34	900

PHOTO 11/03/2011





BLDG COMMENTS
JOHN NOONS INC

BUILDING

BUILDING	CD	ADJ	DESC
MODEL	5		CIM
STYLE	20	1.95	OFFICE BUILDING [100%]
QUALITY	L	0.83	LOW COST [100%]
FRAME	1	1.00	WOOD FRAME [100%]

MEASURE	11/3/2011	DF
LIST	11/3/2011	DF
REVIEW	11/10/2010	DF

YEAR BLT	1980	SIZE ADJ	1.750
NET AREA	496	DETAIL ADJ	1.852
$NLA(RCN)	$306	OVERALL	1.000

CAPACITY	UNITS	ADJ
STORIES	1	1.00
% HEATED	100	1.00
% A/C	100	1.00
% SPRINKLERS	0	1.00

ELEMENT	CD	DESCRIPTION	ADJ
FOUNDATION	3	CONTIN WALL	1.00
EXTERIOR WALL	1	WOOD SHINGLES	1.00
ROOF STRUCTURE	1	GABLE	1.00
ROOF COVER	1	ASPH/COMP SHIN	1.00
FLOORING	3	WW/ CARPET	1.00
INT FINISH	2	DRYWALL	1.02
H.V.A.C.	5	ELECTRIC	0.98
FUEL SOURCE	3	ELECTRIC	1.00
COMPLEX	0		1.00

S	BAT	T	DESCRIPTION	UNITS	YB	ADJ PRICE	RCN
A	CRL	N	CRAWL SPACE	496		15.50	7,688
A	BAS	L	BASE AREA	496	1980	264.67	131,277
B	WDK	N	WOOD DECK	186		69.67	12,958

TOTAL RCN	151,923
CONDITION ELEM	CD

EFF.YR/AGE	1990 / 31
COND	51 51 %
FUNC	0
ECON	0
DEPR	51 % GD 49
RCNLD	$74,400

Key: 1234 **Town of TRURO - Fiscal Year 2023** 9/1/2022 6:23 pm SEQ #: 1,223

LEGAL

CURRENT OWNER	PARCEL ID	LOCATION
NOONS DONALD W ESTATE OF PO BOX 23 NO TRURO, MA 02652-0023	39-107-0	2 SAND PIT RD

TRANSFER HISTORY	DOS	T	SALE PRICE	BK-PG (Cert)

CLASS	CLASS%	DESCRIPTION	BN ID	BN	CARD
4100	100	SAND/GRAVEL		2	2 of 2

PMT NO	PMT DT	TY	DESC	AMOUNT	INSP	BY	1st	%

LAND

CD	T	AC/SF/UN	Nbhd	Infl1	Infl2	ADJ BASE	SAF	Infl3	Lpi	VC	CREDIT AMT	ADJ VALUE

TOTAL		ZONING		FRNT	
Nbhd		NOTE			
Infl1					
Infl2					

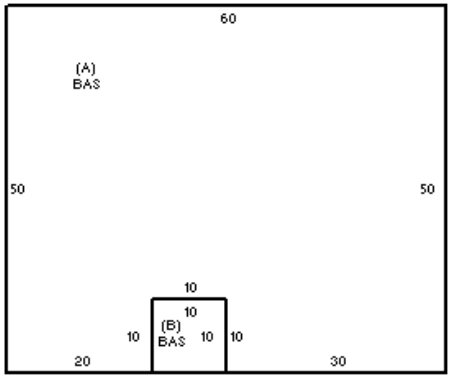
ASSESSED	CURRENT	PREVIOUS
LAND	171,000	
BUILDING		
DETACHED		
OTHER		
TOTAL		

DETACHED

TY	QUAL	COND	DIM/NOTE	YB	UNITS	ADJ PRICE	RCNLD

PHOTO 11/03/2011





BLDG COMMENTS

PLEASANT VIEW AUTO BODY

BUILDING

BUILDING	CD	ADJ	DESC
MODEL	5		CIM
STYLE	52	1.91	SERVICE GARAGE [97%]
QUALITY	L	0.83	LOW COST [100%]
FRAME	4	1.00	METAL FRAME [100%]

MEASURE	11/3/2011	DF
LIST	11/3/2011	EST
REVIEW	11/10/2011	DF

YEAR BLT	1985	SIZE ADJ	0.915
NET AREA	3,000	DETAIL ADJ	1.734
$NLA(RCN)	$130	OVERALL	1.000

CAPACITY	UNITS	ADJ
STORIES	1	1.00
% HEATED	100	1.00
% A/C	0	1.00
% SPRINKLERS	0	1.00

ELEMENT	CD	DESCRIPTION	ADJ
FOUNDATION	2	SLAB	1.00
EXTERIOR WALL	19	PRE-FAB METAL	1.01
ROOF STRUCTURE	1	GABLE	1.00
ROOF COVER	10	METAL	0.98
FLOORING	9	CONCRETE	0.95
INT FINISH	6	MINIMUM	0.95
H.V.A.C.	1	FORCED AIR	1.00
FUEL SOURCE	2	GAS	1.00
COMPLEX	0		1.00

S	BAT	T	DESCRIPTION	UNITS	YB	ADJ PRICE	RCN
A	BAS	L	BASE AREA	2,900	1985	129.56	375,729
B	BAS	L	BASE AREA	100	1985	129.56	12,956

TOTAL RCN	388,685
CONDITION ELEM	CD
EFF.YR/AGE	1985 / 36
COND	56 56 %
FUNC	0
ECON	0
DEPR	56 % GD 44
RCNLD	$171,000

Key: 1235 **Town of TRURO - Fiscal Year 2023** 9/1/2022 6:23 pm SEQ #: 1,224

LEGAL

CURRENT OWNER	PARCEL ID	LOCATION
NOONS DONALD W ESTATE OF **PO BOX 23** **NO TRURO, MA 02652-0023**	**39-108-0**	**9 NOONS DR**

TRANSFER HISTORY	DOS	T	SALE PRICE	BK-PG (Cert)
NOONS DONALD W ESTATE OF	02/08/2007	99		10833-307+
NOONS DONALD W	07/02/1997	H		10833-307

CLASS	CLASS%	DESCRIPTION	BN ID	BN	CARD
1300	100	DEV LAND			1 of 1

PMT NO	PMT DT	TY	DESC	AMOUNT	INSP	BY	1st	%

LAND

CD	T	AC/SF/UN	Nbhd	Infl1	Infl2	ADJ BASE	SAF	Infl3	Lpi	VC	CREDIT AMT	ADJ VALUE
100	A	0.775	11 1.00	1 1.00	L2 0.75	410,944	1.00	1 1.00	V6 1.75			318,480
300	A	16.425	11 1.00	1 1.00	1 1.00	41,825	0.55	1 1.00	V6 1.75			379,070
400	F	300	11 1.00	1 1.00	1 1.00	403	1.00	1 1.00	V6 1.75			120,750

TOTAL	17.200 Acres	ZONING	RES	FRNT	313
Nbhd	NORTH TRURO	NOTE	FY05=DECR ACRG AGAIN PER 2003 PLAN. FY10 ADDED LOC ADJ (ABUTS SAND/GRVL PIT)+VW +CHGD REMAINING FRNTG+ MOVED LT3 ADJ TO CODE 300. FY11=VW INCR (DISTANT PANORAMIC) +DELETED LG TRACT ADJ PER FIELD REV. ADDITIONAL 649' FRONTAGE AT END OF NOONS		
Infl1	NO ADJ				
Infl2	LOC ADJ				

ASSESSED	CURRENT	PREVIOUS
LAND	818,300	706,300
BUILDING	0	0
DETACHED	0	0
OTHER	0	0
TOTAL	**818,300**	**706,300**

DETACHED

TY	QUAL	COND	DIM/NOTE	YB	UNITS	ADJ PRICE	RCNLD

PHOTO

BUILDING

BUILDING	CD	ADJ	DESC
MODEL			
STYLE			
QUALITY			
FRAME			

MEASURE		
LIST		
REVIEW		

BLDG COMMENTS

YEAR BLT		SIZE ADJ	
NET AREA		DETAIL ADJ	
$NLA(RCN)		OVERALL	

CAPACITY	UNITS	ADJ

ELEMENT	CD	DESCRIPTION	ADJ

S	BAT	T	DESCRIPTION	UNITS	YB	ADJ PRICE	RCN

TOTAL RCN

CONDITION ELEM	CD

EFF.YR/AGE

COND	
FUNC	
ECON	
DEPR	% GD

RCNLD

FIDUCIARY DEED

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FLEET NATIONAL BANK, a banking corporation established under the laws of the United States of America and having an address of 75 State Street, Boston, Massachusetts 02109, as it is Executor of the Will of John F. Noons, Barnstable Probate and Family Court Docket Number 58216, pursuant to the power of sale contained in said will and as it is Trustee under a certain trust agreement dated November 21, 1978, recorded in Barnstable Deeds, Book 9722, Page 320 establishing The John F. Noons Trust Agreement, pursuant to the powers set forth or contained therein, and every other power hereto enabling,

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in consideration of ONE ($1.00) DOLLAR paid,

grants to

DONALD W. NOONS of Post Office Box 23, North Truro, Massachusetts 02652

The following parcels of land, together with improvements thereon, if any, in Truro, Barnstable County, Massachusetts:

I. Land containing 19.591 acres, more or less, as shown on a plan entitled in part: "Consolidation of Plan of Land in Truro made for the Estate of John F. Noons" dated Aug., 1981 prepared by Slade Associates, Inc. and recorded in Barnstable County Registry of Deeds Plan Book 360, Page 15.

Excluded from the foregoing premises is a parcel consisting of .806 acres, more or less, and being shown as LOT 1 on a plan entitled in part: "Division Plan of Land in Truro made for Donald W. Noons" dated May, 1993 prepared by Slade Associates, Inc. and recorded in Barnstable County Registry of Deeds Plan Book 499, Page 51, said excluded portion having been previously conveyed by deed recorded in Book 8941, Page 236.

For Grantor's title to Parcel I see deed recorded in Barnstable County Registry of Deeds Book 1051, Page 488 of which the above described premises are a portion. See also decree of the Barnstable Probate and Family Court in case number 96E 0031 CG-1.

II. LOT 6 containing 26,042 square feet, more or less, being shown on a plan entitled in part: "Subdivision Plan of Land in North Truro made for John F. Noons" dated September, 1970 prepared by W.G. Slade, Surveyor and filed in the Barnstable Registry of Deeds in Plan Tube 169.

For Grantor's title to Parcel II see deed recorded with Barnstable County Registry of Deeds Book 1263, Page 205 of which the above described premises are a portion.

III. LOT 7 containing 27,229 square feet, more or less, being shown on a plan entitled in part:

7

"Subdivision Plan of Land in North Truro made for John F. Noons" dated September, 1970 prepared by W.G. Slade, Surveyor and filed in the Barnstable Registry of Deeds in Plan Tube 169.

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For Grantor's title to Parcel III see deed recorded with Barnstable County Registry of Deeds Book 1263, Page 205 of which the above described premises are a portion.

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With respect to all parcels see also the above referenced probate docket number 58216. See also Barnstable Registry District document number 454,307, Shawmut Bank of Cape Cod, N. A. becomes Shawmut Bank of Southeastern Massachusetts, N. A.; document number 485,068, Shawmut Bank of Southeastern Massachusetts, N. A. becomes Shawmut Bank, N. A.; document number 658,460, Shawmut Bank, N. A, becomes Fleet National Bank of Massachusetts; and document number 663,200, Fleet National Bank of Massachusetts becomes Fleet National Bank.

IN WITNESS WHEREOF, the said Fleet National Bank, Trustee and Executor as aforesaid, has caused its corporate seal to be hereto affixed and these presents to be signed, acknowledged and delivered in its name and behalf by GEOFFREY V. REULAND, its Vice President, hereunto duly authorized this 19th day of June, 1997.

FLEET NATIONAL BANK,
Trustee and Executor as aforesaid

By: _____
Geoffrey V. Reuland, Vice President

COMMONWEALTH OF MASSACHUSETTS

Barnstable, ss. June 19, 1997

Then personally appeared the above named Geoffrey V. Reuland, Vice President, and acknowledged the foregoing instrument to be the free act and deed of Fleet National Bank, as trustee and executor as aforesaid, before me,

_____
Notary Public
My Commission Expires: Nov. 30, 2001

BARNSTABLE REGISTRY OF DEEDS

Know all men by these presents,

That I Antone Lucas of Truro in the County of Barnstable and Commonwealth of Massachusetts

IN CONSIDERATION OF (One Hundred Sixty One Dollars)

paid by Joaquim Nunes of Truro aforesaid

the receipt whereof is hereby acknowledged, do hereby give, grant, bargain, sell, and convey unto the said Joaquim Nunes a piece of land situated in North Truro and bounded as follows, viz:- Commencing at the northwest corner of Nunes & Elizabeth G Avery's land and running by the said Averys land Southeasterly Five (5) rods and two (two) feet to land of Edward F Cook Easterly thirty two (32) rods; thence South by one hundred twenty one and one third (121⅓) rods to the land of the Estate of John Smith; thence westerly by land of said Smiths Estate Eighty four (84) rods to land of Nunes & Elizabeth G Avery; thence Northerly by land of said Avery, John L Rich, Michael A Rich, Great Swamp Cranberry Co, John L Rich and Michael A Rich about one hundred and eighty (180) rods to land of John C Thompson; thence by said Thompsons land seventy and one half (70½) rods to the starting point and containing Sixty five Acres more or less. Reserving the right of a road through said land to the land of John L and Michael A Rich and reserving also the same rights of way as held by Jesse Paine and conveyed by the administrators of John L Rich in the deed of Feb 6. 1882 and also reserving to the Great Swamp Cranberry Co a road through the adjoining land not over thirty (30) feet wide. It being the same premises conveyed to me by John L Rich by deed dated May 6 1891 and recorded with Barnstable County Deeds, Book 216 Page 203

TO HAVE AND TO HOLD the granted premises with all the privileges and appurtenances thereto belonging to the said grantee Joaquim Nunes and his Heirs and Assigns to their own use and behoof forever.

And I hereby for myself and my Heirs, Executors, and Administrators, covenant with the said grantee and his Heirs and Assigns, that I am lawfully seized in fee simple of the granted premises: that they are free from all incumbrances except as aforesaid

That I have good right to sell and convey the same as aforesaid; and that I will, and my Heirs, Executors, and Administrators shall WARRANT AND DEFEND the same to the said grantee and his Heirs and Assigns forever against the lawful claims and demands of all persons.

And for the consideration aforesaid

do hereby release unto the said grantee and Heirs and Assigns all right of or to both DOWER and HOMESTEAD in the granted premises, and all other rights and interests therein.

IN WITNESS WHEREOF I the said Antone Lucas Single

have hereunto set my hand and seal this twentieth day of April in the year One Thousand Nine Hundred and five

Signed, Sealed, and Delivered, in presence of

Antone Lucas (LS)
Joaquim Nunes

COMMONWEALTH OF MASSACHUSETTS.

Barnstable ss. April 20th 1905.

Then personally appeared the above-named Antone Lucas and acknowledged the foregoing instrument to be his free act and deed; before me,

William H Young JUSTICE OF THE PEACE.

BARNSTABLE, ss. Received April 30 1906, and is recorded and compared

ATTEST, Frederick T. Nickerson REGISTER.

Bk 27647 Pg25 #49707
08-27-2013 @ 10:32a

SETTLEMENT AND LAND USE AGREEMENT

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This Settlement and Land Use Agreement is made between, on the one hand, Paula Noons, as Executrix of the Estate of Donald Noons, and John F. Noons, Inc. (together, "Noons), and, on the other hand, John A. Shope, Frank Korahais, Gwyndolyn Korahais, Beth Dietz, Christine Markowski, Leslie Gerber, Frederick M. Misilio, Jr. (as trustee of the Noons Drive Realty Trust), Veronika Bernstein, David Bernstein, Nicholas Paradis and Banafsheh Moradi (together, "the Abutters").

WHEREAS, the Estate of Donald Noons is the owner of record of property known as 9 Noons Drive and listed as Parcel 39-108 on the tax rolls of the Truro assessor, as well as adjoining property known as 2 Sandpit Road listed as Parcel 39-107 on the same tax rolls (Parcels 39-107 and 39-108 shall be referred to herein as the "Noons Parcels");

WHEREAS, John F. Noons, Inc., contends that it has operated a sand and gravel operation dating back to the 1950s on Parcels 39-107 and 39-108;

WHEREAS, the Abutters are the owners and/or the occupants of properties that immediately abut Parcel 39-108 (and are not far from Parcel 39-107) and that have addresses of 32 Noons Drive, 30 Noons Drive, 29 Noons Drive, 28 Noons Drive, 25 Noons Drive, 23 Noons Drive, and 21 Noons Drive (all of said properties shall be referred to herein as the "Abutters Parcels");

WHEREAS, the Noons Parcels and the Abutters Parcels affected by this agreement are listed more particularly by reference to deeds on Exhibit A hereto.

WHEREAS, most of the Abutters have complained to the Building Inspector of the Town of Truro about the excavation of sand by John F. Noons, Inc. on Parcel 39-108, and have complained to Noons about the use of Parcels 39-107 and 39-108 for target shooting;

WHEREAS, Noons reports that it has taken preventative action regarding the target shooting, including following through with notice to the Truro Police Department;

WHEREAS, by letter dated August 16, 2012, the Building Inspector issued an order to Noons to cease and desist from the excavation of sand/soil on Parcel 39-108, and to restore the property to its pre-excavation condition;

WHEREAS, Noons has appealed the order of the Building Inspector, and the Abutters have opposed the appeal; and

WHEREAS, Noons and the Abutters seek amicably to resolve the issues concerning the use of Parcels 39-107 and 39-108 for target shooting and the excavation of Parcel 39-108, reserving their rights as to all other land use or other issues that may arise or have arisen between them.

17

NOW, THEREFORE, the parties agree as follows:

1. The Abutters shall withdraw their complaint to the Building Inspector with respect to the excavation of Parcel 39-108, except that the Abutters shall not be deemed to have waived any legal rights in the event that the obligations of Noons do not become effective under paragraph 3 below.

2. So long as Noons shall remain in compliance with this Agreement, the Abutters shall not object to the issuance of a permit to excavate sand, during work days (other than Massachusetts or federal holidays) only, in the portion of Parcel 39-108 designated for new excavation on the map attached hereto as Exhibit B, so long as said permit shall require as a condition compliance with the obligations in paragraph 5 below.

3. Provided the Building Commissioner withdraws his Cease and Desist Order, dated August 16, 2012, and further issues a permit for sand and gravel excavation consistent with the proposed continued new excavation, as shown on Exhibit B attached hereto, excavation (other than as may be permitted for building, road construction, leveling and filling pursuant to a validly issued permit(s) and / or approval(s)) shall be prohibited on all land in between Noons Drive and Somerset Heights Road, the location of which roads is denoted on deeds recorded at the Barnstable Registry of Deeds at, respectively, Plan Book 241, Page 41, and Plan Book 299, Page 54. For certainty, other than as set forth above, the parties reserve their rights as to any excavation on Parcel 39-108, except that Noons agrees that it shall not undertake or permit any excavation except pursuant to a permit issued by the Town of Truro.

4. Noons and their successors, heirs, and assigns shall not use or permit the use of Parcels 39-107 or 39-108 for target shooting or other discharge of firearms. Upon the execution of this agreement by all parties, Noons shall confirm to the Truro Town Police by letter in the form attached hereto as Exhibit C that shooting on Parcels 39-107 and 39-108 is prohibited and that any persons who may hereafter discharge firearms on the property will be trespassing.

5. The Estate of Donald Noons and John F. Noons, Inc. shall be jointly and severally responsible to complete the measures set forth on Exhibits D and E, attached hereto, in order to screen Parcel 39-108 from view from 32 Noons Drive, to permit access to 32 Noons Drive and to partially mitigate the disruption of the natural landscape resulting from the excavation that has already taken place, as more specifically provided for in Exhibit D, the Work Narrative.

6. Noons' obligations under paragraphs 3 and 5 shall be in full force and effect only as long as Noons uses any portion of Parcel 39-108 for a sand and gravel operation. In the event that the owner of record of Parcel 39-108 forever abandons, both for itself and its successors, heirs, and assigns, the sand and gravel operation on parcel 39-108 and records a notice to that effect, then the obligations of Noons under this agreement, as set forth in paragraphs 3 and 5, shall cease to exist and be of no further force and effect. The parties agree that the recorded notice shall have the effect of permanently discontinuing and abandoning the sand and gravel operation on Parcel 39-108, irrespective of how many years have passed, notwithstanding any language in the Truro Zoning or General By-Law to the contrary. Further, the parties agree that irrespective of whether any such notice is filed, Noons shall be obligated to complete all of the work listed on Exhibit D,

the Work Narrative, and that the berm to be constructed thereunder, in order to screen Parcel 39-108 from the view of 32 Noons Drive, shall remain in place and its plantings may be maintained by John A. Shope or his successors (and trimmed by the Abutters per the terms of Exhibit D) until such time as a redevelopment plan for Parcel 39-108 has been filed and received all requisite approvals from the Town of Truro and the Cape Cod Commission, to the extent applicable.

7. The rights, restrictions and responsibilities pursuant to this agreement are intended to run with the land in perpetuity or as long as may be permitted under Massachusetts law. Without limiting the foregoing, (a) the rights, benefits, liabilities, agreements and obligations set forth in Paragraphs 1 and 2 shall bind the Abutters and all parties claiming by, through or under the Abutters, and are for the benefit of the Noons Parcels and may be enforced by the Noons and all parties claiming by, through or under the Noons, and (b) the rights, benefits, restrictions, liabilities, agreements and obligations set forth in Paragraphs 3, 4 and 5 shall burden the Noons Parcels and shall bind Noons and all parties claiming by, through or under Noons, and are for the benefit of the Abutters Parcels and may be enforced by the Abutters and all parties claiming by, through or under the Abutters. This Agreement and extensions pursuant to M.G.L. c. 184, § 27 may be recorded by any party at the Barnstable Registry of Deeds.

8. This agreement shall take effect upon the execution by the last of the Estate of Donald Noons, John F. Noons, Inc., and John A. Shope, irrespective of execution by any other party, but no other party may claim any rights hereunder unless it shall have executed the agreement by May 6, 2013.

9. This agreement may be executed in counterparts that, taken together, shall constitute a single agreement.

WHEREUNTO the parties have subscribed their signatures below.

ESTATE OF DONALD NOONS

Paula Noons, Executrix

By: Paula Noons, Executrix

JOHN F. NOONS, INC.

By: Linda Noons Rose, President

The Commonwealth of Massachusetts

Barnstable, ss. May 6, 2013

On this day, personally appeared the above-named Paul Noons and Linda Noons Rose, proved to me by satisfactory evidence of identification, being (check whichever applies): □ driver's license or other state or federal governmental document bearing a photographic image, □ oath or affirmation of a credible witness known to me who knows the above signatory, or ☒ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing instrument to be his/her free act and deed for the purposes stated therein.

SANDRA VALENTINE-RODA
Notary Public
Commonwealth of Massachusetts
My Commission Expires
March 7, 2014

Sandra Valentine-Roda
(Print Name of Notary Public):
My commission expires: March 7, 2014

John A. Shope

The Commonwealth of Massachusetts

Suffolk, ss. April 22, 2013

On this day, personally appeared the above-named John A. Shope, proved to me by satisfactory evidence of identification, being (check whichever applies): □ driver's license or other state or federal governmental document bearing a photographic image, □ oath or affirmation of a credible witness known to me who knows the above signatory, or ☒ my own personal knowledge of the identity of the signatory, to be the person whose name is signed above, and acknowledged the foregoing instrument to be his/her free act and deed for the purposes stated therein.

Alida Rose McGoldrick
(Print Name of Notary Public):
My commission expires: 10/26/18

ALIDA ROSE McGOLDRICK
Notary Public
Commonwealth of Massachusetts
My Commission Expires October 26, 2018

Frank Korahais

Gwyndolyn H. Korahais

Beth Dietz

Christine Markowski

Leslie Gerber

Frederick M. Misilio, Jr., as trustee of the
Noons Drive Realty Trust

Veronika Bernstein

David Bernstein

Nicholas Paradis

Banafsheh Moradi

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Frank Korahais

Gwydolyn Korahais

Beth Dietz

Christine Markowski

Leslie Gerber

Leslie Gerber

Frederick M. Misilio, Jr., as trustee of the Noons Drive Realty Trust

Veronika Bernstein

David Bernstein

Nicholas Paradis

Banafsheh Moradi

Frank Korahais

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Beth Dietz

Christine Markowski

Leslie Gerber

Frederick M. Misilo, Jr., as trustee of the
Noons Drive Realty Trust

Trustee

Veronika Bernstein

David Bernstein

Nicholas Paradis

Banafsheh Moradi

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Frank Korahais

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Gwyndolyn H. Korahais

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Noons Drive Realty Trust

Veronika Bernstein

David Bernstein

Nicholas Paradis

Banafsheh Moradi

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Exhibit A

Noons Parcels

Parcel 39-107, 2 Sandpit Road, see Barnstable Book 279, Page 34.

Parcel 39-108, 9 Noons Drive, see Barnstable Book 10833, Page 307.

Abutters Parcels

32 Noons Drive, see Barnstable Book 24303, Page 202.

30 Noons Drive, see Barnstable Book 1941, Page 157.

29 Noons Drive, see Barnstable Book 25491, Page 30.

28 Noons Drive, see Barnstable Book 1461, Page 736.

25 Noons Drive, see Barnstable Book 12656, Page 191.

23 Noons Drive, see Barnstable Book 24234, Page 24.

21 Noons Drive, see Barnstable Book 23657, Page 292.

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Exhibit B

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[copies of Exhibit B are on file with the parties and the Building Inspector for the Town of Truro]

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Exhibit C

NOT AN OFFICIAL COPY

[Letterhead of John F. Noons, Inc.]

Chief Kyle Takakjian
Truro Police Department
344 Route 6
Truro, MA 02666

Re: Shooting in Sand Pit

Dear Chief Takakjian:

This will confirm that John F. Noons, Inc. and the Estate of Donald Noons do not permit target shooting or other discharge of firearms in the premises and property at 2 Sandpit Road and 9 Noons Drive, which are popularly known as "the sand pit." Please have your force treat any persons who may be discharging firearms in the sand pit as trespassing.

Thank you for your attention to this matter.

Sincerely,

Linda Noons Rose
President

cc: John A. Shope

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Exhibit D

Work Narrative

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The work to be done is by reference to the pole lines and stakes as shown on the sketch plans attached as Exhibit E.

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Pole #1 sits by the driveway on or near the boundary line for 32 Noons Drive (as depicted at Plan Book 241, Page 41, without reference to the derelict fee statute) as shown on the attached sketch plan. Pole #2 sits within 3 to four feet of the boundary line for 32 Noons Drive at the end of Noons Drive running north, northwesterly. Starting with pole #1, the pole line runs in a north, northwesterly direction, measured in 20' sections with the last section being fifteen feet (15') (all measurements are more or less) for a total distance of approximately one hundred fifty five feet (155'). Noons does not hereby waive any right to seek to relocate or remove Pole #2, there being no effect of such relocation on Noons' obligations hereunder.

At pole #1, the trees are grown and dense and the machinery needed to perform the work (as set forth below) is a minimum of ten feet (10') wide. Therefore it will be necessary to clear some trees from this area in order to bring in the necessary machinery for the work (including any widening of the road). In order to accomplish the work, Noons will be required to cut or trim trees growing along the pole line in order to permit access for the work to be performed pursuant to this agreement. Linda Noons Rose and John Shope have together marked with orange paint the trees to be removed.

Noons shall begin the leveling of the road approximately twenty feet (20') from pole #1, and end at pole #2.

Currently the approximate measurement at the highest point of the grade to level is about six feet (6') from the beginning point.

For purposes of reference, approximately eighty feet (80') from pole #1 there is currently a rim buried in the banking as well as a small pile of rubble at the bottom of the bank - this is the highest point of the grade to level. Noons shall remove this rim and any other debris in connection with the work.

Noons shall grade to soften any cuts created by the creation or regrading of the road.

The material removed will be used to help fill the banking.

Noons shall mulch and terrace the cut edge to promote growth and for aesthetic reasons, unless John A. Shope shall determine that it is not necessary.

Noons shall fill in the area of banking along the projected path of the driveway, which is the first eighty feet (80').

All material used for any of the work pursuant to this agreement shall be clean fill, which the parties agree shall be free of debris or contaminants.

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Appropriate fill will be used working from both the top over the edge and from the bottom.

In order to provide access for larger vehicles as well as a buffer, appropriate fill shall be used to create a passage/base on Noons Drive of thirty feet (30') parallel to the pole line for a distance of approximately 80' from pole #1. From that point to Pole #2, the width of the passage may, at the election of Noons, neck down to the existing width due to the lack of need of access to the corner of the 32 Noons Drive lot.

A standard finished banking grade of 1.5 to 2 to 1 shall be established along this area. That is, the bank shall run horizontally from 1.5' to 2' for each 1' that it rises. However, at the election of Noons, the banking grade may be made softer.

As a protected means, a low berm or small boulders shall be added to the edge as well (or poles) to create a berm of a few feet. The banking shall descend gradually after pole #2.

The banking area running 80' from the work to pole # 2 in a north, northwesterly direction will be leveled but otherwise left in its present condition because Noons is unable to fill from the top without crossing property lines and avoiding wires. (There is previously processed material presently stockpiled at the edge of the bank.)

Noons will fill some from the bottom and/or pull down and re-grade or terrace this section as it becomes accessible.

The Berm

Noons shall create a berm of material for the purpose of a visual buffer and to provide a planting medium.

The area of the berm will be twenty feet (20') in on the northeast side of the road, beginning at a point as shown on the attached sketch plan. The berm will peak at about eight feet (8') and gradually slope to cover an area of approximately fifteen feet (15') running north, northwesterly by Noons Drive and running approximately fifty feet (50') easterly by Somerset Heights Road.

Noons shall cover the side of the berm facing Somerset Heights Road with a mulching material. Noons shall plant on the berm two (2) rows of Leyland Cypress trees on the in a staggered fashion. One row shall be at the base of berm next to the existing pine trees and the other row shall be on the south side of the term. The berm may be terraced if necessary to accommodate the planting of the trees.

The remaining banking behind the berm will be filled to make a 1.5 to 2 to 1 slope, except that a softer grade is permissible at the election of Noons.

The berm shall have soil suitable to sustain Leyland Cypress trees, and in particular, shall have a base layer of loam of at least one foot (1') and a surface layer of loam of at least one foot (1').

No fewer than twenty-four (24) Leyland Cypress trees having an initial height of approximately three feet (3') (but no less than 2'8") shall be planted on the berm.

Noons shall also plant no fewer than seven (7) Leyland Cypress trees having an initial height of approximately three feet (3') (but no less than 2'8") at the intersection of Somerset Heights Road and Noons Drive. The area shall be filled in a couple of feet and graded down not too close to the road to provide an appropriate planting medium for the trees to root well. Linda Noons Rose and John Shope have staked the locations of these seven (7) trees. In this area the planting could get an earlier start with the trees planted before the berm is built.

Noons estimates that the filling and berm creation will require approximately 1600 cubic yards of material, but Noons' obligations hereunder shall not be affected if that estimate is incorrect.

Noons shall not be responsible for watering or tending the trees, but, for itself and its successors, the Estate of Donald Noons hereby grants to John A. Shope and his successors in title at 32 Noons Drive an easement of access for the limited purpose of watering and tending the trees to be planted pursuant to this agreement. In addition, for itself and its successors, the Estate of Donald Noons hereby grants to the Abutters and their successors in title the right to trim the Leland Cypress trees to be planted pursuant to this agreement but only to the extent necessary to preserve unobstructed views of Cape Cod Bay from their currently existing residences. Shope and the Abutters hereby agree to indemnify and hold harmless Noons against any personal injury, damage or claim arising out of the limited rights granted hereunder. Further, the easement of access and trimming rights granted hereunder, shall be in full force and effect only until the owner of record of Parcel 39-108 shall file a notice, pursuant to paragraph 6 of the Settlement and Land Use Agreement, that said owner has permanently abandoned, for itself and its successors and assigns, any sand and gravel operation on Parcel 39-108 and a redevelopment plan for Parcel 39-108 has been filed and received all requisite approvals from the Town of Truro and the Cape Cod Commission. Noons agrees to take care not to damage hoses or any other property used to water or tend the trees and shall indemnify John A. Shope in the event that it does so.

Irrespective of the date on which the building inspector may withdraw his complaint or issue a new permit to excavate, the planting of the seven (7) Leyland Cypress trees at the intersection of Somerset Heights Road and Noons Drive shall be completed by June 15, 2013. The creation of the berm shall be completed by May 31, 2013, except for ten feet or less on the eastern edge. The planting of the trees on the berm shall be completed by June 30, 2013, except for trees on the eastern edge noted above. The remainder of the berm and planting of remaining trees thereon shall be completed by October 1, 2013. The remaining grading and filling shall be completed no later than December 31, 2013.

All work to be performed pursuant to this agreement shall be performed on weekdays only (state and federal holidays excepted), without prior approval of Shope, which shall not be unreasonably withheld.

AREA TO BE EXCAVATED UNDER PERMIT

Stakes have been placed 20' apart for a distance of approximately 300' running 15" or less from the tree line along the road known as Somerset Heights Road, in a north, northeasterly direction. This line is located from Somerset Heights Road in distances varying from 40' to 120' as approximately shown on the attached sketch plan. At the end the line turns (in a curve) north, northeasterly for approximately 120' and then northwesterly to the edge of the already excavated area all as approximately shown on the attached sketch plan.

Upon the completion of excavation, the banking along this line shall be graded to a 1.5 to 2 to 1 grade and some areas such as the circular area (shown on the plan) shall be filled in completely and graded the same ratio, except that at the election of Noons the grade may be softer.

The adjacent areas that have previously been worked in years past will also be regraded so as to create a groomed landscape. The tree line along Somerset Heights Road will not be affected.

For certainty, this agreement does not address any rights of excavation as to Parcel 39-107, as to which the parties reserve their rights.

Exhibit E

[Copies of Exhibit E are on file with the parties and the Building Inspector for the Town of Truro]

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BARNSTABLE REGISTRY OF DEEDS

ASTM E1527-21 USER QUESTIONNAIRE

Name: Jarrod J. Cabral Title: Director of Public works

Company: Town of Truro Date: MAy 8th, 2023

Relationship to Site: The Town of Truro is considering purchasing 2 Sand Pit Road and 9 Noons Way.

Are you aware of any AULs, such as engineering controls, land use restrictions or institutional controls that are in place at the site and/or have been filed or recorded in a registry?

☐ Yes
☑ No

If yes describe:

_____

_____

_____

Do you have any other knowledge or experience with the property that may be pertinent to the environmental professional?

☐ Yes
☑ No

If yes describe:

_____

_____

_____

_____

_____

Are you aware of any environmental cleanup liens against the property that are filed or recorded under federal, tribal, state or local law?

☐ Yes
☑ No

If yes describe:

_____

_____

_____

ASTM E1527-21 USER QUESTIONNAIRE

As the user of this ESA do you have any specialized knowledge or experience related to the property or nearby properties?

☐ Yes
☑ No

If yes describe:

Does the purchase price being paid for this property reasonably reflect the fair market value of the property? If not, have you considered whether the price difference is due to contamination?

☐ Yes
☐ No

Additional Information

Appraisal is under contract, we expect deliverables in four weeks

---

Do you know the past uses of the property?

☑ Yes
☐ No

If yes describe:

The property has historically been used for landscape supply, lobster trap winter storage,

brush dump for landscapers, and storage for Noons construction company.

Do you know of specific chemicals that are present or once were present at the property?

☐ Yes
☑ No

If yes describe:

ASTM E1527-21 USER QUESTIONNAIRE

Do you know of spills or other chemical releases that have taken place at the property?

☐ Yes
☑ No

If yes describe:

_____

_____

_____

Do you know of any environmental cleanups that have taken place at the property?

☐ Yes
☑ No

If yes describe:

_____

_____

_____

As the user of the ESA, based on your knowledge and experience related to the property are there any indicators that point to the presence or likely presence of contamination at the property?

☑ Yes
☐ No

If yes describe:

_____

Monitoring well number one shows PFAS above acceptable limts, and it has been determined

that the source is upgradient.

_____



Bryan Massa, LSP

Senior Scientist
bmassa@horsleywitten.com

Areas of Expertise
Environmental Due Diligence
Environmental Site Assessment and Remediation Design and Oversight

Professional Registrations
Massachusetts Licensed Site Professional
40-Hour OSHA

Academic Background
Bachelors of Science, Environmental Engineering, Wentworth Institute of Technology

Professional Experience
Horsley Witten Group, Inc., Senior Scientist and LSP, August 2018 to Present

Lightship Engineering, Senior Project Manager, July 2013 to August 2018

META Environmental, Project Manager January 2009 to June 2013

Vertex Engineering, Project Manager, June 2005 to December 2008

Battelle, Environmental Laboratory Technician and Hazardous Waste Coordinator, June 2000 to June 2005

Horsley Witten Group
Sustainable Environmental Solutions

Bryan Massa is a Senior Environmental Professional and LSP with over 23 years of experience in the environmental field. Bryan has worked on a variety of environmental projects throughout the United States and Mexico. His experience has included remediation design and oversight, risk assessments, landfill construction oversight and monitoring, emergency response to releases, soil gas and indoor air assessment, LSP services, Phase I and Phase II Environmental Site Assessments for due diligence purposes, forensic evaluation of analytical data and environmental chemistry. His portfolio includes a number of interdisciplinary projects that combine remediation efforts with civil site design, stream restoration, and adaptive reuse.

KEY PROJECTS

Assessment and Remediation of PFAS in Soil and Groundwater, Cape Cod Gateway Airport, Hyannis, MA
Bryan is the LSP of record for a release of PFAS to soil and groundwater relating to the historic usage of aqueous fire-fighting foams (AFFF) at the Airport. Tasks have included the delineation of soil and groundwater impacts, surface water testing, forensic evaluation of groundwater data to identify comingled PFAS plumes and the design and installation of a non-permeable cap on approximately 2-acres of PFAS impacted soils. Mr. Massa is currently developing a comprehensive remedial strategy for the site.

Assessment and Remediation of PFAS and Aviation Gas in Soil and Groundwater, Provincetown, MA
Bryan is the LSP of record for a release of aviation gas and PFAS to soil and groundwater relating to an aircraft accident and subsequent usage of AFFF for firefighting purposes. Tasks have included the delineation of soil and groundwater impacts, groundwater extraction and disposal, soil excavation and disposal, and hydraulic conductivity testing. Investigation of the extent of the release is ongoing.

Former Manufactured Gas Plant, Greenfield, MA
Bryan conducted a comprehensive subsurface investigation to determine the nature and extent of coal tar related impacts in soil, groundwater and river sediment at a former Manufactured Gas Plant. The data collected was used to design a barrier wall to prevent the migration of coal tar into the river and to develop a sediment remedial action and river restoration plan. Bryan subsequently observed the installation of an approximate 620-foot barrier wall with a passive groundwater management system, the excavation of thousands of tons of sediment, community air monitoring and the re-stabilization of the adjacent riverbanks. Bryan oversaw the remediation on a daily basis over a period of approximately nine months and completed numerous field studies including indoor air/sub-slab vapor assessments, groundwater sampling and NAPL recovery.

South Main Street Former Manufactured Gas Plant, Canandaigua, NY
Bryan conducted a comprehensive subsurface investigation of river sediment and soil within and adjacent to Sucker Brook as part of response actions at an adjacent former Manufactured Gas Plant. Investigation activities included the collection of soil, groundwater, and sediment. Mr. Massa subsequently observed the remediation which included the diversion of a stream, excavation of thousands of tons of sediment and land side soil, injection of remedial additives, sheet-pile installation and vibration/crack monitoring, community air monitoring and the re-stabilization of the adjacent riverbanks. Mr. Massa oversaw the remediation on a daily basis over a period of approximately ten months.

Bryan Massa, LSP
Senior Scientist
bmassa@horsleywitten.com

Clark Street Former Manufactured Gas Plant, Canandaigua, NY
Bryan conducted a comprehensive subsurface investigation of soil and groundwater within the parking lot of a strip plaza that was formerly a manufactured gas plant. The investigation also included a comprehensive screening of sub-slab vapors and indoor air within the strip plaza building to determine if vapor intrusion existed. Mr. Massa subsequently observed the remedial action that included the installation of sheet pile, excavation of thousands of tons of soil under a movable sprung structure, and the re-stabilization of the parking lot. Mr. Massa also conducted vibration/crack monitoring and community air monitoring. Mr. Massa oversaw the remediation on a daily basis over a period of approximately six months.

Former Mill Building, Gardner, MA
Bryan conducted an ASTM Phase I Environmental Site Assessment on a former mill building that had been used for the manufacturing of furniture. The former mill building had been abandoned since the mid 1980's and a private developer was interested in converting the former mill building into residential apartments. Bryan identified several recognized environmental conditions ("RECs") at the site. A subsequent Phase II Subsurface Investigation identified a release of petroleum related compounds ("PRCs") from an upgradient source had impacted the site as well as chlorinated solvents relating to the historic use as a furniture manufacturer. Soil, groundwater and soil gas was impacted by the release. A sub-slab depressurization system was subsequently designed and installed at the Site during construction. A Method 3 Risk Assessment determined that a level of No Significant Risk exists at the site.

Former Mill Building, Haverhill, MA
Bryan conducted an ASTM Phase I Environmental Site Assessment of a former mill building that had been used for the manufacturing of circuit boards. The former mill building had been abandoned since the mid 1990's and a private developer was interested in converting the former mill building into residential apartments. Bryan identified several RECs at the site. A subsequent Phase II Subsurface Investigation identified a release of petroleum related compounds, an abandoned in place petroleum underground storage tank, and soil gas impacted with chlorinated solvents.

Former Commercial Vehicle Painter, Braintree, MA
Bryan conducted an ASTM Phase I Environmental Site Assessment on a commercial vehicle painter that had been in operation since the 1970's and identified several RECs at the Site. A subsequent Phase II Subsurface Investigation identified a release of select metals and PAHs in soil relating to the historic use of the site. A Method 3 Risk Assessment determined that a level of No Significant Risk exists at the site.

Emergency Responses to Aircraft Accidents, Commercial Vehicles, and Recreational Boats, MA.
Bryan has provided LSP services for release of oil and/or hazardous materials in excess of the Massachusetts Department of Environmental Protection (MassDEP) Reportable Quantity. These services included MassDEP regulatory reporting, release assessment and remediation oversight.

APPENDIX C

ENVIRONMENTAL DATA RESOURCES, INC REPORT

- The EDR Radius Map™ Report with GeoCheck®
- Certified Sanborn® Map Report
- The EDR Aerial Photo Decade Package
- EDR Historical Topographical Map Report with QuadMatch™
- The EDR-City Directory Image Report

Sand Pit Road
2 Sand Pit Rd
North Truro, MA 02652

Inquiry Number: 7228749.1s
January 19, 2023

The EDR Radius Map™ Report with GeoCheck®

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E1527-21), the ASTM Standard Practice for Environmental Site Assessments for Forestland or Rural Property (E 2247-16), the ASTM Standard Practice for Limited Environmental Due Diligence: Transaction Screen Process (E 1528-14) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

2 SAND PIT RD
NORTH TRURO, MA 02652

COORDINATES

Latitude (North):	42.0234930 - 42ˆ 1' 24.57''
Longitude (West):	70.0797270 - 70ˆ 4' 47.01''
Universal Tranverse Mercator:	Zone 19
UTM X (Meters):	410609.4
UTM Y (Meters):	4652735.0
Elevation:	46 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	11721272 NORTH TRURO, MA
Version Date:	2018

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	20140718
Source:	USDA

MAPPED SITES SUMMARY

Target Property Address:
2 SAND PIT RD
NORTH TRURO, MA 02652

Click on Map ID to see full detail.

MAP ID	SITE NAME	ADDRESS	DATABASE ACRONYMS	RELATIVE ELEVATION	DIST (ft. & mi.) DIRECTION
A1	TOW BOAT US	352 RTE 6	HW GEN	Higher	596, 0.113, East
A2	TOW BOAT US PROVINCE	352 RTE 6	RCRA-VSQG	Higher	596, 0.113, East
A3	ROADWAY - VEHICLE AC	IN FRONT 350 RT 6	SHWS, RELEASE	Higher	628, 0.119, East
4	PROVINCETOWN WATER	JCT RTES 6 AND 6A	RCRA NonGen / NLR	Higher	1043, 0.198, ENE
5	WATTS SERVICE CTR/S	372 ROUTE 6	SEMS-ARCHIVE, LUST, RELEASE	Higher	1424, 0.270, NNE
6	NORTH TRURO POST OFF	34 SHORE RD	LAST, RELEASE	Lower	2363, 0.448, North
7	S HIGHLAND RD LANDFI	HIGHLAND RD	SHWS, INST CONTROL, RELEASE	Higher	2548, 0.483, ENE
8	WTP SO. HOLLOW WELLF	11 SOUTH HOLLOW RD	SHWS, RELEASE	Lower	2852, 0.540, NE
9	NO LOCATION AID	LONG NOOK RD	SHWS, RELEASE	Lower	3197, 0.605, North
10	FORMER AIR BASE	32 OLD DEWLINE RD	SHWS, LUST, RELEASE	Higher	4528, 0.858, NE
11	NO LOCATION AID	1 PERRY RD	SHWS, LAST, RELEASE	Higher	4684, 0.887, SSE
12	CITGO GAS STATION	435 ROUTE 6	SHWS, RELEASE	Higher	5261, 0.996, NNW

EXECUTIVE SUMMARY

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Lists of Federal Delisted NPL sites

Delisted NPL ---------- National Priority List Deletions

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY ---------- Federal Facility Site Information listing
SEMS ---------- Superfund Enterprise Management System

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS ---------- Corrective Action Report

Lists of Federal RCRA TSD facilities

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Lists of Federal RCRA generators

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators

Federal institutional controls / engineering controls registries

LUCIS ---------- Land Use Control Information System
US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROLS ---------- Institutional Controls Sites List

Federal ERNS list

ERNS ---------- Emergency Response Notification System

EXECUTIVE SUMMARY

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF ---------- Solid Waste Facility Database/Transfer Stations

Lists of state and tribal leaking storage tanks

INDIAN LUST ---------- Leaking Underground Storage Tanks on Indian Land

Lists of state and tribal registered storage tanks

FEMA UST ---------- Underground Storage Tank Listing
UST ---------- Summary Listing of all the Tanks Registered in the State of Massachusetts
AST ---------- Aboveground Storage Tank Database
INDIAN UST ---------- Underground Storage Tanks on Indian Land

Lists of state and tribal voluntary cleanup sites

INDIAN VCP ---------- Voluntary Cleanup Priority Listing

Lists of state and tribal brownfield sites

BROWNFIELDS ---------- Completed Brownfields Covenants Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ---------- A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI ---------- Report on the Status of Open Dumps on Indian Lands
DEBRIS REGION 9 ---------- Torres Martinez Reservation Illegal Dump Site Locations
ODI ---------- Open Dump Inventory
IHS OPEN DUMPS ---------- Open Dumps on Indian Land

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL ---------- Delisted National Clandestine Laboratory Register
US CDL ---------- National Clandestine Laboratory Register

Local Land Records

LIENS ---------- Liens Information Listing
LIENS 2 ---------- CERCLA Lien Information

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System
RELEASE ---------- Reportable Releases Database
SPILLS ---------- Historical Spill List
SPILLS 90 ---------- SPILLS 90 data from FirstSearch
SPILLS 80 ---------- SPILLS 80 data from FirstSearch

Other Ascertainable Records

FUDS	Formerly Used Defense Sites
DOD	Department of Defense Sites
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
US FIN ASSUR	Financial Assurance Information
EPA WATCH LIST	EPA WATCH LIST
2020 COR ACTION	2020 Corrective Action Program List
TSCA	Toxic Substances Control Act
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
ROD	Records Of Decision
RMP	Risk Management Plans
RAATS	RCRA Administrative Action Tracking System
PRP	Potentially Responsible Parties
PADS	PCB Activity Database System
ICIS	Integrated Compliance Information System
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
MLTS	Material Licensing Tracking System
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER	PCB Transformer Registration Database
RADINFO	Radiation Information Database
HIST FTTS	FIFRA/TSCA Tracking System Administrative Case Listing
DOT OPS	Incident and Accident Data
CONSENT	Superfund (CERCLA) Consent Decrees
INDIAN RESERV	Indian Reservations
FUSRAP	Formerly Utilized Sites Remedial Action Program
UMTRA	Uranium Mill Tailings Sites
LEAD SMELTERS	Lead Smelter Sites
US AIRS	Aerometric Information Retrieval System Facility Subsystem
US MINES	Mines Master Index File
ABANDONED MINES	Abandoned Mines
FINDS	Facility Index System/Facility Registry System
ECHO	Enforcement & Compliance History Information
UXO	Unexploded Ordnance Sites
DOCKET HWC	Hazardous Waste Compliance Docket Listing
FUELS PROGRAM	EPA Fuels Program Registered Listing
PFAS NPL	Superfund Sites with PFAS Detections Information
PFAS FEDERAL SITES	Federal Sites PFAS Information
PFAS TSCA	PFAS Manufacture and Imports Information
PFAS RCRA MANIFEST	PFAS Transfers Identified In the RCRA Database Listing
PFAS ATSDR	PFAS Contamination Site Location Listing
PFAS WQP	Ambient Environmental Sampling for PFAS
PFAS NPDES	Clean Water Act Discharge Monitoring Information
PFAS ECHO	Facilities in Industries that May Be Handling PFAS Listing
PFAS ECHO FIRE TRAINING	Facilities in Industries that May Be Handling PFAS Listing
PFAS PART 139 AIRPORT	All Certified Part 139 Airports PFAS Information Listing
AQUEOUS FOAM NRC	Aqueous Foam Related Incidents Listing
PFAS	PFAS Contaminated Sites Listing
AIRS	Permitted Facilities Listing
ASBESTOS	ASBESTOS
DRYCLEANERS	Regulated Drycleaning Facilities

ENF Enforcement Action Cases
Financial Assurance Financial Assurance Information Listing
GWDP Ground Water Discharge Permits
MERCURY Mercury Product Recyling Drop-Off Locations Listing
NPDES NPDES Permit Listing
TIER 2 Tier 2 Information Listing
TSD TSD Facility
UIC Underground Injection Control Listing
MINES MRDS Mineral Resources Data System

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP EDR Proprietary Manufactured Gas Plants
EDR Hist Auto EDR Exclusive Historical Auto Stations
EDR Hist Cleaner EDR Exclusive Historical Cleaners

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS Recovered Government Archive State Hazardous Waste Facilities List
RGA LUST Recovered Government Archive Leaking Underground Storage Tank

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for

listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

A review of the SEMS-ARCHIVE list, as provided by EDR, and dated 10/27/2022 has revealed that there is 1 SEMS-ARCHIVE site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WATTS SERVICE CTR/S	***372 ROUTE 6***	***NNE 1/4 - 1/2 (0.270 mi.)***	***5***	***16***
Site ID: 0100505				
EPA Id: MAD044806594				

Lists of Federal RCRA generators

RCRA-VSQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-VSQG list, as provided by EDR, and dated 11/21/2022 has revealed that there is 1 RCRA-VSQG site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TOW BOAT US PROVINCE	352 RTE 6	E 0 - 1/8 (0.113 mi.)	A2	8
EPA ID:: MAR000552703				

Lists of state- and tribal hazardous waste facilities

SHWS: Contains information on releases of oil and hazardous materials that have been reported to DEP.

A review of the SHWS list, as provided by EDR, and dated 07/22/2022 has revealed that there are 7 SHWS sites within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ROADWAY - VEHICLE AC	***IN FRONT 350 RT 6***	***E 0 - 1/8 (0.119 mi.)***	***A3***	***11***
Release Tracking Number: 4-0020912				
Current Status: RAO				
S HIGHLAND RD LANDFI	***HIGHLAND RD***	***ENE 1/4 - 1/2 (0.483 mi.)***	***7***	***23***
Release Tracking Number: 4-0000897				
Current Status: RAO				
FORMER AIR BASE	***32 OLD DEWLINE RD***	***NE 1/2 - 1 (0.858 mi.)***	***10***	***30***
Release Tracking Number: 4-0019586				
Current Status: RAO				
NO LOCATION AID	***1 PERRY RD***	***SSE 1/2 - 1 (0.887 mi.)***	***11***	***34***
Release Tracking Number: 4-0010336				

Current Status: RAO

CITGO GAS STATION	***435 ROUTE 6***	***NNW 1/2 - 1 (0.996 mi.)***	***12***	***39***
Release Tracking Number: 4-0028779 Current Status: PSNC				

Lower Elevation	Address	Direction / Distance	Map ID	Page
WTP SO. HOLLOW WELLF	***11 SOUTH HOLLOW RD***	***NE 1/2 - 1 (0.540 mi.)***	***8***	***27***
Release Tracking Number: 4-0018962 Current Status: RAO				
NO LOCATION AID	***LONG NOOK RD***	***N 1/2 - 1 (0.605 mi.)***	***9***	***29***
Release Tracking Number: 4-0012923 Current Status: RAO				

Lists of state and tribal leaking storage tanks

LUST: Sites within the Releases Database that have a UST listed as its source.

A review of the LUST list, as provided by EDR, and dated 07/22/2022 has revealed that there is 1 LUST site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WATTS SERVICE CTR/S	***372 ROUTE 6***	***NNE 1/4 - 1/2 (0.270 mi.)***	***5***	***16***
Release Tracking Number / Current Status: 4-0000170 / RAO				

LAST: The Leaking Aboveground Storage Tanks database

A review of the LAST list, as provided by EDR, and dated 07/22/2022 has revealed that there is 1 LAST site within approximately 0.5 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORTH TRURO POST OFF	***34 SHORE RD***	***N 1/4 - 1/2 (0.448 mi.)***	***6***	***18***
Release Tracking Number / Current Status: 4-0011029 / RAO				

State and tribal institutional control / engineering control registries

INST CONTROL: Activity and Use Limitations establish limits and conditions on the future use of contaminated property, and therefore allow cleanups to be tailored to these uses.

A review of the INST CONTROL list, as provided by EDR, and dated 07/22/2022 has revealed that there is 1 INST CONTROL site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
S HIGHLAND RD LANDFI	***HIGHLAND RD***	***ENE 1/4 - 1/2 (0.483 mi.)***	***7***	***23***
Release Tracking Number: 4-0000897				

EXECUTIVE SUMMARY

ADDITIONAL ENVIRONMENTAL RECORDS

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 11/21/2022 has revealed that there is 1 RCRA NonGen / NLR site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PROVINCETOWN WATER EPA ID:: MAD981061682	JCT RTES 6 AND 6A	ENE 1/8 - 1/4 (0.198 mi.)	4	13

HW GEN: Permanent generator identification numbers for all Massachusetts generators of hazardous waste and waste oil that have registered with or notified MassDEP of their hazardous waste activities.

A review of the HW GEN list, as provided by EDR, and dated 09/15/2022 has revealed that there is 1 HW GEN site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
TOW BOAT US State Generator Status: VQG-MA EPA Id: MAR000552703	352 RTE 6	E 0 - 1/8 (0.113 mi.)	A1	8

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 2 records.

Site Name	Database(s)
AIR ROUTE SURVEILLANCE RADAR SITE	SHWS, RELEASE
NO LOCATION AID	SHWS, RELEASE

OVERVIEW MAP - 7228749.1S



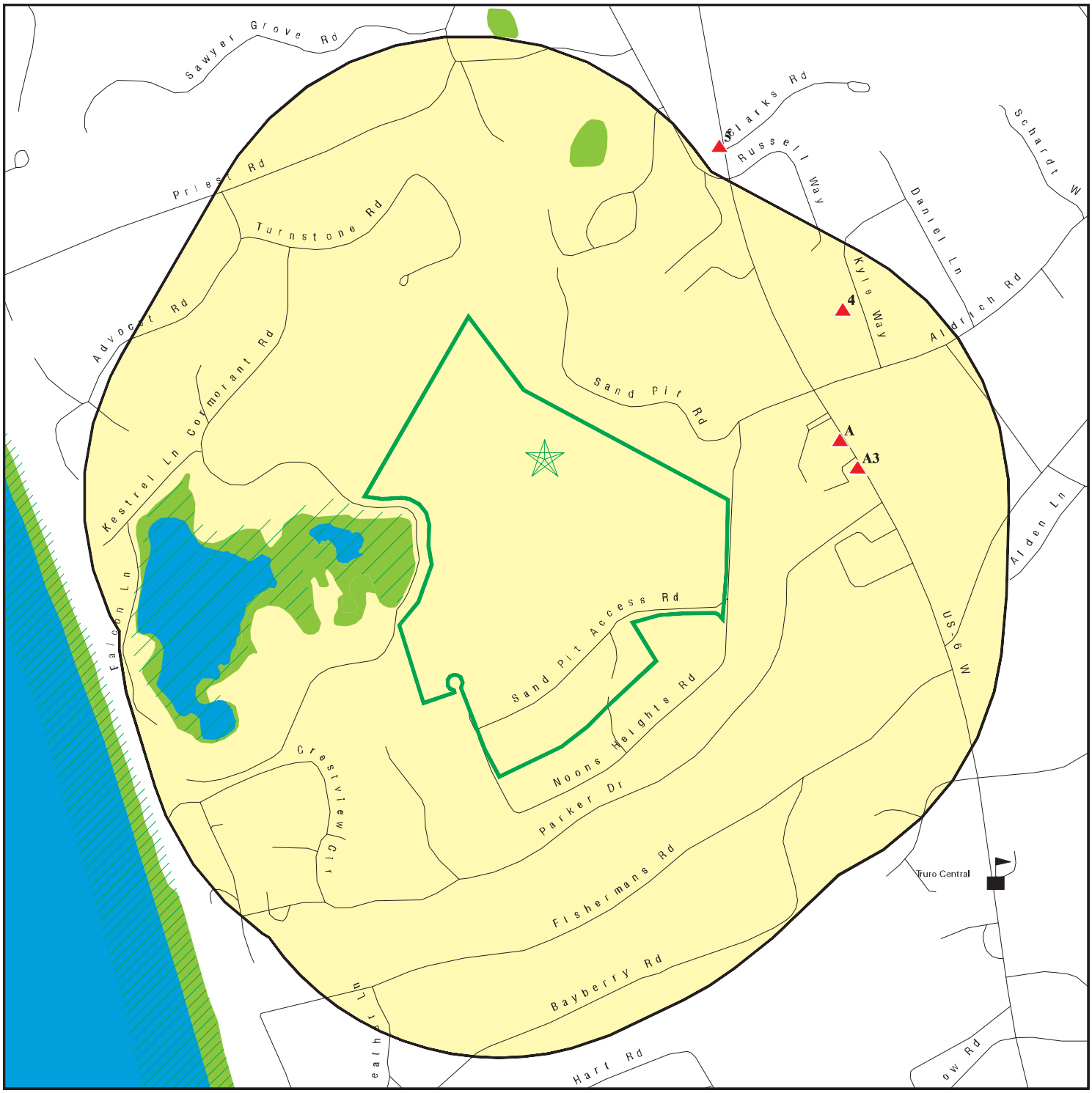
- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Areas of Critical Environmental Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Sand Pit Road	CLIENT:	Horsley Witten Group, Inc.
ADDRESS:	2 Sand Pit Rd North Truro MA 02652	CONTACT:	Caroline Armstrong
		INQUIRY #:	7228749.1s
LAT/LONG:	42.023493 / 70.079727	DATE:	January 19, 2023 10:31 am

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DETAIL MAP - 7228749.1S



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- Special Flood Hazard Area (1%)
- 0.2% Annual Chance Flood Hazard
- National Wetland Inventory
- State Wetlands
- Areas of Critical Environmental Concern

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: Sand Pit Road	CLIENT: Horsley Witten Group, Inc.
ADDRESS: 2 Sand Pit Rd North Truro MA 02652	CONTACT: Caroline Armstrong INQUIRY #: 7228749.1s
LAT/LONG: 42.023493 / 70.079727	DATE: January 19, 2023 10:32 am

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MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Lists of Federal NPL (Superfund) sites								
NPL	1.000		0	0	0	0	NR	0
Proposed NPL	1.000		0	0	0	0	NR	0
NPL LIENS	1.000		0	0	0	0	NR	0
Lists of Federal Delisted NPL sites								
Delisted NPL	1.000		0	0	0	0	NR	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders								
FEDERAL FACILITY	0.500		0	0	0	NR	NR	0
SEMS	0.500		0	0	0	NR	NR	0
Lists of Federal CERCLA sites with NFRAP								
SEMS-ARCHIVE	0.500		0	0	1	NR	NR	1
Lists of Federal RCRA facilities undergoing Corrective Action								
CORRACTS	1.000		0	0	0	0	NR	0
Lists of Federal RCRA TSD facilities								
RCRA-TSDF	0.500		0	0	0	NR	NR	0
Lists of Federal RCRA generators								
RCRA-LQG	0.250		0	0	NR	NR	NR	0
RCRA-SQG	0.250		0	0	NR	NR	NR	0
RCRA-VSQG	0.250		1	0	NR	NR	NR	1
Federal institutional controls / engineering controls registries								
LUCIS	0.500		0	0	0	NR	NR	0
US ENG CONTROLS	0.500		0	0	0	NR	NR	0
US INST CONTROLS	0.500		0	0	0	NR	NR	0
Federal ERNS list								
ERNS	TP		NR	NR	NR	NR	NR	0
Lists of state- and tribal hazardous waste facilities								
SHWS	1.000		1	0	1	5	NR	7
Lists of state and tribal landfills and solid waste disposal facilities								
SWF/LF	0.500		0	0	0	NR	NR	0
Lists of state and tribal leaking storage tanks								
LUST	0.500		0	0	1	NR	NR	1

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
LAST	0.500		0	0	1	NR	NR	1
INDIAN LUST	0.500		0	0	0	NR	NR	0
Lists of state and tribal registered storage tanks								
FEMA UST	0.250		0	0	NR	NR	NR	0
UST	0.250		0	0	NR	NR	NR	0
AST	0.250		0	0	NR	NR	NR	0
INDIAN UST	0.250		0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL	0.500		0	0	1	NR	NR	1
Lists of state and tribal voluntary cleanup sites								
INDIAN VCP	0.500		0	0	0	NR	NR	0
Lists of state and tribal brownfield sites								
BROWNFIELDS	0.500		0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS	0.500		0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
INDIAN ODI	0.500		0	0	0	NR	NR	0
DEBRIS REGION 9	0.500		0	0	0	NR	NR	0
ODI	0.500		0	0	0	NR	NR	0
IHS OPEN DUMPS	0.500		0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US HIST CDL	TP		NR	NR	NR	NR	NR	0
US CDL	TP		NR	NR	NR	NR	NR	0
Local Land Records								
LIENS	TP		NR	NR	NR	NR	NR	0
LIENS 2	TP		NR	NR	NR	NR	NR	0
Records of Emergency Release Reports								
HMIRS	TP		NR	NR	NR	NR	NR	0
RELEASE	TP		NR	NR	NR	NR	NR	0
SPILLS	TP		NR	NR	NR	NR	NR	0
SPILLS 90	TP		NR	NR	NR	NR	NR	0
SPILLS 80	TP		NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA NonGen / NLR	0.250		0	1	NR	NR	NR	1
FUDS	1.000		0	0	0	0	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOD	1.000		0	0	0	0	NR	0
SCRD DRYCLEANERS	0.500		0	0	0	NR	NR	0
US FIN ASSUR	TP		NR	NR	NR	NR	NR	0
EPA WATCH LIST	TP		NR	NR	NR	NR	NR	0
2020 COR ACTION	0.250		0	0	NR	NR	NR	0
TSCA	TP		NR	NR	NR	NR	NR	0
TRIS	TP		NR	NR	NR	NR	NR	0
SSTS	TP		NR	NR	NR	NR	NR	0
ROD	1.000		0	0	0	0	NR	0
RMP	TP		NR	NR	NR	NR	NR	0
RAATS	TP		NR	NR	NR	NR	NR	0
PRP	TP		NR	NR	NR	NR	NR	0
PADS	TP		NR	NR	NR	NR	NR	0
ICIS	TP		NR	NR	NR	NR	NR	0
FTTS	TP		NR	NR	NR	NR	NR	0
MLTS	TP		NR	NR	NR	NR	NR	0
COAL ASH DOE	TP		NR	NR	NR	NR	NR	0
COAL ASH EPA	0.500		0	0	0	NR	NR	0
PCB TRANSFORMER	TP		NR	NR	NR	NR	NR	0
RADINFO	TP		NR	NR	NR	NR	NR	0
HIST FTTS	TP		NR	NR	NR	NR	NR	0
DOT OPS	TP		NR	NR	NR	NR	NR	0
CONSENT	1.000		0	0	0	0	NR	0
INDIAN RESERV	1.000		0	0	0	0	NR	0
FUSRAP	1.000		0	0	0	0	NR	0
UMTRA	0.500		0	0	0	NR	NR	0
LEAD SMELTERS	TP		NR	NR	NR	NR	NR	0
US AIRS	TP		NR	NR	NR	NR	NR	0
US MINES	0.250		0	0	NR	NR	NR	0
ABANDONED MINES	0.250		0	0	NR	NR	NR	0
FINDS	TP		NR	NR	NR	NR	NR	0
ECHO	TP		NR	NR	NR	NR	NR	0
UXO	1.000		0	0	0	0	NR	0
DOCKET HWC	TP		NR	NR	NR	NR	NR	0
FUELS PROGRAM	0.250		0	0	NR	NR	NR	0
PFAS NPL	0.250		0	0	NR	NR	NR	0
PFAS FEDERAL SITES	0.250		0	0	NR	NR	NR	0
PFAS TSCA	0.250		0	0	NR	NR	NR	0
PFAS RCRA MANIFEST	0.250		0	0	NR	NR	NR	0
PFAS ATSDR	0.250		0	0	NR	NR	NR	0
PFAS WQP	0.250		0	0	NR	NR	NR	0
PFAS NPDES	0.250		0	0	NR	NR	NR	0
PFAS ECHO	0.250		0	0	NR	NR	NR	0
PFAS ECHO FIRE TRAINING	0.250		0	0	NR	NR	NR	0
PFAS PART 139 AIRPORT	0.250		0	0	NR	NR	NR	0
AQUEOUS FOAM NRC	0.250		0	0	NR	NR	NR	0
PFAS	0.250		0	0	NR	NR	NR	0
AIRS	TP		NR	NR	NR	NR	NR	0
ASBESTOS	TP		NR	NR	NR	NR	NR	0
DRYCLEANERS	0.250		0	0	NR	NR	NR	0
ENF	TP		NR	NR	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Search Distance (Miles)	Target Property	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
Financial Assurance	TP		NR	NR	NR	NR	NR	0
GWDP	TP		NR	NR	NR	NR	NR	0
HW GEN	0.250		1	0	NR	NR	NR	1
MERCURY	0.500		0	0	0	NR	NR	0
NPDES	TP		NR	NR	NR	NR	NR	0
TIER 2	TP		NR	NR	NR	NR	NR	0
TSD	0.500		0	0	0	NR	NR	0
UIC	TP		NR	NR	NR	NR	NR	0
MINES MRDS	TP		NR	NR	NR	NR	NR	0
EDR HIGH RISK HISTORICAL RECORDS								
EDR Exclusive Records								
EDR MGP	1.000		0	0	0	0	NR	0
EDR Hist Auto	0.125		0	NR	NR	NR	NR	0
EDR Hist Cleaner	0.125		0	NR	NR	NR	NR	0
EDR RECOVERED GOVERNMENT ARCHIVES								
Exclusive Recovered Govt. Archives								
RGA HWS	TP		NR	NR	NR	NR	NR	0
RGA LUST	TP		NR	NR	NR	NR	NR	0
- Totals --		0	3	1	5	5	0	14

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1 **TOW BOAT US** **HW GEN** **S123811229**
East **352 RTE 6** **N/A**
< 1/8 **TRURO, MA 02666**
0.113 mi.
596 ft. **Site 1 of 3 in cluster A**

Relative: HW GEN:
Higher

Actual: Name: TOW BOAT US
113 ft. Address: 352 RTE 6
City,State,Zip: TRURO, MA 02666
EPA Id: MAR000552703
RCRA Generator Status: VSQG
State Generator Status: VQG-MA

A2 **TOW BOAT US PROVINCETOWN/CHATHAM/BASS RIVER** **RCRA-VSQG** **1025502795**
East **352 RTE 6** **MAR000552703**
< 1/8 **TRURO, MA 02666**
0.113 mi.
596 ft. **Site 2 of 3 in cluster A**

Relative: RCRA Listings:
Higher

Actual: Date Form Received by Agency: 20190326
113 ft. Handler Name: TOW BOAT US PROVINCETOWN/CHATHAM/BASS RIVER
Handler Address: 352 RTE 6
Handler City,State,Zip: TRURO, MA 02666
EPA ID: MAR000552703
Contact Name: NOAH SANTOS
Contact Address: COMMERCIAL STREET
Contact City,State,Zip: PROVINCETOWN, MA 02657
Contact Telephone: 508-742-7166
Contact Fax: Not reported
Contact Email: TOWBOATSUSPROVINCETOWN@GMAIL.COM
Contact Title: PRESIDENT
EPA Region: 01
Land Type: Private
Federal Waste Generator Description: Conditionally Exempt Small Quantity Generator
Non-Notifier: Not reported
Biennial Report Cycle: Not reported
Accessibility: Not reported
Active Site Indicator: Handler Activities, State-specific Activities
State District Owner: MA
State District: SE
Mailing Address: COMMERCIAL STREET
Mailing City,State,Zip: PROVINCETOWN, MA 02657
Owner Name: NOAH SANTOS
Owner Type: Private
Operator Name: NOAH SANTOS
Operator Type: Private
Short-Term Generator Activity: No
Importer Activity: No
Mixed Waste Generator: No
Transporter Activity: No
Transfer Facility Activity: No
Recycler Activity with Storage: No
Small Quantity On-Site Burner Exemption: No
Smelting Melting and Refining Furnace Exemption: No
Underground Injection Control: No
Off-Site Waste Receipt: No
Universal Waste Indicator: No
Universal Waste Destination Facility: No

TOW BOAT US PROVINCETOWN/CHATHAM/BASS RIVER (Continued) **1025502795**

Federal Universal Waste:	No
Active Site Fed-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	--Y
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	NN
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20190402
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	D001
Waste Description:	IGNITABLE WASTE
Waste Code:	D018
Waste Description:	BENZENE

Handler - Owner Operator:

Owner/Operator Indicator:	Owner
Owner/Operator Name: NOAH SANTOS	
Legal Status:	Private

TOW BOAT US PROVINCETOWN/CHATHAM/BASS RIVER (Continued) **1025502795**

Date Became Current:	20190326
Date Ended Current:	Not reported
Owner/Operator Address:	131A COMMERCIAL STREET
Owner/Operator City,State,Zip:	PROVINCETOWN, MA 02657
Owner/Operator Telephone:	508-742-7166
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	TOWBOATSUSPROVINCETOWN@GMAIL.COM
Owner/Operator Indicator:	Operator
Owner/Operator Name: NOAH SANTOS	
Legal Status:	Private
Date Became Current:	20190326
Date Ended Current:	Not reported
Owner/Operator Address:	131A COMMERCIAL STREET
Owner/Operator City,State,Zip:	PROVINCETOWN, MA 02657
Owner/Operator Telephone:	508-742-7166
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	TOWBOATSUSPROVINCETOWN@GMAIL.COM

Historic Generators:

Receive Date:	20190326
Handler Name:	TOW BOAT US PROVINCETOWN/CHATHAM/BASS RIVER
Federal Waste Generator Description:	Conditionally Exempt Small Quantity Generator
State District Owner:	MA
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	No
Electronic Manifest Broker:	No

List of NAICS Codes and Descriptions:

NAICS Code:	336612
NAICS Description:	BOAT BUILDING

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

A3 **ROADWAY - VEHICLE ACCIDENT** **SHWS** **S108962912**
East **IN FRONT 350 RT 6** **RELEASE** **N/A**
< 1/8 **TRURO, MA 02666**
0.119 mi.
628 ft. **Site 3 of 3 in cluster A**

Relative:
Higher

Actual:
117 ft.

SHWS:

Name:	ROADWAY - VEHICLE ACCIDENT
Address:	IN FRONT 350 RT 6
City,State,Zip:	TRURO, MA 026660000
Facility ID:	4-0020912
Source Type:	VEHICLE
Release Town:	TRURO
Notification Date:	11/20/2007
Category:	TWO HR
Associated ID:	Not reported
Current Status:	RAO
Status Date:	01/31/2008
Phase:	Not reported
Response Action Outcome:	A2
Oil Or Haz Material:	Oil

Release:

Name:	ROADWAY - VEHICLE ACCIDENT
Address:	IN FRONT 350 RT 6
City,State,Zip:	TRURO, MA 026660000
Release Tracking Number/Current Status:	4-0020912 / RAO
Primary ID:	Not reported
Official City:	TRURO
Notification:	11/20/2007
Category:	TWO HR
Status Date:	01/31/2008
Phase:	Not reported
Response Action Outcome:	A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil / Haz Material Type:	Oil

Click here to access the MA DEP site for this facility:

Actions:

Action Type:	Immediate Response Action
Action Status:	Imminent Hazard Evaluation Received
Action Date:	1/31/2008
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type:	RNFE
Action Status:	Transmittal, Notice, or Notification Received
Action Date:	1/31/2008
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type:	Immediate Response Action
Action Status:	Completion Statement Received
Action Date:	1/31/2008
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

ROADWAY - VEHICLE ACCIDENT (Continued) **S108962912**

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 1/31/2008
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FLDDO
Action Date: 11/20/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: FLDISS
Action Date: 11/20/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 11/20/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 11/21/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 12/10/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 12/4/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 12/5/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FLDD1U
Action Date: 12/5/2007
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: Level I - Technical Screen Audit
Action Date: 5/14/2008

ROADWAY - VEHICLE ACCIDENT (Continued) **S108962912**

Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Chemicals:
Chemical: DIESEL FUEL
Quantity: 35 gallons
Location Type: ROADWAY
Source: VEHICLE

---

4 ENE 1/8-1/4 0.198 mi. 1043 ft. **PROVINCETOWN WATER** **RCRA NonGen / NLR** **1000433238**
JCT RTES 6 AND 6A **MAD981061682**
TRURO, MA 02652

Relative: Higher
Actual: 114 ft.

RCRA Listings:

Date Form Received by Agency:		19860331
Handler Name:	PROVINCETOWN WATER	
Handler Address:		JCT RTES 6 AND 6A
Handler City,State,Zip:		TRURO, MA 02652
EPA ID:		MAD981061682
Contact Name:		PAUL DALEY
Contact Address:		TOWN HALL 260 COMMERCIAL ST
Contact City,State,Zip:		PROVINCETOWN, MA 02657
Contact Telephone:		508-487-1810
Contact Fax:		Not reported
Contact Email:		Not reported
Contact Title:		Not reported
EPA Region:		01
Land Type:		Private
Federal Waste Generator Description:		Not a generator, verified
Non-Notifier:		Not reported
Biennial Report Cycle:		Not reported
Accessibility:		Not reported
Active Site Indicator:		Not reported
State District Owner:		MA
State District:		S
Mailing Address:		TOWN HALL 260 COMMERCIAL ST
Mailing City,State,Zip:		PROVINCETOWN, MA 02657
Owner Name:	TOWN OF PROVINCETOWN	
Owner Type:		Private
Operator Name:	PROVINCETOWN CITY OF SHWF SITE	
Operator Type:		Private
Short-Term Generator Activity:		No
Importer Activity:		No
Mixed Waste Generator:		No
Transporter Activity:		No
Transfer Facility Activity:		No
Recycler Activity with Storage:		No
Small Quantity On-Site Burner Exemption:		No
Smelting Melting and Refining Furnace Exemption:		No
Underground Injection Control:		No
Off-Site Waste Receipt:		No
Universal Waste Indicator:		No
Universal Waste Destination Facility:		No
Federal Universal Waste:		No
Active Site Fed-Reg Treatment Storage and Disposal Facility:		Not reported

PROVINCETOWN WATER (Continued) **1000433238**

Active Site Converter Treatment storage and Disposal Facility:	Not reported
Active Site State-Reg Treatment Storage and Disposal Facility:	Not reported
Active Site State-Reg Handler:	---
Federal Facility Indicator:	Not reported
Hazardous Secondary Material Indicator:	NN
Sub-Part K Indicator:	Not reported
Commercial TSD Indicator:	No
Treatment Storage and Disposal Type:	Not reported
2018 GPRA Permit Baseline:	Not on the Baseline
2018 GPRA Renewals Baseline:	Not on the Baseline
Permit Renewals Workload Universe:	Not reported
Permit Workload Universe:	Not reported
Permit Progress Universe:	Not reported
Post-Closure Workload Universe:	Not reported
Closure Workload Universe:	Not reported
202 GPRA Corrective Action Baseline:	No
Corrective Action Workload Universe:	No
Subject to Corrective Action Universe:	No
Non-TSDFs Where RCRA CA has Been Imposed Universe:	No
TSDFs Potentially Subject to CA Under 3004 (u)/(v) Universe:	No
TSDFs Only Subject to CA under Discretionary Auth Universe:	No
Corrective Action Priority Ranking:	No NCAPS ranking
Environmental Control Indicator:	No
Institutional Control Indicator:	No
Human Exposure Controls Indicator:	N/A
Groundwater Controls Indicator:	N/A
Operating TSDF Universe:	Not reported
Full Enforcement Universe:	Not reported
Significant Non-Complier Universe:	No
Unaddressed Significant Non-Complier Universe:	No
Addressed Significant Non-Complier Universe:	No
Significant Non-Complier With a Compliance Schedule Universe:	No
Financial Assurance Required: Not reported	
Handler Date of Last Change:	20171020
Recognized Trader-Importer:	No
Recognized Trader-Exporter:	No
Importer of Spent Lead Acid Batteries:	No
Exporter of Spent Lead Acid Batteries:	No
Recycler Activity Without Storage:	No
Manifest Broker:	No
Sub-Part P Indicator:	No

Hazardous Waste Summary:

Waste Code:	U019
Waste Description:	BENZENE (I,T)
Waste Code:	U220
Waste Description:	BENZENE, METHYL- (OR) TOLUENE
Waste Code:	U239
Waste Description:	BENZENE, DIMETHYL- (I,T) (OR) XYLENE (I)

Handler - Owner Operator:

Owner/Operator Indicator: Owner
Owner/Operator Name: TOWN OF PROVINCETOWN

PROVINCETOWN WATER (Continued) **1000433238**

Legal Status:	Private
Date Became Current:	20041016
Date Ended Current:	Not reported
Owner/Operator Address:	TOWN HALL 260 COMMERCIAL ST
Owner/Operator City,State,Zip:	PROVINCETOWN, MA 02657
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Owner/Operator Indicator:	Operator
Owner/Operator Name:	PROVINCETOWN CITY OF SHWF SITE
Legal Status:	Private
Date Became Current:	19911208
Date Ended Current:	19990416
Owner/Operator Address:	TOWN HALL 260 COMMERCIAL ST
Owner/Operator City,State,Zip:	PROVINCETOWN, MA 02657
Owner/Operator Telephone:	Not reported
Owner/Operator Telephone Ext:	Not reported
Owner/Operator Fax:	Not reported
Owner/Operator Email:	Not reported

Historic Generators:

Receive Date:	19860331
Handler Name:	PROVINCETOWN WATER
Federal Waste Generator Description:	Not a generator, verified
State District Owner:	MA
Large Quantity Handler of Universal Waste:	No
Recognized Trader Importer:	No
Recognized Trader Exporter:	No
Spent Lead Acid Battery Importer:	No
Spent Lead Acid Battery Exporter:	No
Current Record:	Yes
Non Storage Recycler Activity:	Not reported
Electronic Manifest Broker:	Not reported

List of NAICS Codes and Descriptions:

NAICS Codes:	No NAICS Codes Found

Facility Has Received Notices of Violations:

Violations:	No Violations Found

Evaluation Action Summary:

Evaluations:	No Evaluations Found

5 NNE 1/4-1/2 0.270 mi. 1424 ft. | **WATTS SERVICE CTR/S HOLLOW WELLFIELD**
372 ROUTE 6
TRURO, MA 02666 | **SEMS-ARCHIVE**
LUST
RELEASE | **1003862278**
MAD044806594

Relative: Higher

Actual: 56 ft.

SEMS Archive:

Site ID:	0100505
EPA ID:	MAD044806594
Name:	WATTS SERVICE CTR/S HOLLOW WELLFIELD
Address:	372 ROUTE 6
Address 2:	Not reported
City,State,Zip:	TRURO, MA 02666
Cong District:	12
FIPS Code:	25001
FF:	N
NPL:	Not on the NPL
Non NPL Status:	NFRAP-Site does not qualify for the NPL based on existing information

SEMS Archive Detail:

Region:	01
Site ID:	0100505
EPA ID:	MAD044806594
Site Name:	WATTS SERVICE CTR/S HOLLOW WELLFIELD
NPL:	N
FF:	N
OU:	00
Action Code:	VS
Action Name:	ARCH SITE
SEQ:	1
Start Date:	Not reported
Finish Date:	1982-04-01 05:00:00
Qual:	Not reported
Current Action Lead:	EPA Perf In-Hse

Region:	01
Site ID:	0100505
EPA ID:	MAD044806594
Site Name:	WATTS SERVICE CTR/S HOLLOW WELLFIELD
NPL:	N
FF:	N
OU:	00
Action Code:	DS
Action Name:	DISCVRY
SEQ:	1
Start Date:	1977-12-01 05:00:00
Finish Date:	1977-12-01 05:00:00
Qual:	Not reported
Current Action Lead:	EPA Perf

Region:	01
Site ID:	0100505
EPA ID:	MAD044806594
Site Name:	WATTS SERVICE CTR/S HOLLOW WELLFIELD
NPL:	N
FF:	N
OU:	00
Action Code:	PA
Action Name:	PA
SEQ:	1

WATTS SERVICE CTR/S HOLLOW WELLFIELD (Continued) **1003862278**

Start Date: Not reported
Finish Date: 1982-04-01 05:00:00
Qual: N
Current Action Lead: EPA Perf

LUST:

Facility:
Name: WATTS SERV WELLFIELD
Address: OFF RTE 6A
City,State,Zip: TRURO, MA 02666
Current Status: **Response Action Outcome**
Release Tracking Number/Current Status: 4-0000170 / RAO
Status Date: 12/31/1996
Source Type: UST
Release Town: TRURO
Notification Date: 10/15/1987
Category: NONE
Associated ID: Not reported
Phase: Not reported
Response Action Outcome: A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil Or Haz Material: Not reported

Location Type: GASSTATION
Source: UST

Click here to access the MA DEP site for this facility:

Chemicals:
Chemical: UNKNOWN
Quantity: Not reported

Actions:
Action Type: Release Disposition
Action Status: Valid Transition Site
Action Date: 10/15/1987
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RAO - DEP Lead
Action Status: RAO Statement Received
Action Date: 12/31/1996
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FLDRUN
Action Date: 9/23/1996
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

WATTS SERVICE CTR/S HOLLOW WELLFIELD (Continued) **1003862278**

Release:

Name:	WATTS SERV WELLFIELD
Address:	OFF RTE 6A
City,State,Zip:	TRURO, MA 02666
Release Tracking Number/Current Status:	4-0000170 / RAO
Primary ID:	Not reported
Official City:	TRURO
Notification:	10/15/1987
Category:	NONE
Status Date:	12/31/1996
Phase:	Not reported
Response Action Outcome:	A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil / Haz Material Type:	Not reported

Click here to access the MA DEP site for this facility:

Actions:

Action Type:	Release Disposition
Action Status:	Valid Transition Site
Action Date:	10/15/1987
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RAO - DEP Lead
Action Status:	RAO Statement Received
Action Date:	12/31/1996
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FLDRUN
Action Date:	9/23/1996
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

Chemicals:

Chemical:	UNKNOWN
Quantity:	Not reported
Location Type:	GASSTATION
Source:	UST

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6 **NORTH TRURO POST OFFICE** **LAST** **S102088269**
North **34 SHORE RD** **RELEASE** **N/A**
1/4-1/2 **TRURO, MA 02666**
0.448 mi.
2363 ft.

Relative:
Lower

Actual:
13 ft.

LAST:

Name:	NORTH TRURO POST OFFICE
Address:	34 SHORE RD
City,State,Zip:	TRURO, MA 026660000
Release Tracking Number/Current Status:	4-0011029 / RAO
Source Type:	AST
Release Town:	TRURO
Notification Date:	01/03/1995

NORTH TRURO POST OFFICE (Continued) **S102088269**

Category: TWO HR
Associated ID: Not reported
Status Date: 08/08/1995
Phase: Not reported
Response Action Outcome: A1 - A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.
Oil Or Haz Material: Oil

Chemicals:
Chemical: FUEL OIL
Quantity: 150 gallons
Chemical: #2 FUEL OIL
Quantity: 190 gallons
Location Type: MUNICIPAL
Source: AST

Actions:
Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 1/4/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 1/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 1/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

NORTH TRURO POST OFFICE (Continued) **S102088269**

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 2/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 3/2/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Imminent Hazard Evaluation Received
Action Date: 3/2/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/21/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 3/22/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 5/23/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Status or Interim Report Received
Action Date: 6/23/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Response Action Outcome - RAO
Action Status: Fee Received - FMCRA Use Only
Action Date: 8/15/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Completion Statement Received
Action Date: 8/8/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 8/8/1995

NORTH TRURO POST OFFICE (Continued) **S102088269**

Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Release:
Name: NORTH TRURO POST OFFICE
Address: 34 SHORE RD
City,State,Zip: TRURO, MA 026660000
Release Tracking Number/Current Status: 4-0011029 / RAO
Primary ID: Not reported
Official City: TRURO
Notification: 01/03/1995
Category: TWO HR
Status Date: 08/08/1995
Phase: Not reported
Response Action Outcome: A1 - A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.
Oil / Haz Material Type: Oil

Click here to access the MA DEP site for this facility:

Actions:
Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 1/3/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 1/4/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 1/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced

NORTH TRURO POST OFFICE (Continued) **S102088269**

to background or a threat of release has been eliminated.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 1/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 2/9/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 3/2/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Imminent Hazard Evaluation Received
Action Date: 3/2/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/21/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 3/22/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 5/23/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action
Action Status: Status or Interim Report Received
Action Date: 6/23/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Response Action Outcome - RAO
Action Status: Fee Received - FMCRA Use Only
Action Date: 8/15/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Immediate Response Action

NORTH TRURO POST OFFICE (Continued) **S102088269**

Action Status: Completion Statement Received
Action Date: 8/8/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 8/8/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Chemicals:
Chemical: FUEL OIL
Quantity: 150 gallons
Chemical: #2 FUEL OIL
Quantity: 190 gallons
Location Type: MUNICIPAL
Source: AST

7
ENE
1/4-1/2
0.483 mi.
2548 ft.

S HIGHLAND RD LANDFILL **SHWS** **S105200407**
HIGHLAND RD **INST CONTROL** **N/A**
TRURO, MA 02666 **RELEASE**

Relative:
Higher

Actual:
94 ft.

SHWS:
Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Facility ID: 4-0000897
Source Type: UNCONTAIN
Release Town: TRURO
Notification Date: 07/15/1990
Category: NONE
Associated ID: Not reported
Current Status: RAO
Status Date: 04/08/2005
Phase: Not reported
Response Action Outcome: A3
Oil Or Haz Material: Not reported

INST CONTROL:
Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number: 4-0000897
Action Type: AUL
Action Stat: LEGNOT
Action Date: 05/04/2005
Response Action Outcome: A3 - A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number: 4-0000897

S HIGHLAND RD LANDFILL (Continued) **S105200407**

Action Type: AUL
Action Stat: RECPT
Action Date: 04/08/2005
Response Action Outcome: A3 - A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number: 4-0000897
Action Type: AUL
Action Stat: SNAUDI
Action Date: 10/17/2008
Response Action Outcome: A3 - A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number: 4-0000897
Action Type: AUL
Action Stat: TSAUD
Action Date: 08/04/2005
Response Action Outcome: A3 - A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Release:
Name: S HIGHLAND RD LANDFILL
Address: HIGHLAND RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number/Current Status: 4-0000897 / RAO
Primary ID: Not reported
Official City: TRURO
Notification: 07/15/1990
Category: NONE
Status Date: 04/08/2005
Phase: Not reported
Response Action Outcome: A3 - A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.
Oil / Haz Material Type: Not reported

Click here to access the MA DEP site for this facility:

Actions:
Action Type: Activity and Use Limitation
Action Status: Level II - Audit Inspection
Action Date: 10/17/2008
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: An activity type that is related to an Audit

S HIGHLAND RD LANDFILL (Continued) **S105200407**

Action Status: NAFNVD
Action Date: 10/17/2008
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: RLFA
Action Status: FLDRUN
Action Date: 2/26/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 4
Action Status: Written Plan Received
Action Date: 4/4/2003
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 1
Action Status: Completion Statement Received
Action Date: 4/7/2000
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Tier Classification
Action Status: Tier 2 Classification
Action Date: 4/7/2000
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Compliance and Enforcement Action
Action Status: Notice of Non-Compliance Issued
Action Date: 4/7/2000
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Tier Classification
Action Status: Transmittal, Notice, or Notification Received
Action Date: 4/7/2000
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 4/8/1999
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 2
Action Status: Completion Statement Received

S HIGHLAND RD LANDFILL (Continued) **S105200407**

Action Date: 4/8/2002
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 3
Action Status: Completion Statement Received
Action Date: 4/8/2002
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 4
Action Status: Completion Statement Received
Action Date: 4/8/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 4
Action Status: As-Built Construction Report Received
Action Date: 4/8/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Activity and Use Limitation
Action Status: Transmittal, Notice, or Notification Received
Action Date: 4/8/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 4/8/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Activity and Use Limitation
Action Status: Legal Notice Published
Action Date: 5/4/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Release Disposition
Action Status: Valid Transition Site
Action Date: 7/15/1990
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Phase 2
Action Status: Scope of Work Received
Action Date: 7/30/2001

S HIGHLAND RD LANDFILL (Continued) **S105200407**

Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Activity and Use Limitation
Action Status: Level I - Technical Screen Audit
Action Date: 8/4/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Action Type: Response Action Outcome - RAO
Action Status: Level I - Technical Screen Audit
Action Date: 8/8/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background and an Activity and use Limitation (AUL) has been implemented.

Chemicals:
Chemical: UNKNOWN
Quantity: Not reported
Location Type: LANDFILL
Source: UNCONTAIN

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8 WTP SO. HOLLOW WELLFIELD **SHWS S106863510**
NE 11 SOUTH HOLLOW RD **RELEASE N/A**
1/2-1 TRURO, MA 02666
0.540 mi.
2852 ft.

Relative: Lower
Actual: 24 ft.

SHWS:
Name: WTP SO. HOLLOW WELLFIELD
Address: 11 SOUTH HOLLOW RD
City,State,Zip: TRURO, MA 026660000
Facility ID: 4-0018962
Source Type: Not reported
Release Town: TRURO
Notification Date: 03/11/2005
Category: TWO HR
Associated ID: Not reported
Current Status: RAO
Status Date: 05/09/2005
Phase: Not reported
Response Action Outcome: A2
Oil Or Haz Material: Hazardous Material

Release:
Name: WTP SO. HOLLOW WELLFIELD
Address: 11 SOUTH HOLLOW RD
City,State,Zip: TRURO, MA 026660000
Release Tracking Number/Current Status: 4-0018962 / RAO
Primary ID: Not reported
Official City: TRURO
Notification: 03/11/2005
Category: TWO HR
Status Date: 05/09/2005
Phase: Not reported

WTP SO. HOLLOW WELLFIELD (Continued) **S106863510**

Response Action Outcome: A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil / Haz Material Type: Hazardous Material

Click here to access the MA DEP site for this facility:

Actions:

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 3/11/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/11/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 3/11/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Compliance and Enforcement Action
Action Status: REFAG
Action Date: 3/16/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FLDD1A
Action Date: 3/25/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 4/5/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: Level I - Technical Screen Audit
Action Date: 5/25/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 5/9/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Completion Statement Received

WTP SO. HOLLOW WELLFIELD (Continued) **S106863510**

Action Date: 5/9/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 5/9/2005
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Chemicals:
Chemical: POTASSIUM HYDROXIDE
Quantity: 8 gallons
Location Type: MUNICIPAL

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9 **NO LOCATION AID** **SHWS S102618672**
North **LONG NOOK RD** **RELEASE N/A**
1/2-1 **TRURO, MA 02666**
0.605 mi.
3197 ft.

Relative: **Lower**
Actual: **45 ft.**

SHWS:
Name: NO LOCATION AID
Address: LONG NOOK RD
City,State,Zip: TRURO, MA 026660000
Facility ID: 4-0012923
Source Type: TRANSFORM
Release Town: TRURO
Notification Date: 04/01/1997
Category: TWO HR
Associated ID: Not reported
Current Status: RAO
Status Date: 05/30/1997
Phase: Not reported
Response Action Outcome: A1
Oil Or Haz Material: Hazardous Material

Release:
Name: NO LOCATION AID
Address: LONG NOOK RD
City,State,Zip: TRURO, MA 026660000
Release Tracking Number/Current Status: 4-0012923 / RAO
Primary ID: Not reported
Official City: TRURO
Notification: 04/01/1997
Category: TWO HR
Status Date: 05/30/1997
Phase: Not reported
Response Action Outcome: A1 - A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.
Oil / Haz Material Type: Hazardous Material

Click here to access the MA DEP site for this facility:

Actions:
Action Type: Immediate Response Action

NO LOCATION AID (Continued) **S102618672**

Action Status: Oral Approval of Plan or Action
Action Date: 4/1/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 4/1/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 4/1/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 4/11/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 5/19/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 5/30/1997
Response Action Outcome: A permanent solution has been achieved. Contamination has been reduced to background or a threat of release has been eliminated.

Chemicals:
Chemical: PCB OIL
Quantity: 15 gallons
Location Type: ROADWAY
Location Type: STATE
Source: TRANSFORM

10
NE
1/2-1
0.858 mi.
4528 ft.

FORMER AIR BASE
32 OLD DEWLINE RD
NORTH TRURO, MA 02652

SHWS **S107678074**
LUST **N/A**
RELEASE

Relative:
Higher

Actual:
129 ft.

SHWS:
Name: FORMER AIR BASE
Address: 32 OLD DEWLINE RD
City,State,Zip: NORTH TRURO, MA 026520000
Facility ID: 4-0019586
Source Type: PIPE
Release Town: TRURO
Notification Date: 01/26/2006
Category: 72 HR

FORMER AIR BASE (Continued) **S107678074**

Associated ID:	Not reported
Current Status:	RAO
Status Date:	03/28/2006
Phase:	Not reported
Response Action Outcome:	A2
Oil Or Haz Material:	Oil

LUST:

Facility:

Name:	FORMER AIR BASE
Address:	32 OLD DEWLINE RD
City,State,Zip:	NORTH TRURO, MA 026520000
Current Status:	**Response Action Outcome**
Release Tracking Number/Current Status:	4-0019586 / RAO
Status Date:	03/28/2006
Source Type:	UST
Release Town:	TRURO
Notification Date:	01/26/2006
Category:	72 HR
Associated ID:	Not reported
Phase:	Not reported
Response Action Outcome:	A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil Or Haz Material:	Oil
Location Type:	FEDERAL
Source:	PIPE
Source:	UST

Click here to access the MA DEP site for this facility:

Chemicals:

Chemical:	GASOLINE
Quantity:	Not reported

Actions:

Action Type:	Release Disposition
Action Status:	Reportable Release under MGL 21E
Action Date:	1/26/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FLDD1A
Action Date:	1/26/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FLDRAN
Action Date:	1/27/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

FORMER AIR BASE (Continued) **S107678074**

Action Type:	A Notice sent to a Potentially Responsible Party (PRP)
Action Status:	A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date:	2/27/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FOLOFF
Action Date:	2/8/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RNF
Action Status:	Reportable Release under MGL 21E
Action Date:	3/28/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	Response Action Outcome - RAO
Action Status:	RAO Statement Received
Action Date:	3/28/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	Response Action Outcome - RAO
Action Status:	Level I - Technical Screen Audit
Action Date:	8/11/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

Release:

Name:	FORMER AIR BASE
Address:	32 OLD DEWLINE RD
City,State,Zip:	NORTH TRURO, MA 026520000
Release Tracking Number/Current Status:	4-0019586 / RAO
Primary ID:	Not reported
Official City:	TRURO
Notification:	01/26/2006
Category:	72 HR
Status Date:	03/28/2006
Phase:	Not reported
Response Action Outcome:	A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil / Haz Material Type:	Oil

Click here to access the MA DEP site for this facility:

Actions:

Action Type:	Release Disposition
Action Status:	Reportable Release under MGL 21E
Action Date:	1/26/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA

FORMER AIR BASE (Continued) **S107678074**

Action Status:	FLDD1A
Action Date:	1/26/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FLDRAN
Action Date:	1/27/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	A Notice sent to a Potentially Responsible Party (PRP)
Action Status:	A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date:	2/27/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RLFA
Action Status:	FOLOFF
Action Date:	2/8/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	RNF
Action Status:	Reportable Release under MGL 21E
Action Date:	3/28/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	Response Action Outcome - RAO
Action Status:	RAO Statement Received
Action Date:	3/28/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	Response Action Outcome - RAO
Action Status:	Level I - Technical Screen Audit
Action Date:	8/11/2006
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.

Chemicals:

Chemical:	GASOLINE
Quantity:	Not reported
Location Type:	FEDERAL
Source:	PIPE
Source:	UST

11
SSE
1/2-1
0.887 mi.
4684 ft.

NO LOCATION AID
1 PERRY RD
TRURO, MA 02666

SHWS **S102087911**
LAST **N/A**
RELEASE

Relative:
Higher

Actual:
72 ft.

SHWS:

Name:	NO LOCATION AID
Address:	1 PERRY RD
City,State,Zip:	TRURO, MA 02666
Facility ID:	4-0010336
Source Type:	BASEMENT
Release Town:	TRURO
Notification Date:	03/15/1994
Category:	TWO HR
Associated ID:	Not reported
Current Status:	RAO
Status Date:	03/10/1995
Phase:	Not reported
Response Action Outcome:	A2
Oil Or Haz Material:	Oil

LAST:

Name:	NO LOCATION AID
Address:	1 PERRY RD
City,State,Zip:	TRURO, MA 02666
Release Tracking Number/Current Status:	4-0010336 / RAO
Source Type:	AST
Release Town:	TRURO
Notification Date:	03/15/1994
Category:	TWO HR
Associated ID:	Not reported
Status Date:	03/10/1995
Phase:	Not reported
Response Action Outcome:	A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil Or Haz Material:	Oil

Chemicals:

Chemical:	#2 FUEL OIL
Quantity:	200 gallons
Location Type:	RESIDNTIAL
Source:	BASEMENT
Source:	AST

Actions:

Action Type:	An activity type that is related to an Audit
Action Status:	NOA
Action Date:	11/17/1995
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	An activity type that is related to an Audit
Action Status:	NAFNVD
Action Date:	2/20/1996
Response Action Outcome:	A permanent solution has been achieved. Contamination has not been reduced to background.
Action Type:	Immediate Response Action
Action Status:	Completion Statement Received

NO LOCATION AID (Continued) **S102087911**

Action Date: 3/10/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 3/10/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: Fee Received - FMCRA Use Only
Action Date: 3/13/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/16/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 3/18/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/22/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 4/12/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

NO LOCATION AID (Continued) **S102087911**

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 4/12/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 4/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 4/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 5/25/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 5/25/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 5/9/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 5/9/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 6/14/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Release:
Name: NO LOCATION AID
Address: 1 PERRY RD
City,State,Zip: TRURO, MA 02666
Release Tracking Number/Current Status: 4-0010336 / RAO
Primary ID: Not reported
Official City: TRURO
Notification: 03/15/1994

NO LOCATION AID (Continued) **S102087911**

Category: TWO HR
Status Date: 03/10/1995
Phase: Not reported
Response Action Outcome: A2 - A permanent solution has been achieved. Contamination has not been reduced to background.
Oil / Haz Material Type: Oil

Click here to access the MA DEP site for this facility:

Actions:

Action Type: An activity type that is related to an Audit
Action Status: NOA
Action Date: 11/17/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: An activity type that is related to an Audit
Action Status: NAFNVD
Action Date: 2/20/1996
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Completion Statement Received
Action Date: 3/10/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: RAO Statement Received
Action Date: 3/10/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Response Action Outcome - RAO
Action Status: Fee Received - FMCRA Use Only
Action Date: 3/13/1995
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 3/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

NO LOCATION AID (Continued) **S102087911**

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/16/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 3/18/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 3/22/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RNF
Action Status: Reportable Release under MGL 21E
Action Date: 4/12/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 4/12/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Written Approval of Plan
Action Date: 4/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 4/15/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLFLD
Action Date: 5/25/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 5/25/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: RLFA
Action Status: FOLOFF
Action Date: 5/9/1994

NO LOCATION AID (Continued) **S102087911**

Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Oral Approval of Plan or Action
Action Date: 5/9/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 6/14/1994
Response Action Outcome: A permanent solution has been achieved. Contamination has not been reduced to background.

Chemicals:
Chemical: #2 FUEL OIL
Quantity: 200 gallons
Location Type: RESIDNTIAL
Source: BASEMENT
Source: AST

12
NNW
1/2-1
0.996 mi.
5261 ft.

CITGO GAS STATION **SHWS S127590317**
435 ROUTE 6 **RELEASE N/A**
TRURO, MA 02652

Relative: Higher

Actual: 50 ft.

SHWS:
Name: CITGO GAS STATION
Address: 435 ROUTE 6
City,State,Zip: TRURO, MA 026520000
Facility ID: 4-0028779
Source Type: HOSE
Release Town: TRURO
Notification Date: 05/02/2021
Category: TWO HR
Associated ID: Not reported
Current Status: PSNC
Status Date: 04/26/2022
Phase: Not reported
Response Action Outcome: PN
Oil Or Haz Material: Not reported

Name: CITGO GAS STATION
Address: 435 ROUTE 6
City,State,Zip: TRURO, MA 026520000
Facility ID: 4-0028779
Source Type: GAS STATIO
Release Town: TRURO
Notification Date: 05/02/2021
Category: TWO HR
Associated ID: Not reported
Current Status: PSNC
Status Date: 04/26/2022
Phase: Not reported
Response Action Outcome: PN

CITGO GAS STATION (Continued) **S127590317**

Oil Or Haz Material: Not reported

Release:
Name: CITGO GAS STATION
Address: 435 ROUTE 6
City,State,Zip: TRURO, MA 026520000
Release Tracking Number/Current Status: 4-0028779 / PSNC
Primary ID: Not reported
Official City: TRURO
Notification: 05/02/2021
Category: TWO HR
Status Date: 04/26/2022
Phase: Not reported
Response Action Outcome: PN - PN
Oil / Haz Material Type: Not reported

Click here to access the MA DEP site for this facility:

Actions:
Action Type: Response Action Outcome - RAO
Action Status: PSNRCD
Action Date: 4/26/2022
Response Action Outcome: PN

Action Type: BOL
Action Status: Transmittal, Notice, or Notification Received
Action Date: 5/14/2021
Response Action Outcome: PN

Action Type: A Notice sent to a Potentially Responsible Party (PRP)
Action Status: A MassDEP piece of correspondence was issued (approvals, NORs, etc.
Action Date: 5/17/2021
Response Action Outcome: PN

Action Type: Release Disposition
Action Status: Reportable Release under MGL 21E
Action Date: 5/2/2021
Response Action Outcome: PN

Action Type: Immediate Response Action
Action Status: Oral Approval of a Modified Plan
Action Date: 5/7/2021
Response Action Outcome: PN

Action Type: Immediate Response Action
Action Status: Written Plan Received
Action Date: 7/1/2021
Response Action Outcome: PN

Action Type: RNFE
Action Status: Transmittal, Notice, or Notification Received
Action Date: 7/1/2021
Response Action Outcome: PN

Action Type: Immediate Response Action
Action Status: Level I - Technical Screen Audit

CITGO GAS STATION (Continued) **S127590317**

Action Date:	7/21/2021
Response Action Outcome:	PN
Action Type:	BOL
Action Status:	SHPFAC
Action Date:	9/7/2021
Response Action Outcome:	PN

Chemicals:

Chemical:	Not reported
Quantity:	Not reported
Location Type:	COMMERCIAL
Source:	HOSE
Source:	GAS STATIO

Count: 2 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
NORTH TRURO	S108962702	AIR ROUTE SURVEILLANCE RADAR SITE	OLD DEWLINE RD	02652	SHWS, RELEASE
TRURO	S103812491	NO LOCATION AID	HIGGIN HOLLOW RD	02666	SHWS, RELEASE

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Lists of Federal NPL (Superfund) sites

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

Lists of Federal Delisted NPL sites

Delisted NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: N/A
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Quarterly

Lists of Federal sites subject to CERCLA removals and CERCLA orders

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPA Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 08/25/2022
Date Data Arrived at EDR: 09/06/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 90

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Varies

SEMS: Superfund Enterprise Management System

SEMS (Superfund Enterprise Management System) tracks hazardous waste sites, potentially hazardous waste sites, and remedial activities performed in support of EPA's Superfund Program across the United States. The list was formerly know as CERCLIS, renamed to SEMS by the EPA in 2015. The list contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This dataset also contains sites which are either proposed to or on the National Priorities List (NPL) and the sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Quarterly

Lists of Federal CERCLA sites with NFRAP

SEMS-ARCHIVE: Superfund Enterprise Management System Archive

SEMS-ARCHIVE (Superfund Enterprise Management System Archive) tracks sites that have no further interest under the Federal Superfund Program based on available information. The list was formerly known as the CERCLIS-NFRAP, renamed to SEMS ARCHIVE by the EPA in 2015. EPA may perform a minimal level of assessment work at a site while it is archived if site conditions change and/or new information becomes available. Archived sites have been removed and archived from the inventory of SEMS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list the site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. The decision does not necessarily mean that there is no hazard associated with a given site; it only means that. based upon available information, the location is not judged to be potential NPL site.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA facilities undergoing Corrective Action

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA TSD facilities

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (888) 372-7341
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

Lists of Federal RCRA generators

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (888) 372-7341
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (888) 372-7341
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

RCRA-VSQG: RCRA - Very Small Quantity Generators (Formerly Conditionally Exempt Small Quantity Generators)

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Very small quantity generators (VSQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (888) 372-7341
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

Federal institutional controls / engineering controls registries

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 11/02/2022
Date Data Arrived at EDR: 11/08/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 63

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 11/01/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 08/15/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 68

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

US INST CONTROLS: Institutional Controls Sites List

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 08/15/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 68

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 12/12/2022
Date Data Arrived at EDR: 12/14/2022
Date Made Active in Reports: 12/19/2022
Number of Days to Update: 5

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 12/14/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

Lists of state- and tribal hazardous waste facilities

SHWS: Site Transition List

Contains information on releases of oil and hazardous materials that have been reported to DEP.

Date of Government Version: 07/22/2022
Date Data Arrived at EDR: 10/03/2022
Date Made Active in Reports: 12/15/2022
Number of Days to Update: 73

Source: Department of Environmental Protection
Telephone: 617-292-5990
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

Lists of state and tribal landfills and solid waste disposal facilities

SWF/LF: Solid Waste Facility Database/Transfer Stations

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 05/02/2022
Date Data Arrived at EDR: 05/03/2022
Date Made Active in Reports: 07/22/2022
Number of Days to Update: 80

Source: Department of Environmental Protection
Telephone: 617-292-5989
Last EDR Contact: 12/29/2022
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Annually

LF PROFILES: Landfill Profiles Listing

This spreadsheet describes landfills that have actively accepted waste or have closed under MassDEP Solid Waste Regulations first adopted in 1971 (310 CMR 16.00 and 310 CMR 19.00). The list does not include landfills that closed before 1971 (and which never had a MassDEP permit or approval), or for which agency data is incomplete.

Date of Government Version: 07/01/2015
Date Data Arrived at EDR: 10/27/2015
Date Made Active in Reports: 12/14/2015
Number of Days to Update: 48

Source: Department of Environmental Protection
Telephone: 617-292-5868
Last EDR Contact: 12/29/2022
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Varies

Lists of state and tribal leaking storage tanks

LUST: Leaking Underground Storage Tank Listing

Sites within the Leaking Underground Storage Tank Listing that have a UST listed as its source.

Date of Government Version: 07/22/2022
Date Data Arrived at EDR: 10/03/2022
Date Made Active in Reports: 12/15/2022
Number of Days to Update: 73

Source: Department of Environmental Protection
Telephone: 617-292-5990
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

LAST: Leaking Aboveground Storage Tank Sites
Sites within the Releases Database that have a AST listed as its source.

Date of Government Version: 07/22/2022
Date Data Arrived at EDR: 10/03/2022
Date Made Active in Reports: 12/15/2022
Number of Days to Update: 73
Source: Department of Environmental Protection
Telephone: 617-292-5500
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 04/28/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R5: Leaking Underground Storage Tanks on Indian Land
Leaking underground storage tanks located on Indian Land in Michigan, Minnesota and Wisconsin.

Date of Government Version: 04/11/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA, Region 5
Telephone: 312-886-7439
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 04/08/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64
Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 06/02/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 79
Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land
A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 04/28/2021
Date Data Arrived at EDR: 06/11/2021
Date Made Active in Reports: 09/07/2021
Number of Days to Update: 88

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 04/14/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

Lists of state and tribal registered storage tanks

FEMA UST: Underground Storage Tank Listing
A listing of all FEMA owned underground storage tanks.

Date of Government Version: 10/14/2021
Date Data Arrived at EDR: 11/05/2021
Date Made Active in Reports: 02/01/2022
Number of Days to Update: 88

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

UST: Summary Listing of all the Tanks Registered in the State of Massachusetts
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 07/12/2022
Date Data Arrived at EDR: 07/14/2022
Date Made Active in Reports: 09/27/2022
Number of Days to Update: 75

Source: Department of Fire Services, Office of the Public Safety
Telephone: 617-556-1035
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Quarterly

AST 2: Aboveground Storage Tanks
Aboveground storage tanks

Date of Government Version: 10/06/2022
Date Data Arrived at EDR: 10/06/2022
Date Made Active in Reports: 12/22/2022
Number of Days to Update: 77

Source: Department of Fire Services
Telephone: 978-567-3181
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

AST: Aboveground Storage Tank Database
Registered Aboveground Storage Tanks.

Date of Government Version: 09/21/2022
Date Data Arrived at EDR: 10/07/2022
Date Made Active in Reports: 12/27/2022
Number of Days to Update: 81

Source: Department of Public Safety
Telephone: 617-556-1035
Last EDR Contact: 01/10/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: No Update Planned

INDIAN UST R9: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 04/08/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/14/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 04/20/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 04/07/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 04/11/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 04/28/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/16/2022
Number of Days to Update: 64

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 06/02/2022
Date Data Arrived at EDR: 06/13/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 79

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Sites With Activity and Use Limitation

Activity and Use Limitations establish limits and conditions on the future use of contaminated property, and therefore allow cleanups to be tailored to these uses.

Date of Government Version: 07/22/2022
Date Data Arrived at EDR: 10/03/2022
Date Made Active in Reports: 12/15/2022
Number of Days to Update: 73

Source: Department of Environmental Protection
Telephone: 617-292-5990
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

Lists of state and tribal voluntary cleanup sites

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 07/08/2021
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 07/27/2015
Date Data Arrived at EDR: 09/29/2015
Date Made Active in Reports: 02/18/2016
Number of Days to Update: 142

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 12/13/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Varies

Lists of state and tribal brownfield sites

BROWNFIELDS: Completed Brownfields Covenants Listing

Under Massachusetts law, M.G.L. c. 21E is the statute that governs the cleanup of releases of oil and/or hazardous material to the environment. The Brownfields Act of 1998 amended M.G.L. c. 21E by establishing significant liability relief and financial incentives to spur the redevelopment of brownfields, while ensuring that the Commonwealth's environmental standards are met. Most brownfields are redeveloped with the benefit of liability protections that operate automatically under M.G.L. c. 21E.

Date of Government Version: 04/05/2017
Date Data Arrived at EDR: 08/03/2017
Date Made Active in Reports: 10/10/2017
Number of Days to Update: 68

Source: Office of the Attorney General
Telephone: 617-963-2423
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Annually

BROWNFIELDS 2: Potential Brownfields Listing
A listing of potential brownfields site locations in the state.

Date of Government Version: 12/03/2019
Date Data Arrived at EDR: 01/29/2021
Date Made Active in Reports: 04/21/2021
Number of Days to Update: 82
Source: Department of Environmental Protection
Telephone: 617-556-1007
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Brownfields are real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Cleaning up and reinvesting in these properties takes development pressures off of undeveloped, open land, and both improves and protects the environment. Assessment, Cleanup and Redevelopment Exchange System (ACRES) stores information reported by EPA Brownfields grant recipients on brownfields properties assessed or cleaned up with grant funding as well as information on Targeted Brownfields Assessments performed by EPA Regions. A listing of ACRES Brownfield sites is obtained from Cleanups in My Community. Cleanups in My Community provides information on Brownfields properties for which information is reported back to EPA, as well as areas served by Brownfields grant programs.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/10/2022
Date Made Active in Reports: 03/10/2022
Number of Days to Update: 0
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 12/07/2022
Next Scheduled EDR Contact: 03/27/2023
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 10/20/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 01/13/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: No Update Planned

IHS OPEN DUMPS: Open Dumps on Indian Land
A listing of all open dumps located on Indian Land in the United States.

Date of Government Version: 04/01/2014
Date Data Arrived at EDR: 08/06/2014
Date Made Active in Reports: 01/29/2015
Number of Days to Update: 176
Source: Department of Health & Human Serivces, Indian Health Service
Telephone: 301-443-1452
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US HIST CDL: National Clandestine Laboratory Register
A listing of clandestine drug lab locations that have been removed from the DEAs National Clandestine Laboratory Register.

Date of Government Version: 07/29/2022
Date Data Arrived at EDR: 08/18/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 67
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: No Update Planned

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 07/29/2022
Date Data Arrived at EDR: 08/18/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 67
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Quarterly

Local Land Records

LIENS: Liens Information Listing
A listing of environmental liens.

Date of Government Version: 03/07/2018
Date Data Arrived at EDR: 03/09/2018
Date Made Active in Reports: 06/21/2018
Number of Days to Update: 104
Source: Department of Environmental Protection
Telephone: 617-292-5628
Last EDR Contact: 11/08/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

LIENS 2: CERCLA Lien Information
A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14
Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Semi-Annually

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 09/19/2022
Date Data Arrived at EDR: 09/19/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 11

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 12/14/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

MA SPILLS: Historical Spill List

The Spills Database was the release notification tracking system for spills that occurred prior to October 1, 1993. This information should be considered to be primarily of historical interest since all of the listed spills have either been cleaned up or assigned new tracking numbers and moved to the Reportable Releases or Sites Transition List databases.

Date of Government Version: 09/30/1993
Date Data Arrived at EDR: 12/03/2003
Date Made Active in Reports: 12/31/2003
Number of Days to Update: 28

Source: Department of Environmental Protection
Telephone: 617-292-5720
Last EDR Contact: 12/03/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

RELEASE: Reportable Releases

Contains information on all releases of oil and hazardous materials that have been reported to DEP

Date of Government Version: 07/22/2022
Date Data Arrived at EDR: 10/03/2022
Date Made Active in Reports: 12/15/2022
Number of Days to Update: 73

Source: Department of Environmental Protection
Telephone: 617-292-5990
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

SPILLS 90: SPILLS90 data from FirstSearch

Spills 90 includes those spill and release records available exclusively from FirstSearch databases. Typically, they may include chemical, oil and/or hazardous substance spills recorded after 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 90.

Date of Government Version: 12/11/2012
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 02/08/2013
Number of Days to Update: 36

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SPILLS 80: SPILLS80 data from FirstSearch

Spills 80 includes those spill and release records available from FirstSearch databases prior to 1990. Typically, they may include chemical, oil and/or hazardous substance spills recorded before 1990. Duplicate records that are already included in EDR incident and release records are not included in Spills 80.

Date of Government Version: 03/10/1998
Date Data Arrived at EDR: 01/03/2013
Date Made Active in Reports: 03/05/2013
Number of Days to Update: 61

Source: FirstSearch
Telephone: N/A
Last EDR Contact: 01/03/2013
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

Other Ascertainable Records

RCRA NonGen / NLR: RCRA - Non Generators / No Longer Regulated

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 11/21/2022
Date Data Arrived at EDR: 11/21/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: (888) 372-7341
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 08/11/2022
Date Data Arrived at EDR: 08/11/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 50

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 11/10/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 06/07/2021
Date Data Arrived at EDR: 07/13/2021
Date Made Active in Reports: 03/09/2022
Number of Days to Update: 239

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 01/13/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands

Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 04/02/2018
Date Data Arrived at EDR: 04/11/2018
Date Made Active in Reports: 11/06/2019
Number of Days to Update: 574

Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: N/A

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing

The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 01/01/2017
Date Data Arrived at EDR: 02/03/2017
Date Made Active in Reports: 04/07/2017
Number of Days to Update: 63

Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 11/03/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

US FIN ASSUR: Financial Assurance Information

All owners and operators of facilities that treat, store, or dispose of hazardous waste are required to provide proof that they will have sufficient funds to pay for the clean up, closure, and post-closure care of their facilities.

Date of Government Version: 09/19/2022
Date Data Arrived at EDR: 09/20/2022
Date Made Active in Reports: 12/22/2022
Number of Days to Update: 93

Source: Environmental Protection Agency
Telephone: 202-566-1917
Last EDR Contact: 12/14/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Quarterly

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

EPA WATCH LIST: EPA WATCH LIST

EPA maintains a "Watch List" to facilitate dialogue between EPA, state and local environmental agencies on enforcement matters relating to facilities with alleged violations identified as either significant or high priority. Being on the Watch List does not mean that the facility has actually violated the law only that an investigation by EPA or a state or local environmental agency has led those organizations to allege that an unproven violation has in fact occurred. Being on the Watch List does not represent a higher level of concern regarding the alleged violations that were detected, but instead indicates cases requiring additional dialogue between EPA, state and local agencies - primarily because of the length of time the alleged violation has gone unaddressed or unresolved.

Date of Government Version: 08/30/2013
Date Data Arrived at EDR: 03/21/2014
Date Made Active in Reports: 06/17/2014
Number of Days to Update: 88

Source: Environmental Protection Agency
Telephone: 617-520-3000
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Quarterly

2020 COR ACTION: 2020 Corrective Action Program List

The EPA has set ambitious goals for the RCRA Corrective Action program by creating the 2020 Corrective Action Universe. This RCRA cleanup baseline includes facilities expected to need corrective action. The 2020 universe contains a wide variety of sites. Some properties are heavily contaminated while others were contaminated but have since been cleaned up. Still others have not been fully investigated yet, and may require little or no remediation. Inclusion in the 2020 Universe does not necessarily imply failure on the part of a facility to meet its RCRA obligations.

Date of Government Version: 09/30/2017
Date Data Arrived at EDR: 05/08/2018
Date Made Active in Reports: 07/20/2018
Number of Days to Update: 73

Source: Environmental Protection Agency
Telephone: 703-308-4044
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Varies

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2016
Date Data Arrived at EDR: 06/17/2020
Date Made Active in Reports: 09/10/2020
Number of Days to Update: 85

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 12/12/2022
Next Scheduled EDR Contact: 03/27/2023
Data Release Frequency: Every 4 Years

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 08/14/2020
Date Made Active in Reports: 11/04/2020
Number of Days to Update: 82

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 11/01/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Annually

SSTS: Section 7 Tracking Systems

Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 10/17/2022
Date Data Arrived at EDR: 10/18/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 84

Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 01/18/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Annually

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Annually

RMP: Risk Management Plans

When Congress passed the Clean Air Act Amendments of 1990, it required EPA to publish regulations and guidance for chemical accident prevention at facilities using extremely hazardous substances. The Risk Management Program Rule (RMP Rule) was written to implement Section 112(r) of these amendments. The rule, which built upon existing industry codes and standards, requires companies of all sizes that use certain flammable and toxic substances to develop a Risk Management Program, which includes a(n): Hazard assessment that details the potential effects of an accidental release, an accident history of the last five years, and an evaluation of worst-case and alternative accidental releases; Prevention program that includes safety precautions and maintenance, monitoring, and employee training measures; and Emergency response program that spells out emergency health care, employee training measures and procedures for informing the public and response agencies (e.g the fire department) should an accident occur.

Date of Government Version: 04/27/2022
Date Data Arrived at EDR: 05/04/2022
Date Made Active in Reports: 05/10/2022
Number of Days to Update: 6

Source: Environmental Protection Agency
Telephone: 202-564-8600
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Varies

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

PRP: Potentially Responsible Parties

A listing of verified Potentially Responsible Parties

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: EPA
Telephone: 202-564-6023
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/20/2022
Date Data Arrived at EDR: 01/20/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 64

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 01/04/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 11/18/2016
Date Data Arrived at EDR: 11/23/2016
Date Made Active in Reports: 02/10/2017
Number of Days to Update: 79

Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25

Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/18/2017
Next Scheduled EDR Contact: 12/04/2017
Data Release Frequency: No Update Planned

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 10/26/2022
Date Data Arrived at EDR: 11/22/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 13

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 01/17/2023
Next Scheduled EDR Contact: 05/01/2023
Data Release Frequency: Quarterly

COAL ASH DOE: Steam-Electric Plant Operation Data

A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/22/2022
Number of Days to Update: 84

Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 11/29/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List

A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 01/12/2017
Date Data Arrived at EDR: 03/05/2019
Date Made Active in Reports: 11/11/2019
Number of Days to Update: 251

Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 11/23/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 09/13/2019
Date Data Arrived at EDR: 11/06/2019
Date Made Active in Reports: 02/10/2020
Number of Days to Update: 96
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 11/03/2022
Next Scheduled EDR Contact: 02/13/2023
Data Release Frequency: Varies

RADINFO: Radiation Information Database
The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 07/01/2019
Date Data Arrived at EDR: 07/01/2019
Date Made Active in Reports: 09/23/2019
Number of Days to Update: 84
Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 12/20/2022
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

DOT OPS: Incident and Accident Data
Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/02/2020
Date Data Arrived at EDR: 01/28/2020
Date Made Active in Reports: 04/17/2020
Number of Days to Update: 80
Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 10/24/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Quarterly

CONSENT: Superfund (CERCLA) Consent Decrees
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 09/30/2022
Date Data Arrived at EDR: 10/21/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 81

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 03/02/2022
Date Made Active in Reports: 03/25/2022
Number of Days to Update: 23

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 12/21/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Biennially

INDIAN RESERV: Indian Reservations

This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 07/14/2015
Date Made Active in Reports: 01/10/2017
Number of Days to Update: 546

Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Semi-Annually

FUSRAP: Formerly Utilized Sites Remedial Action Program

DOE established the Formerly Utilized Sites Remedial Action Program (FUSRAP) in 1974 to remediate sites where radioactive contamination remained from Manhattan Project and early U.S. Atomic Energy Commission (AEC) operations.

Date of Government Version: 07/26/2021
Date Data Arrived at EDR: 07/27/2021
Date Made Active in Reports: 10/22/2021
Number of Days to Update: 87

Source: Department of Energy
Telephone: 202-586-3559
Last EDR Contact: 10/27/2022
Next Scheduled EDR Contact: 02/16/2023
Data Release Frequency: Varies

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 08/30/2019
Date Data Arrived at EDR: 11/15/2019
Date Made Active in Reports: 01/28/2020
Number of Days to Update: 74

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 11/09/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

LEAD SMELTER 1: Lead Smelter Sites

A listing of former lead smelter site locations.

Date of Government Version: 10/27/2022
Date Data Arrived at EDR: 11/01/2022
Date Made Active in Reports: 11/15/2022
Number of Days to Update: 14

Source: Environmental Protection Agency
Telephone: 703-603-8787
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Varies

LEAD SMELTER 2: Lead Smelter Sites

A list of several hundred sites in the U.S. where secondary lead smelting was done from 1931and 1964. These sites may pose a threat to public health through ingestion or inhalation of contaminated soil or dust

Date of Government Version: 04/05/2001
Date Data Arrived at EDR: 10/27/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 36

Source: American Journal of Public Health
Telephone: 703-305-6451
Last EDR Contact: 12/02/2009
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

US AIRS (AFS): Aerometric Information Retrieval System Facility Subsystem (AFS)

The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

US AIRS MINOR: Air Facility System Data

A listing of minor source facilities.

Date of Government Version: 10/12/2016
Date Data Arrived at EDR: 10/26/2016
Date Made Active in Reports: 02/03/2017
Number of Days to Update: 100

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 09/26/2017
Next Scheduled EDR Contact: 01/08/2018
Data Release Frequency: Annually

MINES VIOLATIONS: MSHA Violation Assessment Data

Mines violation and assessment information. Department of Labor, Mine Safety & Health Administration.

Date of Government Version: 11/29/2022
Date Data Arrived at EDR: 11/30/2022
Date Made Active in Reports: 12/22/2022
Number of Days to Update: 22

Source: DOL, Mine Safety & Health Admi
Telephone: 202-693-9424
Last EDR Contact: 01/03/2023
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Quarterly

US MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 08/03/2022
Date Data Arrived at EDR: 08/17/2022
Date Made Active in Reports: 08/31/2022
Number of Days to Update: 14

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 11/17/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Semi-Annually

US MINES 2: Ferrous and Nonferrous Metal Mines Database Listing

This map layer includes ferrous (ferrous metal mines are facilities that extract ferrous metals, such as iron ore or molybdenum) and nonferrous (Nonferrous metal mines are facilities that extract nonferrous metals, such as gold, silver, copper, zinc, and lead) metal mines in the United States.

Date of Government Version: 05/06/2020
Date Data Arrived at EDR: 05/27/2020
Date Made Active in Reports: 08/13/2020
Number of Days to Update: 78

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

US MINES 3: Active Mines & Mineral Plants Database Listing

Active Mines and Mineral Processing Plant operations for commodities monitored by the Minerals Information Team of the USGS.

Date of Government Version: 04/14/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: USGS
Telephone: 703-648-7709
Last EDR Contact: 11/21/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

ABANDONED MINES: Abandoned Mines

An inventory of land and water impacted by past mining (primarily coal mining) is maintained by OSMRE to provide information needed to implement the Surface Mining Control and Reclamation Act of 1977 (SMCRA). The inventory contains information on the location, type, and extent of AML impacts, as well as, information on the cost associated with the reclamation of those problems. The inventory is based upon field surveys by State, Tribal, and OSMRE program officials. It is dynamic to the extent that it is modified as new problems are identified and existing problems are reclaimed.

Date of Government Version: 09/13/2022
Date Data Arrived at EDR: 09/14/2022
Date Made Active in Reports: 12/05/2022
Number of Days to Update: 82

Source: Department of Interior
Telephone: 202-208-2609
Last EDR Contact: 12/13/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 08/03/2022
Date Data Arrived at EDR: 08/25/2022
Date Made Active in Reports: 10/24/2022
Number of Days to Update: 60

Source: EPA
Telephone: (617) 918-1111
Last EDR Contact: 11/29/2022
Next Scheduled EDR Contact: 03/13/2023
Data Release Frequency: Quarterly

ECHO: Enforcement & Compliance History Information

ECHO provides integrated compliance and enforcement information for about 800,000 regulated facilities nationwide.

Date of Government Version: 09/25/2022
Date Data Arrived at EDR: 09/30/2022
Date Made Active in Reports: 12/22/2022
Number of Days to Update: 83

Source: Environmental Protection Agency
Telephone: 202-564-2280
Last EDR Contact: 01/04/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Quarterly

DOCKET HWC: Hazardous Waste Compliance Docket Listing

A complete list of the Federal Agency Hazardous Waste Compliance Docket Facilities.

Date of Government Version: 05/06/2021
Date Data Arrived at EDR: 05/21/2021
Date Made Active in Reports: 08/11/2021
Number of Days to Update: 82

Source: Environmental Protection Agency
Telephone: 202-564-0527
Last EDR Contact: 11/15/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

UXO: Unexploded Ordnance Sites

A listing of unexploded ordnance site locations

Date of Government Version: 11/09/2021
Date Data Arrived at EDR: 10/20/2022
Date Made Active in Reports: 01/10/2023
Number of Days to Update: 82

Source: Department of Defense
Telephone: 703-704-1564
Last EDR Contact: 01/09/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

FUELS PROGRAM: EPA Fuels Program Registered Listing

This listing includes facilities that are registered under the Part 80 (Code of Federal Regulations) EPA Fuels Programs. All companies now are required to submit new and updated registrations.

Date of Government Version: 08/11/2022
Date Data Arrived at EDR: 08/11/2022
Date Made Active in Reports: 09/30/2022
Number of Days to Update: 50

Source: EPA
Telephone: 800-385-6164
Last EDR Contact: 11/10/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Quarterly

PFAS NPL: Superfund Sites with PFAS Detections Information

EPA's Office of Land and Emergency Management and EPA Regional Offices maintain data describing what is known about site investigations, contamination, and remedial actions under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) where PFAS is present in the environment.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 07/08/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 123

Source: Environmental Protection Agency
Telephone: 703-603-8895
Last EDR Contact: 01/10/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS FEDERAL SITES: Federal Sites PFAS Information

Several federal entities, such as the federal Superfund program, Department of Defense, National Aeronautics and Space Administration, Department of Transportation, and Department of Energy provided information for sites with known or suspected detections at federal facilities.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS TSCA: PFAS Manufacture and Imports Information

EPA issued the Chemical Data Reporting (CDR) Rule under the Toxic Substances Control Act (TSCA) and requires chemical manufacturers and facilities that manufacture or import chemical substances to report data to EPA. EPA publishes non-confidential business information (non-CBI) and includes descriptive information about each site, corporate parent, production volume, other manufacturing information, and processing and use information.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS RCRA MANIFEST: PFAS Transfers Identified In the RCRA Database Listing

To work around the lack of PFAS waste codes in the RCRA database, EPA developed the PFAS Transfers dataset by mining e-Manifest records containing at least one of these common PFAS keywords: PFAS, PFOA, PFOS, PERFL, AFFF, GENX, GEN-X (plus the VT waste codes). These keywords were searched for in the following text fields: Manifest handling instructions (MANIFEST_HANDLING_INSTR), Non-hazardous waste description (NON_HAZ_WASTE_DESCRIPTION), DOT printed information (DOT_PRINTED_INFORMATION), Waste line handling instructions (WASTE_LINE_HANDLING_INSTR), Waste residue comments (WASTE_RESIDUE_COMMENTS).

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS ATSDR: PFAS Contamination Site Location Listing

PFAS contamination site locations from the Department of Health & Human Services, Center for Disease Control & Prevention. ATSDR is involved at a number of PFAS-related sites, either directly or through assisting state and federal partners. As of now, most sites are related to drinking water contamination connected with PFAS production facilities or fire training areas where aqueous film-forming firefighting foam (AFFF) was regularly used.

Date of Government Version: 06/24/2020
Date Data Arrived at EDR: 03/17/2021
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 601

Source: Department of Health & Human Services
Telephone: 202-741-5770
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

PFAS WQP: Ambient Environmental Sampling for PFAS

The Water Quality Portal (WQP) is a part of a modernized repository storing ambient sampling data for all environmental media and tissue samples. A wide range of federal, state, tribal and local governments, academic and non-governmental organizations and individuals submit project details and sampling results to this public repository. The information is commonly used for research and assessments of environmental quality.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS NPDES: Clean Water Act Discharge Monitoring Information

Any discharger of pollutants to waters of the United States from a point source must have a National Pollutant Discharge Elimination System (NPDES) permit. The process for obtaining limits involves the regulated entity (permittee) disclosing releases in a NPDES permit application and the permitting authority (typically the state but sometimes EPA) deciding whether to require monitoring or monitoring with limits.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS ECHO: Facilities in Industries that May Be Handling PFAS Listing

Regulators and the public have expressed interest in knowing which regulated entities may be using PFAS. EPA has developed a dataset from various sources that show which industries may be handling PFAS. Approximately 120,000 facilities subject to federal environmental programs have operated or currently operate in industry sectors with processes that may involve handling and/or release of PFAS.

Date of Government Version: 01/03/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS ECHO FIRE TRAINING: Facilities in Industries that May Be Handling PFAS Listing

A list of fire training sites was added to the Industry Sectors dataset using a keyword search on the permitted facilitys name to identify sites where fire-fighting foam may have been used in training exercises. Additionally, you may view an example spreadsheet of the subset of fire training facility data, as well as the keywords used in selecting or deselecting a facility for the subset. as well as the keywords used in selecting or deselecting a facility for the subset. These keywords were tested to maximize accuracy in selecting facilities that may use fire-fighting foam in training exercises, however, due to the lack of a required reporting field in the data systems for designating fire training sites, this methodology may not identify all fire training sites or may potentially misidentify them.

Date of Government Version: 08/22/2018
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS PART 139 AIRPORT: All Certified Part 139 Airports PFAS Information Listing

Since July 1, 2006, all certified part 139 airports are required to have fire-fighting foam onsite that meet military specifications (MIL-F-24385) (14 CFR 139.317). To date, these military specification fire-fighting foams are fluorinated and have been historically used for training and extinguishing. The 2018 FAA Reauthorization Act has a provision stating that no later than October 2021, FAA shall not require the use of fluorinated AFFF. This provision does not prohibit the use of fluorinated AFFF at Part 139 civilian airports; it only prohibits FAA from mandating its use. The Federal Aviation Administration?s document AC 150/5210-6D - Aircraft Fire Extinguishing Agents provides guidance on Aircraft Fire Extinguishing Agents, which includes Aqueous Film Forming Foam (AFFF).

Date of Government Version: 08/22/2018
Date Data Arrived at EDR: 10/26/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 13

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

AQUEOUS FOAM NRC: Aqueous Foam Related Incidents Listing

The National Response Center (NRC) serves as an emergency call center that fields initial reports for pollution and railroad incidents and forwards that information to appropriate federal/state agencies for response. The spreadsheets posted to the NRC website contain initial incident data that has not been validated or investigated by a federal/state response agency. Response center calls from 1990 to the most recent complete calendar year where there was indication of Aqueous Film Forming Foam (AFFF) usage are included in this dataset. NRC calls may reference AFFF usage in the ?Material Involved? or ?Incident Description? fields.

Date of Government Version: 02/23/2022
Date Data Arrived at EDR: 03/31/2022
Date Made Active in Reports: 11/08/2022
Number of Days to Update: 222

Source: Environmental Protection Agency
Telephone: 202-272-0167
Last EDR Contact: 01/05/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

PFAS: PFAS Contaminated Sites Listing

Detection of Per- and Polyfluoroalkyl Substances (PFAS) in drinking water.

Date of Government Version: 06/24/2022
Date Data Arrived at EDR: 06/28/2022
Date Made Active in Reports: 09/12/2022
Number of Days to Update: 76

Source: Department of Environmental Protection
Telephone: 617-292-6770
Last EDR Contact: 12/12/2022
Next Scheduled EDR Contact: 04/10/2023
Data Release Frequency: Varies

AIRS: Permitted Facilities Listing

A listing of Air Quality permit applications.

Date of Government Version: 10/06/2022
Date Data Arrived at EDR: 10/06/2022
Date Made Active in Reports: 12/22/2022
Number of Days to Update: 77

Source: Department of Environmental Protection
Telephone: 617-292-5789
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

ASBESTOS: Asbestos Notification Listing

Asbestos sites

Date of Government Version: 08/23/2022
Date Data Arrived at EDR: 08/24/2022
Date Made Active in Reports: 09/06/2022
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 617-292-5982
Last EDR Contact: 11/08/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

DRYCLEANERS: Regulated Drycleaning Facilities

A listing of Department of Environmental Protection regulated drycleaning facilities that use perchloroethylene under the Environmental Results Program.

Date of Government Version: 12/07/2022
Date Data Arrived at EDR: 12/13/2022
Date Made Active in Reports: 01/12/2023
Number of Days to Update: 30

Source: Department of Environmental Protection
Telephone: 617-292-5633
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

ENFORCEMENT: Enforcement Action Cases

A listing of enforcement action cases tracked by Department of Environmental Protection programs, including Solid Waste and Hazardous Waste.

Date of Government Version: 01/09/2023
Date Data Arrived at EDR: 01/10/2023
Date Made Active in Reports: 01/12/2023
Number of Days to Update: 2

Source: Department of Environmental Quality
Telephone: 617-292-5979
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

Financial Assurance 1: Financial Assurance Information Listing

Information for hazardous waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 12/01/2010
Date Data Arrived at EDR: 12/23/2010
Date Made Active in Reports: 02/03/2011
Number of Days to Update: 42

Source: Department of Environmental Protection
Telephone: 617-292-5970
Last EDR Contact: 11/30/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Varies

Financial Assurance 2: Financial Assurance Information Listing

A listing of financial assurance information for underground storage tanks. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 07/12/2022
Date Data Arrived at EDR: 07/14/2022
Date Made Active in Reports: 09/27/2022
Number of Days to Update: 75

Source: Office of State Fire Marshal
Telephone: 978-567-3100
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Varies

Financial Assurance 3: Financial Assurance Information listing

Information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay

Date of Government Version: 01/16/2018
Date Data Arrived at EDR: 04/17/2018
Date Made Active in Reports: 06/15/2018
Number of Days to Update: 59

Source: Department of Environmental Protection
Telephone: 617-292-5970
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

GWDP: Ground Water Discharge Permits

The Ground Water Discharge Permits datalayer (formerly known as Groundwater Discharge Points) is a statewide point dataset containing approximate locations of permitted discharges to groundwater.

Date of Government Version: 12/29/2021
Date Data Arrived at EDR: 01/25/2022
Date Made Active in Reports: 04/18/2022
Number of Days to Update: 83

Source: MassGIS
Telephone: 617-556-1150
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Varies

HW GEN: List of Massachusetts Hazardous Waste Generators

Permanent generator identification numbers for all Massachusetts generators of hazardous waste and waste oil that have registered with or notified MassDEP of their hazardous waste activities.

Date of Government Version: 09/15/2022
Date Data Arrived at EDR: 09/20/2022
Date Made Active in Reports: 12/07/2022
Number of Days to Update: 78

Source: Department of Environmental Protection
Telephone: 617-292-5500
Last EDR Contact: 12/14/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Semi-Annually

MERCURY: Mercury Product Recyling Drop-Off Locations Listing

A listing of locations, collecting and recycling for mercury-added products. Mercury is toxic to the human nervous system, as well as fish and animals. Mercury can enter the body either through skin absorption or through inhalation of mercury vapors. At room temperature, small beads of mercury will vaporize.

Date of Government Version: 09/26/2022
Date Data Arrived at EDR: 09/26/2022
Date Made Active in Reports: 12/09/2022
Number of Days to Update: 74

Source: Department of Environmental Protection
Telephone: 617-292-5632
Last EDR Contact: 11/23/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Varies

NPDES: NPDES Permit Listing

Listing of treatment plants in Massachusetts that hold permits to discharge to groundwater.

Date of Government Version: 01/07/2020
Date Data Arrived at EDR: 02/11/2020
Date Made Active in Reports: 04/21/2020
Number of Days to Update: 70

Source: Department of Environmental Protection
Telephone: 508-767-2781
Last EDR Contact: 11/10/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

TIER 2: Tier 2 Information Listing

A listing of facilities which store or manufacture hazardous materials and submit a chemical inventory report

Date of Government Version: 12/31/2019
Date Data Arrived at EDR: 07/19/2021
Date Made Active in Reports: 08/17/2021
Number of Days to Update: 29

Source: Massachusetts Emergency Management Agency
Telephone: 508-820-2019
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Annually

TSD: TSD Facility

List of Licensed Hazardous Waste Treatment, Storage Disposal Facilities (TSDFs) in Massachusetts.

Date of Government Version: 09/15/2022
Date Data Arrived at EDR: 09/20/2022
Date Made Active in Reports: 12/07/2022
Number of Days to Update: 78

Source: Department of Environmental Protection
Telephone: 617-292-5580
Last EDR Contact: 12/14/2022
Next Scheduled EDR Contact: 04/03/2023
Data Release Frequency: Varies

UIC: Underground Injection Control Listing

A list of UIC registration data and their locations

Date of Government Version: 03/10/2022
Date Data Arrived at EDR: 03/15/2022
Date Made Active in Reports: 06/10/2022
Number of Days to Update: 87

Source: Department of Environmental Protection
Telephone: 617-566-1172
Last EDR Contact: 11/01/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: Varies

PCS: Permit Compliance System

PCS is a computerized management information system that contains data on National Pollutant Discharge Elimination System (NPDES) permit holding facilities. PCS tracks the permit, compliance, and enforcement status of NPDES facilities.

Date of Government Version: 07/14/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/29/2011
Number of Days to Update: 55

Source: EPA, Office of Water
Telephone: 202-564-2496
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Semi-Annually

PCS INACTIVE: Listing of Inactive PCS Permits
An inactive permit is a facility that has shut down or is no longer discharging.

Date of Government Version: 11/05/2014
Date Data Arrived at EDR: 01/06/2015
Date Made Active in Reports: 05/06/2015
Number of Days to Update: 120

Source: EPA
Telephone: 202-564-2496
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Semi-Annually

MINES MRDS: Mineral Resources Data System
Mineral Resources Data System

Date of Government Version: 04/06/2018
Date Data Arrived at EDR: 10/21/2019
Date Made Active in Reports: 10/24/2019
Number of Days to Update: 3

Source: USGS
Telephone: 703-648-6533
Last EDR Contact: 11/22/2022
Next Scheduled EDR Contact: 03/06/2023
Data Release Frequency: Varies

PCS ENF: Enforcement data
No description is available for this data

Date of Government Version: 12/31/2014
Date Data Arrived at EDR: 02/05/2015
Date Made Active in Reports: 03/06/2015
Number of Days to Update: 29

Source: EPA
Telephone: 202-564-2497
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Varies

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

EDR Hist Auto: EDR Exclusive Historical Auto Stations
EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR Hist Cleaner: EDR Exclusive Historical Cleaners

EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

EDR RECOVERED GOVERNMENT ARCHIVES

Exclusive Recovered Govt. Archives

RGA HWS: Recovered Government Archive State Hazardous Waste Facilities List

The EDR Recovered Government Archive State Hazardous Waste database provides a list of SHWS incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Protection in Massachusetts.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

RGA LUST: Recovered Government Archive Leaking Underground Storage Tank

The EDR Recovered Government Archive Leaking Underground Storage Tank database provides a list of LUST incidents derived from historical databases and includes many records that no longer appear in current government lists. Compiled from Records formerly available from the Department of Environmental Protection in Massachusetts.

Date of Government Version: N/A
Date Data Arrived at EDR: 07/01/2013
Date Made Active in Reports: 12/24/2013
Number of Days to Update: 176

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 06/01/2012
Next Scheduled EDR Contact: N/A
Data Release Frequency: Varies

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 08/08/2022
Date Data Arrived at EDR: 08/08/2022
Date Made Active in Reports: 10/21/2022
Number of Days to Update: 74

Source: Department of Energy & Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 11/16/2022
Next Scheduled EDR Contact: 02/20/2023
Data Release Frequency: No Update Planned

NJ MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 12/31/2018
Date Data Arrived at EDR: 04/10/2019
Date Made Active in Reports: 05/16/2019
Number of Days to Update: 36

Source: Department of Environmental Protection
Telephone: N/A
Last EDR Contact: 12/28/2022
Next Scheduled EDR Contact: 04/17/2023
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data
Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 01/01/2019
Date Data Arrived at EDR: 10/29/2021
Date Made Active in Reports: 01/19/2022
Number of Days to Update: 82

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 10/28/2022
Next Scheduled EDR Contact: 02/06/2023
Data Release Frequency: Quarterly

PA MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 06/30/2018
Date Data Arrived at EDR: 07/19/2019
Date Made Active in Reports: 09/10/2019
Number of Days to Update: 53

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Annually

RI MANIFEST: Manifest information
Hazardous waste manifest information

Date of Government Version: 12/31/2020
Date Data Arrived at EDR: 11/30/2021
Date Made Active in Reports: 02/18/2022
Number of Days to Update: 80

Source: Department of Environmental Management
Telephone: 401-222-2797
Last EDR Contact: 12/20/2022
Next Scheduled EDR Contact: 02/27/2023
Data Release Frequency: Annually

VT MANIFEST: Hazardous Waste Manifest Data
Hazardous waste manifest information.

Date of Government Version: 10/28/2019
Date Data Arrived at EDR: 10/29/2019
Date Made Active in Reports: 01/09/2020
Number of Days to Update: 72

Source: Department of Environmental Conservation
Telephone: 802-241-3443
Last EDR Contact: 01/06/2023
Next Scheduled EDR Contact: 04/24/2023
Data Release Frequency: Annually

WI MANIFEST: Manifest Information
Hazardous waste manifest information.

Date of Government Version: 05/31/2018
Date Data Arrived at EDR: 06/19/2019
Date Made Active in Reports: 09/03/2019
Number of Days to Update: 76

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 12/01/2022
Next Scheduled EDR Contact: 03/20/2023
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines
Source: Endeavor Business Media
Petroleum Bundle (Crude Oil, Refined Products, Petrochemicals, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)) N = Natural Gas Bundle (Natural Gas, Gas Liquids (LPG/NGL), and Specialty Gases (Miscellaneous)). This map includes information copyrighted by Endeavor Business Media. This information is provided on a best effort basis and Endeavor Business Media does not guarantee its accuracy nor warrant its fitness for any particular purpose. Such information has been reprinted with the permission of Endeavor Business Media.

Electric Power Transmission Line Data
Source: Endeavor Business Media
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Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: MassDEP
Telephone: 617-292-5907

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

STREET AND ADDRESS INFORMATION

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GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

SAND PIT ROAD
2 SAND PIT RD
NORTH TRURO, MA 02652

TARGET PROPERTY COORDINATES

Latitude (North):	42.023493 - 42ˆ 1’ 24.57’’
Longitude (West):	70.079727 - 70ˆ 4’ 47.02’’
Universal Tranverse Mercator:	Zone 19
UTM X (Meters):	410609.4
UTM Y (Meters):	4652735.0
Elevation:	46 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	11721272 NORTH TRURO, MA
Version Date:	2018

EDR’s GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

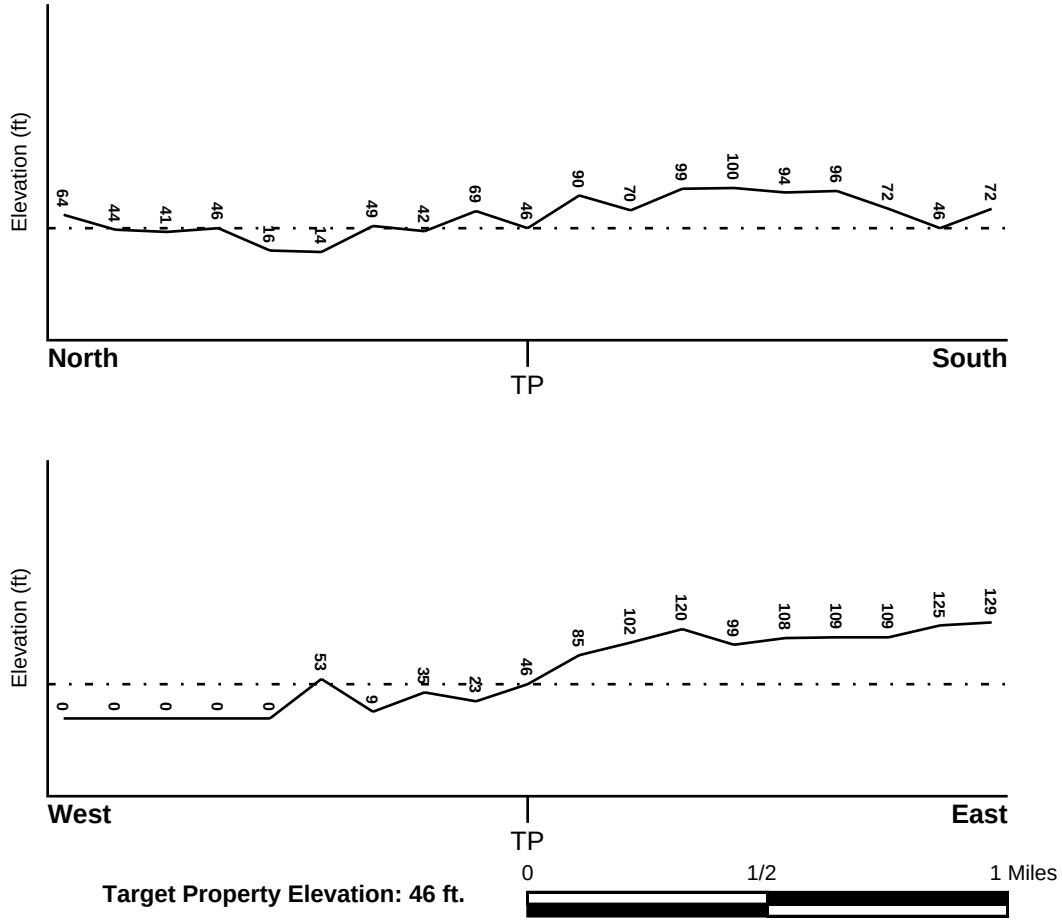
TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General WNW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES



Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Flood Plain Panel at Target Property	FEMA Source Type
25001C0139J	FEMA FIRM Flood data

Additional Panels in search area:	FEMA Source Type
25001C0136J	FEMA FIRM Flood data
25001C0137J	FEMA FIRM Flood data
25001C0138J	FEMA FIRM Flood data
25001C0143J	FEMA FIRM Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
NORTH TRURO	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

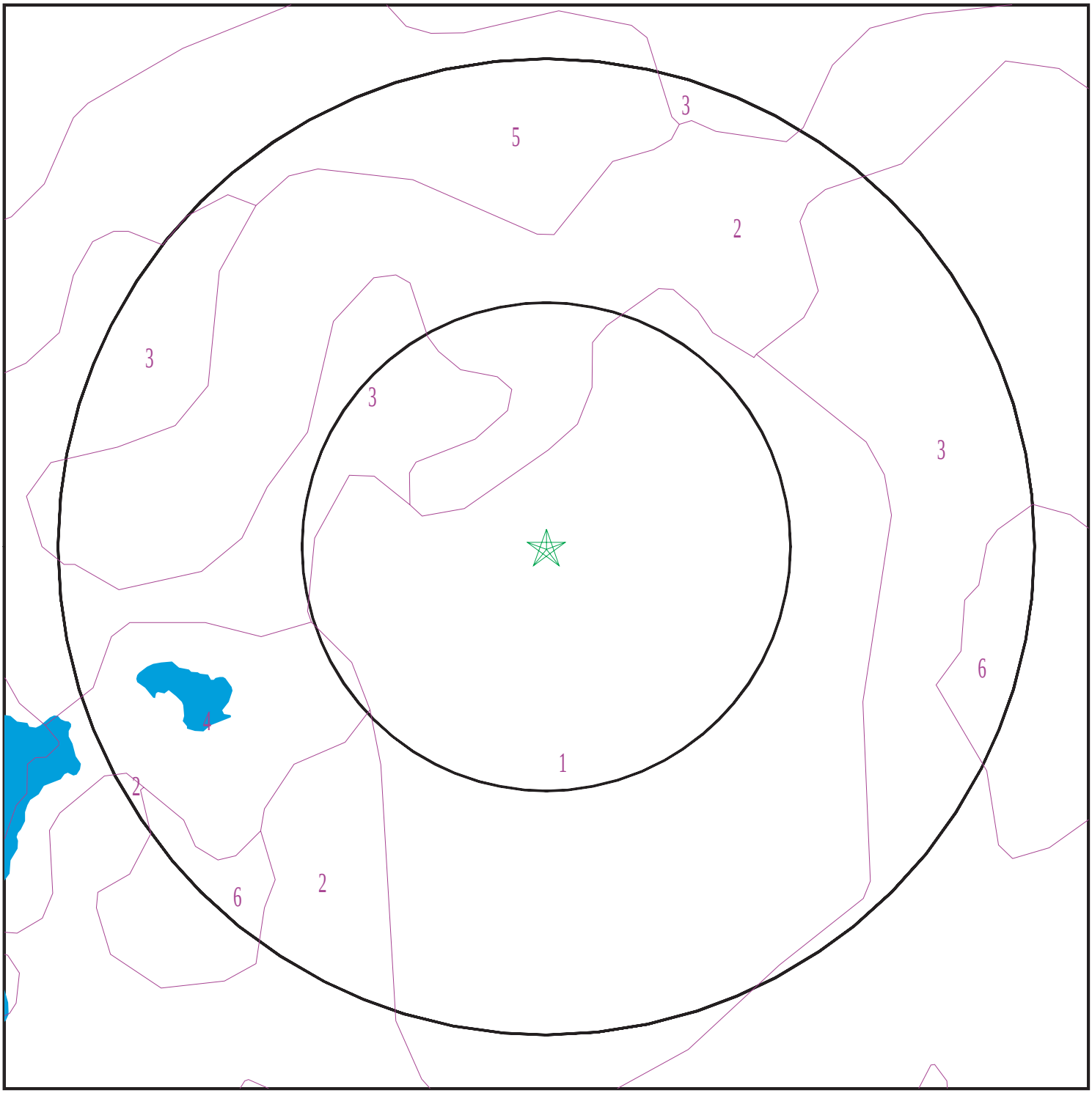
Era:	Cenozoic
System:	Quaternary
Series:	Pleistocene
Code:	Qp *(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Stratifed Sequence

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 7228749.1s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Sand Pit Road	CLIENT:	Horsley Witten Group, Inc.
ADDRESS:	2 Sand Pit Rd North Truro MA 02652	CONTACT:	Caroline Armstrong
LAT/LONG:	42.023493 / 70.079727	INQUIRY #:	7228749.1s
		DATE:	January 19, 2023 10:32 am

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GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name:	Pits
Soil Surface Texture:	
Hydrologic Group:	Not reported
Soil Drainage Class:	
Hydric Status: Unknown	
Corrosion Potential - Uncoated Steel:	Not Reported
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

No Layer Information available.

Soil Map ID: 2

Soil Component Name:	Carver
Soil Surface Texture:	coarse sand
Hydrologic Group:	Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.
Soil Drainage Class:	Excessively drained
Hydric Status: Partially hydric	
Corrosion Potential - Uncoated Steel:	Low
Depth to Bedrock Min:	> 0 inches
Depth to Watertable Min:	> 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
2	7 inches	16 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
3	16 inches	64 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6

Soil Map ID: 3

Soil Component Name: Carver

Soil Surface Texture: coarse sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
2	7 inches	16 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
3	16 inches	64 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6

Soil Map ID: 4

Soil Component Name: Freetown

Soil Surface Texture: muck

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Very poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	muck	Not reported	Not reported	Max: 42.34 Min: 4.23	Max: Min:
2	5 inches	64 inches	muck	Not reported	Not reported	Max: 42.34 Min: 4.23	Max: Min:

Soil Map ID: 5

Soil Component Name: Carver

Soil Surface Texture: coarse sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
2	7 inches	16 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
3	16 inches	64 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6

Soil Map ID: 6

Soil Component Name: Carver

Soil Surface Texture: coarse sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Excessively drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Low

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
2	7 inches	16 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6
3	16 inches	64 inches	coarse sand	Not reported	Not reported	Max: 705 Min: 141.14	Max: 5.5 Min: 3.6

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	USGS40000464026	0 - 1/8 Mile WNW
A2	USGS40000464014	0 - 1/8 Mile WSW
A3	USGS40000464032	0 - 1/8 Mile WNW
9	USGS40000464083	1/4 - 1/2 Mile North
10	USGS40000464082	1/4 - 1/2 Mile NNE
11	USGS40000464005	1/4 - 1/2 Mile ESE
12	USGS40000464122	1/4 - 1/2 Mile NNE
13	USGS40000464123	1/4 - 1/2 Mile NNW
14	USGS40000463934	1/4 - 1/2 Mile South
C15	USGS40000464124	1/4 - 1/2 Mile NNE
16	USGS40000463942	1/4 - 1/2 Mile SSW
C17	USGS40000464130	1/4 - 1/2 Mile NNE
C18	USGS40000464129	1/4 - 1/2 Mile NNE
19	USGS40000464162	1/4 - 1/2 Mile North
D21	USGS40000464128	1/2 - 1 Mile NE
D22	USGS40000464138	1/2 - 1 Mile NNE
23	USGS40000464114	1/2 - 1 Mile NW
D24	USGS40000464139	1/2 - 1 Mile NE
D25	USGS40000464140	1/2 - 1 Mile NE
E26	USGS40000463918	1/2 - 1 Mile SSE
27	USGS40000464151	1/2 - 1 Mile NE
28	USGS40000463975	1/2 - 1 Mile ESE
30	USGS40000464208	1/2 - 1 Mile NNW
31	USGS40000464202	1/2 - 1 Mile NNW
32	USGS40000463863	1/2 - 1 Mile South
33	USGS40000464163	1/2 - 1 Mile NW
34	USGS40000464235	1/2 - 1 Mile NNW
36	USGS40000464216	1/2 - 1 Mile NNW
37	USGS40000463981	1/2 - 1 Mile ESE
F38	USGS40000464022	1/2 - 1 Mile East
G39	USGS40000464269	1/2 - 1 Mile North
G40	USGS40000464270	1/2 - 1 Mile North
42	USGS40000464170	1/2 - 1 Mile NW
44	USGS40000463837	1/2 - 1 Mile South
45	USGS40000464215	1/2 - 1 Mile NE
48	USGS40000463868	1/2 - 1 Mile SE

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
49	USGS40000464319	1/2 - 1 Mile North
51	USGS40000463806	1/2 - 1 Mile South

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

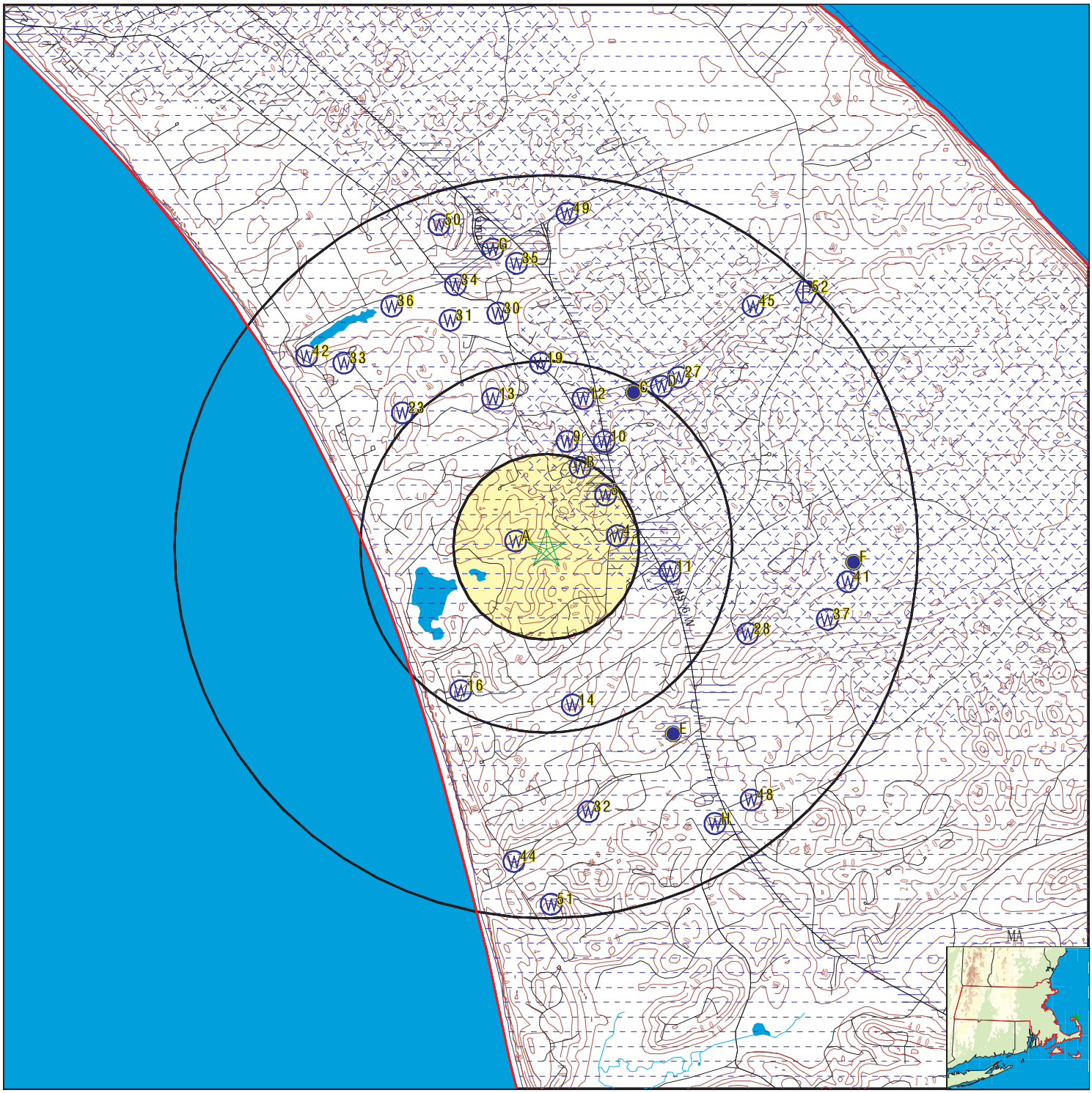
MAP ID	WELL ID	LOCATION FROM TP
52	MA4300001	1/2 - 1 Mile NE

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
4	MA9000000001704	1/8 - 1/4 Mile East
5	MA9000000000202	1/8 - 1/4 Mile NE
B6	MA9000000002077	1/8 - 1/4 Mile NNE
B7	MA9000000000884	1/8 - 1/4 Mile NNE
B8	MA9000000001085	1/8 - 1/4 Mile NNE
C20	MA9000000001814	1/4 - 1/2 Mile NNE
E29	MA9000000003145	1/2 - 1 Mile SE
35	MA9000000002839	1/2 - 1 Mile North
41	MA9000000002567	1/2 - 1 Mile East
F43	MA9000000002566	1/2 - 1 Mile East
H46	MA9000000001955	1/2 - 1 Mile SSE
H47	MA9000000003627	1/2 - 1 Mile SSE
50	MA9000000001405	1/2 - 1 Mile NNW

PHYSICAL SETTING SOURCE MAP - 7228749.1s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons
- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- Potentially Productive Aquifers
- Not Potentially Productive Aquifers
- DEP Approved Zone IIs
- EPA Designated Sole Src. Aq.

SITE NAME:	Sand Pit Road	CLIENT:	Horsley Witten Group, Inc.
ADDRESS:	2 Sand Pit Rd North Truro MA 02652	CONTACT:	Caroline Armstrong
		INQUIRY #:	7228749.1s
LAT/LONG:	42.023493 / 70.079727	DATE:	January 19, 2023 10:32 am

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GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

A1
WNW
0 - 1/8 Mile
Lower

FED USGS **USGS40000464026**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 189	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19661024	Well Depth:	55
Well Depth Units:	ft	Well Hole Depth:	60
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	1	Level reading date:	1966-10-24
Feet below surface:	18.50	Feet to sea level:	Not Reported
Note:	Not Reported		

A2
WSW
0 - 1/8 Mile
Lower

FED USGS **USGS40000464014**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 188	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19661020	Well Depth:	44
Well Depth Units:	ft	Well Hole Depth:	59
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	1	Level reading date:	1966-10-20
Feet below surface:	9.80	Feet to sea level:	Not Reported
Note:	Not Reported		

A3
WNW
0 - 1/8 Mile
Lower

FED USGS **USGS40000464032**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 157	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19661026	Well Depth:	50

Well Depth Units:	ft	Well Hole Depth:	60
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	48	Level reading date:	1977-04-11
Feet below surface:	0.63	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1976-12-06	Feet below surface:	1.32
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-29	Feet below surface:	1.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-04	Feet below surface:	1.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-31	Feet below surface:	1.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-03	Feet below surface:	1.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-07-02	Feet below surface:	1.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-05-24	Feet below surface:	0.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-28	Feet below surface:	0.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-05	Feet below surface:	0.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-03-01	Feet below surface:	0.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-01-29	Feet below surface:	0.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-12-29	Feet below surface:	0.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-11-26	Feet below surface:	0.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-29	Feet below surface:	1.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-19	Feet below surface:	1.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-07-22	Feet below surface:	1.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-06-25	Feet below surface:	0.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-05-19	Feet below surface:	0.65
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1975-04-24	Feet below surface:	0.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-03-24	Feet below surface:	0.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-19	Feet below surface:	0.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-01-17	Feet below surface:	0.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-17	Feet below surface:	0.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-23	Feet below surface:	1.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-22	Feet below surface:	1.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-16	Feet below surface:	1.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-14	Feet below surface:	1.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	0.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	0.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	0.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-18	Feet below surface:	0.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	0.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	0.33
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	0.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	0.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	0.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	0.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	0.77
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	0.53
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-06-13	Feet below surface:	0.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	0.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	0.33
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	0.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	0.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	0.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	0.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-31	Feet below surface:	0.33
Feet to sea level:	Not Reported	Note:	Not Reported

4
East
1/8 - 1/4 Mile
Higher

MA WELLS **MA9000000001704**

PWS ID:	4300020	Site Name:	PILGRIM SPRING MOTEL
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	100
Feature Type:	GW	Location Method:	GP_6
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300020-01G	PWS Name:	PILGRIM SPRING MOTEL
Source Name:	WELL # 1	PWS Status:	I
Source Status:	I	PWS Class:	NC
Source Availability:	INACT		

5
NE
1/8 - 1/4 Mile
Higher

MA WELLS **MA9000000000202**

PWS ID:	4300004	Site Name:	CAPE VIEW MOTEL
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	100
Feature Type:	GW	Location Method:	GP_6
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		

Source ID:	4300004-01G	PWS Name:	CAPE VIEW MOTEL
Source Name:	WELL 1	PWS Status:	A
Source Status:	A	PWS Class:	NC
Source Availability:	ACTIVE		

B6
NNE **MA WELLS** **MA9000000002077**
1/8 - 1/4 Mile
Lower

PWS ID:	4300040	Site Name:	STONES THROW CONDOS
Type:	Non-Transient Non-Community		
Facility Name:	Not Reported	SubBasin:	CAPE COD
Basemap:	DOQ	Accuracy Estimate (ft):	16
Feature Type:	GW	Location Method:	GP_2
Primary Location Source:	SV	Secondary Location Source:	AP_DOQ
Tertiary Location Source:	Not Reported		
Source ID:	4300040-03G	PWS Name:	STONES THROW CONDOS
Source Name:	REPLACEMENT WELL #2	PWS Status:	A
Source Status:	A	PWS Class:	NTNC
Source Availability:	ACTIVE		

B7
NNE **MA WELLS** **MA9000000000884**
1/8 - 1/4 Mile
Higher

PWS ID:	4300040	Site Name:	STONES THROW CONDOS
Type:	Non-Transient Non-Community		
Facility Name:	Not Reported	SubBasin:	CAPE COD
Basemap:	DVB	Accuracy Estimate (ft):	500
Feature Type:	GW	Location Method:	OTH
Primary Location Source:	KNOW	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300040-02G	PWS Name:	STONES THROW CONDOS
Source Name:	WELL #2	PWS Status:	A
Source Status:	A	PWS Class:	NTNC
Source Availability:	ACTIVE		

B8
NNE **MA WELLS** **MA9000000001085**
1/8 - 1/4 Mile
Higher

PWS ID:	4300040	Site Name:	STONES THROW CONDOS
Type:	Non-Transient Non-Community		
Facility Name:	Not Reported	SubBasin:	CAPE COD

Basemap:	NA	Accuracy Estimate (ft):	16
Feature Type:	GW	Location Method:	GP_2
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		

Source ID:	4300040-01G	PWS Name:	STONES THROW CONDOS
Source Name:	WELL #1	PWS Status:	A
Source Status:	I	PWS Class:	NTNC
Source Availability:	INACT		

9
North **FED USGS** **USGS40000464083**
1/4 - 1/2 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 156	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720519	Well Depth:	9.2
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	5	Level reading date:	1973-10-18
Feet below surface:	2.47	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1973-05-14	Feet below surface:	1.53
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-11-10	Feet below surface:	2.02
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-06-05	Feet below surface:	1.33
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-05-19	Feet below surface:	1.81
Feet to sea level:	Not Reported	Note:	Not Reported

10
NNE **FED USGS** **USGS40000464082**
1/4 - 1/2 Mile
Higher

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 239	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19790330	Well Depth:	130

Well Depth Units:	ft	Well Hole Depth:	150
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	1	Level reading date:	1979-03-30
Feet below surface:	45.50	Feet to sea level:	Not Reported
Note:	Not Reported		

11
ESE **FED USGS** **USGS40000464005**
1/4 - 1/2 Mile
Higher

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 288	Type:	Well
Description:	CCC OBS WELL P2	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	20011212
Well Depth:	129.5	Well Depth Units:	ft
Well Hole Depth:	129.5	Well Hole Depth Units:	ft

12
NNE **FED USGS** **USGS40000464122**
1/4 - 1/2 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 155	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720526	Well Depth:	14.1
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	7	Level reading date:	1975-05-21
Feet below surface:	10.50	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1974-09-04	Feet below surface:	11.21
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-10-18	Feet below surface:	10.63
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-05-14	Feet below surface:	9.60
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-11-11	Feet below surface:	10.24
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-06-05	Feet below surface:	10.03
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-26	Feet below surface:	10.03
Feet to sea level:	Not Reported	Note:	Not Reported

13
NNW
1/4 - 1/2 Mile
Lower

FED USGS **USGS40000464123**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 145	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720531	Well Depth:	12.2
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	26	Level reading date:	2000-12-19
Feet below surface:	1.70	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	2000-11-29	Feet below surface:	1.76
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-09-25	Feet below surface:	1.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-08-30	Feet below surface:	1.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-07-31	Feet below surface:	1.59
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-06-28	Feet below surface:	1.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-05-26	Feet below surface:	1.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-04-26	Feet below surface:	0.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-03-29	Feet below surface:	1.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-03-09	Feet below surface:	1.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-01-24	Feet below surface:	2.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-12-22	Feet below surface:	2.07
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1999-11-23	Feet below surface:	2.10
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-10-21	Feet below surface:	2.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-09-23	Feet below surface:	2.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-08-24	Feet below surface:	2.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-07-21	Feet below surface:	2.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-06-21	Feet below surface:	1.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-05-21	Feet below surface:	1.48
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-04-13	Feet below surface:	1.43
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-03-25	Feet below surface:	1.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-18	Feet below surface:	1.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	0.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-11	Feet below surface:	1.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	1.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-31	Feet below surface:	1.21
Feet to sea level:	Not Reported	Note:	Not Reported

14
South
1/4 - 1/2 Mile
Higher

FED USGS **USGS40000463934**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 160	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	197205	Well Depth:	104
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	1	Level reading date:	1972-05-15

Feet below surface:	95.99	Feet to sea level:	Not Reported
Note:	Not Reported		

C15
NNE **FED USGS** **USGS40000464124**
1/4 - 1/2 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 270	Type:	Well
Description:	SO. HOLLOW ZOT MONITOR WELL NR PSW SH-1		
HUC:	01090002	Drainage Area:	Not Reported
Drainage Area Units:	Not Reported	Contrib Drainage Area:	Not Reported
Contrib Drainage Area Unts:	Not Reported		
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	19990101
Well Depth:	199	Well Depth Units:	ft
Well Hole Depth:	199	Well Hole Depth Units:	ft

16
SSW **FED USGS** **USGS40000463942**
1/4 - 1/2 Mile
Higher

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 159	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	197205	Well Depth:	91.7
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	1	Level reading date:	1972-06-01
Feet below surface:	80.32	Feet to sea level:	Not Reported
Note:	Not Reported		

C17
NNE **FED USGS** **USGS40000464130**
1/4 - 1/2 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 154	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	1953	Well Depth:	37.9
Well Depth Units:	ft	Well Hole Depth:	Not Reported

Well Hole Depth Units: Not Reported

Ground water levels,Number of Measurements: 45 Level reading date: 1977-04-11
Feet below surface: 11.05 Feet to sea level: Not Reported
Note: Not Reported

Level reading date: 1977-03-01 Feet below surface: 11.19
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1976-12-06 Feet below surface: 9.93
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer had been pumped recently.

Level reading date: 1976-10-29 Feet below surface: 16.30
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-10-04 Feet below surface: 12.28
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-08-31 Feet below surface: 12.75
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-08-03 Feet below surface: 12.83
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-07-02 Feet below surface: 10.65
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer had been pumped recently.

Level reading date: 1976-05-24 Feet below surface: 10.70
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-04-28 Feet below surface: 10.69
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1976-04-05 Feet below surface: 8.86
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer had been pumped recently.

Level reading date: 1976-03-01 Feet below surface: 8.93
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer had been pumped recently.

Level reading date: 1976-01-29 Feet below surface: 8.96
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer had been pumped recently.

Level reading date: 1975-12-29 Feet below surface: 11.00
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date: 1975-11-26 Feet below surface: 11.38
Feet to sea level: Not Reported
Note: A nearby site that taps the same aquifer was being pumped.

Level reading date:	1975-10-22	Feet below surface:	11.59
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-09-29	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-08-19	Feet below surface:	11.82
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-07-22	Feet below surface:	11.94
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-06-25	Feet below surface:	12.47
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-05-19	Feet below surface:	10.78
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-04-24	Feet below surface:	9.65
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-03-24	Feet below surface:	9.37
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1975-02-19	Feet below surface:	10.96
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-01-17	Feet below surface:	11.09
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-12-17	Feet below surface:	10.82
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-11-23	Feet below surface:	11.32
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-10-22	Feet below surface:	9.75
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-09-16	Feet below surface:	11.78
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-08-14	Feet below surface:	12.28
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-07-10	Feet below surface:	11.59
Feet to sea level:	Not Reported		

Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-05-15	Feet below surface:	10.39
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-04-08	Feet below surface:	10.44
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-03-13	Feet below surface:	8.76
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-02-19	Feet below surface:	8.68
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-01-28	Feet below surface:	10.34
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-01-02	Feet below surface:	10.49
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-11-20	Feet below surface:	10.95
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-10-18	Feet below surface:	12.22
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-05-14	Feet below surface:	9.75
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1972-11-11	Feet below surface:	9.48
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1972-06-07	Feet below surface:	10.45
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1972-06-06	Feet below surface:	8.98
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1972-06-05	Feet below surface:	9.12
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1972-05-31	Feet below surface:	8.91
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

C18
NNE
1/4 - 1/2 Mile
Lower

FED USGS **USGS40000464129**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 78	Type:	Well: Multiple wells
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	195310
Well Depth:	60.6	Well Depth Units:	ft
Well Hole Depth:	Not Reported	Well Hole Depth Units:	Not Reported

Ground water levels,Number of Measurements:	1	Level reading date:	1953-10-01
Feet below surface:	21.70	Feet to sea level:	Not Reported
Note:	Not Reported		

19
North
1/4 - 1/2 Mile
Lower

FED USGS **USGS40000464162**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 146	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720518	Well Depth:	8.9
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	23	Level reading date:	1975-05-21
Feet below surface:	5.02	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1974-08-13	Feet below surface:	5.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	5.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	4.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	4.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	4.56
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1974-02-21	Feet below surface:	4.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-30	Feet below surface:	4.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	4.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	5.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	5.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	5.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	5.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	4.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	4.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	4.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	4.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	3.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	4.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	4.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-11	Feet below surface:	4.77
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	4.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-18	Feet below surface:	4.54
Feet to sea level:	Not Reported	Note:	Not Reported

C20
NNE
1/4 - 1/2 Mile
Lower

MA WELLS **MA9000000001814**

PWS ID:	4242000	Site Name:	PAUL D. DALEY WELLFIELD
Type:	Community Groundwater Well		
Facility Name:	Not Reported	SubBasin:	CAPE COD

Basemap:	DOQ	Accuracy Estimate (ft):	100
Feature Type:	PH	Location Method:	PHO
Primary Location Source:	AP_DOQ	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		

Source ID:	4242000-03G	PWS Name:	PROVINCETOWN WATER DEPARTMENT
Source Name:	PAUL D. DALEY WELLFIELD	PWS Status:	A
Source Status:	A	PWS Class:	COM
Source Availability:	ACTIVE		

Well Name:	PAUL D. DALEY WELLFIELD	Purveyor:	PROVINCETOWN WATER DEPARTMENT
Basin:	CAPE COD	Region:	4

D21
NE
1/2 - 1 Mile
Lower

FED USGS **USGS40000464128**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 271	Type:	Well
Description:	SO HOLLOW ZOT MONITOR WELL NEAR PSW SH-5		
HUC:	01090002	Drainage Area:	Not Reported
Drainage Area Units:	Not Reported	Contrib Drainage Area:	Not Reported
Contrib Drainage Area Unts:	Not Reported		
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	19990101
Well Depth:	153	Well Depth Units:	ft
Well Hole Depth:	153	Well Hole Depth Units:	ft

D22
NNE
1/2 - 1 Mile
Lower

FED USGS **USGS40000464138**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 87	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19521218	Well Depth:	50.6
Well Depth Units:	ft	Well Hole Depth:	65.6
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	402	Level reading date:	1978-03-02
Feet below surface:	12.93	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1977-04-01	Feet below surface:	13.66
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		

Level reading date:	1977-02-23	Feet below surface:	13.39
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1977-01-26	Feet below surface:	12.98
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-12-27	Feet below surface:	12.98
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1976-11-29	Feet below surface:	12.94
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1976-10-28	Feet below surface:	12.98
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1976-09-28	Feet below surface:	14.37
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-09-15	Feet below surface:	14.51
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-08-26	Feet below surface:	15.11
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-07-27	Feet below surface:	14.84
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-06-28	Feet below surface:	14.20
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-05-25	Feet below surface:	13.42
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1976-04-26	Feet below surface:	12.21
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1976-03-24	Feet below surface:	12.73
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1976-02-25	Feet below surface:	12.62
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1976-02-04	Feet below surface:	12.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1976-01-29	Feet below surface:	12.02
Feet to sea level:	Not Reported		

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-12-30	Feet below surface:	13.16
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-12-15	Feet below surface:	13.33
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-11-24	Feet below surface:	13.59
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-10-28	Feet below surface:	13.41
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-09-25	Feet below surface:	14.77
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-08-26	Feet below surface:	15.02
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-07-23	Feet below surface:	14.37
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-06-25	Feet below surface:	14.06
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1975-05-28	Feet below surface:	13.46
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-04-29	Feet below surface:	12.67
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1975-03-26	Feet below surface:	12.37
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1975-02-25	Feet below surface:	12.81
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1975-01-29	Feet below surface:	13.36
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-12-27	Feet below surface:	13.90
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-11-26	Feet below surface:	13.45
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		

Level reading date:	1974-10-29	Feet below surface:	12.83
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1974-09-26	Feet below surface:	13.73
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-08-28	Feet below surface:	14.72
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-08-14	Feet below surface:	14.62
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-07-30	Feet below surface:	14.43
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1974-07-10	Feet below surface:	13.10
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-06-26	Feet below surface:	13.25
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-05-29	Feet below surface:	13.17
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-05-15	Feet below surface:	12.77
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-04-24	Feet below surface:	12.04
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-04-08	Feet below surface:	12.87
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-03-28	Feet below surface:	11.83
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-03-13	Feet below surface:	11.82
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-02-26	Feet below surface:	11.74
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1974-02-19	Feet below surface:	11.79
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1974-01-29	Feet below surface:	12.87
Feet to sea level:	Not Reported		

Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-01-28	Feet below surface:	12.85
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1974-01-02	Feet below surface:	13.03
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-12-20	Feet below surface:	12.54
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-11-28	Feet below surface:	13.33
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-11-20	Feet below surface:	13.46
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-10-29	Feet below surface:	13.48
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-10-17	Feet below surface:	13.25
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-09-27	Feet below surface:	13.45
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-09-12	Feet below surface:	13.71
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-08-28	Feet below surface:	14.22
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-08-14	Feet below surface:	14.24
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-07-27	Feet below surface:	13.95
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-07-17	Feet below surface:	13.78
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		
Level reading date:	1973-06-27	Feet below surface:	13.14
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-06-13	Feet below surface:	13.12
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer was being pumped.		

Level reading date:	1973-05-25	Feet below surface:	12.64
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-05-15	Feet below surface:	12.44
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-04-26	Feet below surface:	12.28
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-04-13	Feet below surface:	12.07
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-03-27	Feet below surface:	12.44
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-03-14	Feet below surface:	12.49
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-02-26	Feet below surface:	12.08
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-02-08	Feet below surface:	12.11
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1973-01-26	Feet below surface:	11.98
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-12-27	Feet below surface:	12.21
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-11-27	Feet below surface:	12.52
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-11-10	Feet below surface:	12.63
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-10-26	Feet below surface:	12.29
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-09-27	Feet below surface:	12.39
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-08-29	Feet below surface:	13.85
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1972-07-27	Feet below surface:	13.85
Feet to sea level:	Not Reported		

Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-06-27 Feet below surface: 12.78
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-06-07 Feet below surface: 12.68
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-06-06 Feet below surface: 12.22
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-06-05 Feet below surface: 12.34
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-06-01 Feet below surface: 12.30
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-05-25 Feet below surface: 12.95
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-04-26 Feet below surface: 12.76
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-04-07 Feet below surface: 12.83
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-03-28 Feet below surface: 12.65
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-02-25 Feet below surface: 12.48
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1972-01-27 Feet below surface: 12.51
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1971-12-27 Feet below surface: 12.47
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1971-11-26 Feet below surface: 13.53
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1971-10-27 Feet below surface: 13.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1971-09-27 Feet below surface: 14.61
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date:	1971-08-26	Feet below surface:	14.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-07-28	Feet below surface:	14.48
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-06-25	Feet below surface:	13.24
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-05-24	Feet below surface:	13.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-04-27	Feet below surface:	12.56
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-03-26	Feet below surface:	12.87
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-02-24	Feet below surface:	12.31
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1971-01-27	Feet below surface:	12.86
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-12-28	Feet below surface:	12.66
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-11-24	Feet below surface:	13.02
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-10-28	Feet below surface:	13.05
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-09-28	Feet below surface:	13.18
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-08-27	Feet below surface:	14.22
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-07-29	Feet below surface:	14.41
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-06-26	Feet below surface:	13.57
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-05-20	Feet below surface:	12.60
Feet to sea level:	Not Reported		

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-04-24	Feet below surface:	11.43
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-03-25	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-02-24	Feet below surface:	11.84
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1970-01-26	Feet below surface:	12.28
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-12-30	Feet below surface:	12.35
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-11-25	Feet below surface:	13.02
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-10-29	Feet below surface:	13.56
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-09-26	Feet below surface:	14.18
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-08-27	Feet below surface:	14.74
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-07-29	Feet below surface:	14.28
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-06-27	Feet below surface:	13.76
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-05-26	Feet below surface:	12.79
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-04-28	Feet below surface:	12.34
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-03-27	Feet below surface:	12.14
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1969-02-26	Feet below surface:	12.25
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1969-01-27	Feet below surface:	13.19
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-12-26	Feet below surface:	13.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-11-25	Feet below surface:	13.43
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-10-29	Feet below surface:	13.91
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-09-25	Feet below surface:	14.03
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-08-27	Feet below surface:	14.97
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-07-26	Feet below surface:	14.68
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-06-26	Feet below surface:	13.75
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-05-27	Feet below surface:	13.28
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-04-22	Feet below surface:	12.73
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-03-27	Feet below surface:	12.46
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-02-27	Feet below surface:	12.69
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1968-01-29	Feet below surface:	12.34
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-12-26	Feet below surface:	13.27
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-11-27	Feet below surface:	13.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-10-26	Feet below surface:	13.20
Feet to sea level:	Not Reported		

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-09-27	Feet below surface:	13.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-08-23	Feet below surface:	13.64
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-08-22	Feet below surface:	13.55
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-08-08	Feet below surface:	12.55
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-07-26	Feet below surface:	12.61
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-06-27	Feet below surface:	12.03
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-05-24	Feet below surface:	12.58
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-04-25	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-03-29	Feet below surface:	12.43
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-02-28	Feet below surface:	12.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1967-01-27	Feet below surface:	12.38
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-12-21	Feet below surface:	12.88
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-11-28	Feet below surface:	12.43
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-11-26	Feet below surface:	12.53
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-10-25	Feet below surface:	13.74
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1966-09-27	Feet below surface:	13.99
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-08-25	Feet below surface:	14.56
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-07-22	Feet below surface:	14.95
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-06-23	Feet below surface:	14.37
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-05-29	Feet below surface:	14.36
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-04-25	Feet below surface:	13.72
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-03-21	Feet below surface:	13.46
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-02-28	Feet below surface:	12.87
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1966-01-31	Feet below surface:	13.53
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-12-20	Feet below surface:	12.99
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-11-23	Feet below surface:	13.11
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-10-27	Feet below surface:	14.17
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-09-28	Feet below surface:	14.51
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-08-26	Feet below surface:	15.38
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-07-28	Feet below surface:	15.22
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1965-06-28	Feet below surface:	14.79
Feet to sea level:	Not Reported		

Note: Other conditions existed that would affect the measured water level.

Level reading date: 1965-05-28 Feet below surface: 13.72
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1965-04-27 Feet below surface: 13.46
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1965-03-29 Feet below surface: 12.55
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1965-02-28 Feet below surface: 13.26
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1965-01-29 Feet below surface: 13.32
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-12-29 Feet below surface: 13.34
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-11-24 Feet below surface: 13.63
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-10-27 Feet below surface: 13.77
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-09-28 Feet below surface: 14.29
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-09-01 Feet below surface: 14.46
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-07-29 Feet below surface: 14.32
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-06-30 Feet below surface: 12.88
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-05-27 Feet below surface: 13.51
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-04-28 Feet below surface: 12.64
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-03-30 Feet below surface: 12.50
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-02-28 Feet below surface: 12.69
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1964-01-31 Feet below surface: 13.05
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-12-30 Feet below surface: 12.28
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-12-02 Feet below surface: 12.35
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-10-25 Feet below surface: 13.66
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-09-30 Feet below surface: 13.64
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-08-29 Feet below surface: 14.45
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-07-31 Feet below surface: 14.26
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-06-28 Feet below surface: 14.10
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-05-29 Feet below surface: 13.29
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-04-30 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-04-01 Feet below surface: 12.12
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-02-28 Feet below surface: 12.35
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1963-01-31 Feet below surface: 11.62
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1962-12-28 Feet below surface: 11.69
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1962-11-29 Feet below surface: 12.48
Feet to sea level: Not Reported

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-10-30	Feet below surface:	13.09
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-09-26	Feet below surface:	13.13
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-06-28	Feet below surface:	13.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-05-26	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-04-25	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-03-30	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-02-26	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-02-02	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1962-01-01	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-12-01	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-11-01	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-10-01	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-09-01	Feet below surface:	13.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-07-31	Feet below surface:	14.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-06-26	Feet below surface:	13.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1961-06-02	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-04-01	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-03-27	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-02-27	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-01-30	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1961-01-09	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-11-28	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-10-31	Feet below surface:	13.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-09-26	Feet below surface:	14.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-08-29	Feet below surface:	14.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-07-29	Feet below surface:	14.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-06-27	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-05-30	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-04-30	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-03-26	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1960-02-27	Feet below surface:	11.80
Feet to sea level:	Not Reported		

Note: Other conditions existed that would affect the measured water level.

Level reading date: 1960-01-30 Feet below surface: 12.30
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-12-31 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-11-28 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-10-31 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-09-26 Feet below surface: 13.10
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-08-29 Feet below surface: 12.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-07-25 Feet below surface: 13.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-06-27 Feet below surface: 12.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-05-30 Feet below surface: 13.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-04-25 Feet below surface: 11.80
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-03-28 Feet below surface: 12.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-02-28 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1959-01-31 Feet below surface: 12.10
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1958-12-31 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1958-11-29 Feet below surface: 11.80
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date:	1958-10-25	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-09-27	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-08-30	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-07-26	Feet below surface:	13.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-06-28	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-05-31	Feet below surface:	11.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-04-26	Feet below surface:	11.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-03-29	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-02-22	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1958-01-25	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-12-28	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-11-09	Feet below surface:	13.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-11-02	Feet below surface:	13.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-10-26	Feet below surface:	13.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-10-19	Feet below surface:	13.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-10-12	Feet below surface:	13.20
Feet to sea level:	Not Reported		

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-10-05	Feet below surface:	13.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-09-28	Feet below surface:	13.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-09-21	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-09-14	Feet below surface:	13.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-09-07	Feet below surface:	13.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-08-31	Feet below surface:	14.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-08-24	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-08-17	Feet below surface:	14.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-08-10	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-08-03	Feet below surface:	14.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-07-27	Feet below surface:	14.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-07-20	Feet below surface:	15.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-07-13	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-07-06	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-06-29	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1957-06-22	Feet below surface:	13.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-06-15	Feet below surface:	14.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-06-08	Feet below surface:	13.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-06-01	Feet below surface:	12.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-05-25	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-05-18	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-05-11	Feet below surface:	12.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-05-04	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-04-27	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-04-20	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-03-30	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-03-23	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-03-16	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-03-09	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-03-02	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1957-02-23	Feet below surface:	12.50
Feet to sea level:	Not Reported		

Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-02-16 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-02-09 Feet below surface: 12.50
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-02-02 Feet below surface: 12.30
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-01-26 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-01-19 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-01-12 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1957-01-05 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-12-29 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-12-22 Feet below surface: 12.40
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-12-15 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-12-07 Feet below surface: 12.60
Feet to sea level: Not Reported Note: Not Reported

Level reading date: 1956-12-01 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-11-10 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-11-03 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-10-27 Feet below surface: 12.60
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1956-10-20 Feet below surface: 12.20

Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-10-13	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-10-06	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-09-29	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-09-22	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-09-15	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-09-08	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-09-01	Feet below surface:	12.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-08-25	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-08-18	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-08-11	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-07-28	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-07-21	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-07-14	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-07-07	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-06-30	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1956-06-23	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-06-16	Feet below surface:	11.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-06-09	Feet below surface:	11.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-06-02	Feet below surface:	11.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-05-26	Feet below surface:	11.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-05-19	Feet below surface:	11.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-05-12	Feet below surface:	11.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-05-05	Feet below surface:	11.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-04-28	Feet below surface:	11.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-04-21	Feet below surface:	11.11
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-04-14	Feet below surface:	11.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-04-07	Feet below surface:	11.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-03-31	Feet below surface:	11.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-03-26	Feet below surface:	11.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-02-18	Feet below surface:	11.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-02-11	Feet below surface:	11.50
Feet to sea level:	Not Reported		

Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-02-04	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-01-28	Feet below surface:	11.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1956-01-05	Feet below surface:	12.33
Feet to sea level:	Not Reported		
Note:	A nearby site that taps the same aquifer had been pumped recently.		
Level reading date:	1955-12-31	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-12-24	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-12-17	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-12-10	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-12-03	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-11-17	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-11-12	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-11-05	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-10-29	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-10-22	Feet below surface:	12.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-10-15	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-10-08	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

Level reading date:	1955-10-01	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-09-24	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-09-17	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-09-10	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-09-03	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-08-27	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-08-20	Feet below surface:	13.40
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-08-13	Feet below surface:	13.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-08-06	Feet below surface:	13.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-07-30	Feet below surface:	13.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-07-23	Feet below surface:	14.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-07-16	Feet below surface:	13.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-07-09	Feet below surface:	12.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-07-02	Feet below surface:	11.80
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-06-25	Feet below surface:	12.60
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-06-18	Feet below surface:	12.50
Feet to sea level:	Not Reported		

Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-06-11 Feet below surface: 12.20
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-06-04 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-05-28 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-05-21 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-05-14 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-05-07 Feet below surface: 11.80
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-04-30 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-04-23 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-04-16 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-04-09 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-04-02 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-03-26 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-03-19 Feet below surface: 11.90
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-03-12 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date: 1955-03-05 Feet below surface: 12.00
Feet to sea level: Not Reported
Note: Other conditions existed that would affect the measured water level.

Level reading date:	1955-02-26	Feet below surface:	12.00
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-02-19	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-02-12	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-02-05	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-01-29	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-01-22	Feet below surface:	11.90
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-01-15	Feet below surface:	12.10
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-01-08	Feet below surface:	12.20
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1955-01-01	Feet below surface:	12.30
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1954-12-25	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1954-12-18	Feet below surface:	12.50
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		
Level reading date:	1954-12-11	Feet below surface:	12.70
Feet to sea level:	Not Reported		
Note:	Other conditions existed that would affect the measured water level.		

23
NW
1/2 - 1 Mile
Lower

FED USGS **USGS40000464114**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 143	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported

Construction Date:	19720517	Well Depth:	14.2
Well Depth Units:	ft	Well Hole Depth:	14.2
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	23	Level reading date:	1975-05-21
Feet below surface:	5.93	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1974-09-04	Feet below surface:	6.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-13	Feet below surface:	6.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	6.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	5.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	5.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	5.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-21	Feet below surface:	5.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-30	Feet below surface:	5.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	5.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	6.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	6.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	6.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	6.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	5.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	5.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	5.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	5.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	5.78
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-02-08	Feet below surface:	5.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	5.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	5.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-17	Feet below surface:	5.66
Feet to sea level:	Not Reported	Note:	Not Reported

D24
NE
1/2 - 1 Mile
Lower

FED USGS **USGS40000464139**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 192	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19521218	Well Depth:	69.8
Well Depth Units:	ft	Well Hole Depth:	85
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	1	Level reading date:	1952-12-18
Feet below surface:	28.00	Feet to sea level:	Not Reported
Note:	Not Reported		

D25
NE
1/2 - 1 Mile
Lower

FED USGS **USGS40000464140**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 233	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19521024	Well Depth:	62
Well Depth Units:	ft	Well Hole Depth:	82
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	1	Level reading date:	1952-10-24
Feet below surface:	26.10	Feet to sea level:	Not Reported
Note:	Not Reported		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

E26
SSE
1/2 - 1 Mile
Lower | **FED USGS** | **USGS40000463918**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 163	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720519	Well Depth:	19.7
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	23	Level reading date:	1975-05-21
Feet below surface:	16.29	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1974-09-04	Feet below surface:	16.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-14	Feet below surface:	16.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	16.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	15.86
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	15.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	15.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	15.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	15.77
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	15.91
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	16.33
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	16.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	16.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	16.15
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-07-17	Feet below surface:	15.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	15.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	15.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	15.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	15.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	15.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	16.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	15.76
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-19	Feet below surface:	15.96
Feet to sea level:	Not Reported	Note:	Not Reported

27
NE
1/2 - 1 Mile
Lower

FED USGS **USGS40000464151**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 272	Type:	Well
Description:	SO HOLLOW WELL FIELD ZOT MONITOR WELL SH8-3		
HUC:	01090002	Drainage Area:	Not Reported
Drainage Area Units:	Not Reported	Contrib Drainage Area:	Not Reported
Contrib Drainage Area Unts:	Not Reported		
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	19990101
Well Depth:	205	Well Depth Units:	ft
Well Hole Depth:	205	Well Hole Depth Units:	ft

28
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40000463975**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 45	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	195002

Well Depth:	120	Well Depth Units:	ft
Well Hole Depth:	120	Well Hole Depth Units:	ft

Ground water levels,Number of Measurements:	1	Level reading date:	1950-02-01
Feet below surface:	65.50	Feet to sea level:	Not Reported
Note:	Not Reported		

E29
SE
1/2 - 1 Mile
Lower

MA WELLS **MA9000000003145**

PWS ID:	4300019	Site Name:	WHITMAN HOUSE RESTAURANT
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		

Basemap:	NA	Accuracy Estimate (ft):	100
Feature Type:	GW	Location Method:	GP_6
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		

Source ID:	4300019-01G	PWS Name:	WHITMAN HOUSE RESTAURANT
Source Name:	WELL 1	PWS Status:	A
Source Status:	A	PWS Class:	NC
Source Availability:	ACTIVE		

30
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000464208**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 147	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720518	Well Depth:	14.4
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	5	Level reading date:	1973-10-18
Feet below surface:	1.20	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1973-05-14	Feet below surface:	0.29
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-11-11	Feet below surface:	0.72
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-06-05	Feet below surface:	0.50
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-05-18	Feet below surface:	0.63
Feet to sea level:	Not Reported	Note:	Not Reported

31
NNW **FED USGS** **USGS40000464202**
1/2 - 1 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 158	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720504	Well Depth:	14.3
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	6	Level reading date:	1975-05-21
Feet below surface:	8.83	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1973-10-18	Feet below surface:	8.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	8.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	8.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	8.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-04	Feet below surface:	8.64
Feet to sea level:	Not Reported	Note:	Not Reported

32
South **FED USGS** **USGS40000463863**
1/2 - 1 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 162	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720519	Well Depth:	20.1
Well Depth Units:	ft	Well Hole Depth:	20.1
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	48	Level reading date:	1977-04-11
Feet below surface:	12.37	Feet to sea level:	Not Reported

Note:	Not Reported		
Level reading date:	1977-03-01	Feet below surface:	12.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-12-06	Feet below surface:	12.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-29	Feet below surface:	12.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-04	Feet below surface:	12.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-31	Feet below surface:	12.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-03	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-07-02	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-05-24	Feet below surface:	11.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-28	Feet below surface:	11.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-05	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-03-01	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-01-29	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-11-26	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-10-22	Feet below surface:	12.48
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-29	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-19	Feet below surface:	12.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-07-22	Feet below surface:	12.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-06-25	Feet below surface:	12.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-05-19	Feet below surface:	12.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-04-24	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1975-03-24	Feet below surface:	12.10
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-19	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-01-17	Feet below surface:	12.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-17	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-23	Feet below surface:	12.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-22	Feet below surface:	12.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-16	Feet below surface:	12.59
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-14	Feet below surface:	12.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	11.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	11.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	11.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	11.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	11.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	11.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	12.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	11.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-05-15	Feet below surface:	11.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	11.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	11.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	11.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	11.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-31	Feet below surface:	11.92
Feet to sea level:	Not Reported	Note:	Not Reported

33
NW
1/2 - 1 Mile
Higher

FED USGS **USGS40000464163**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 142	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	1971	Well Depth:	64.3
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	50	Level reading date:	1977-04-11
Feet below surface:	54.63	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1977-03-01	Feet below surface:	54.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-29	Feet below surface:	55.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-04	Feet below surface:	55.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-31	Feet below surface:	55.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-03	Feet below surface:	55.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-07-02	Feet below surface:	54.91
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-05-24	Feet below surface:	54.59
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1976-04-28	Feet below surface:	54.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-05	Feet below surface:	54.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-03-01	Feet below surface:	54.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-01-29	Feet below surface:	54.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-12-29	Feet below surface:	54.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-11-26	Feet below surface:	54.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-10-22	Feet below surface:	54.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-29	Feet below surface:	55.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-19	Feet below surface:	54.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-07-22	Feet below surface:	54.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-06-25	Feet below surface:	54.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-05-19	Feet below surface:	54.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-04-24	Feet below surface:	54.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-03-24	Feet below surface:	54.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-19	Feet below surface:	54.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-01-17	Feet below surface:	54.91
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-17	Feet below surface:	54.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-23	Feet below surface:	54.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-22	Feet below surface:	55.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-16	Feet below surface:	54.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-13	Feet below surface:	55.20
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1974-07-10	Feet below surface:	54.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	54.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	54.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	54.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-21	Feet below surface:	54.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-30	Feet below surface:	54.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	54.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	54.86
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	54.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	54.77
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	54.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	54.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	54.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	54.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	54.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	54.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	54.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	54.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	54.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	54.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-02	Feet below surface:	54.47
Feet to sea level:	Not Reported	Note:	Not Reported

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

34
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000464235**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 148	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720518	Well Depth:	9
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	6	Level reading date:	1975-05-21
Feet below surface:	3.95	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1973-10-18	Feet below surface:	4.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	3.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	3.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	3.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-18	Feet below surface:	3.43
Feet to sea level:	Not Reported	Note:	Not Reported

35
North
1/2 - 1 Mile
Higher

MA WELLS **MA9000000002839**

PWS ID:	4300042	Site Name:	MAMARAZZI RESTAURANT
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	16
Feature Type:	GW	Location Method:	GP_2
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300042-01G	PWS Name:	MAMARAZZI RESTAURANT
Source Name:	WELL #1 MAMARAZZI RESTAURANT		
PWS Status:	I	Source Status:	I
PWS Class:	NC	Source Availability:	ACTIVE

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

36
NNW
1/2 - 1 Mile
Lower

FED USGS **USGS40000464216**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 144	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720518	Well Depth:	8.9
Well Depth Units:	ft	Well Hole Depth:	8.9
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	7	Level reading date:	1975-05-21
Feet below surface:	2.03	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1974-09-04	Feet below surface:	2.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-18	Feet below surface:	1.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	1.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	1.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	1.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-18	Feet below surface:	1.77
Feet to sea level:	Not Reported	Note:	Not Reported

37
ESE
1/2 - 1 Mile
Higher

FED USGS **USGS40000463981**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 74	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	19510316
Well Depth:	158	Well Depth Units:	ft
Well Hole Depth:	160	Well Hole Depth Units:	ft

Ground water levels,Number of Measurements:	4	Level reading date:	1973-05-14

Feet below surface:	102.43	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1972-11-10	Feet below surface:	101.86
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	102.03
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1951-03-16	Feet below surface:	101.00
Feet to sea level:	Not Reported	Note:	Not Reported

F38
East
1/2 - 1 Mile
Higher

FED USGS **USGS40000464022**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 285	Type:	Well
Description:	CCC OBS WELL P3	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	20020110
Well Depth:	162	Well Depth Units:	ft
Well Hole Depth:	170	Well Hole Depth Units:	ft

G39
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000464269**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 89 TRURO, MA	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Outwash	Aquifer Type:	Unconfined single aquifer
Construction Date:	19570924	Well Depth:	21.7
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	565	Level reading date:	2005-02-24
Feet below surface:	11.62	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	2004-12	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-11-23	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-10-21	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	2004-09-30	Feet below surface:	12.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-08-24	Feet below surface:	12.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-07-27	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-06-21	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-05-20	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-04-28	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-03-24	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2004-02-25	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-12-23	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-11-19	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-10-21	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-09-30	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-08-26	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-07-22	Feet below surface:	11.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-06-24	Feet below surface:	11.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-05-22	Feet below surface:	10.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-04-25	Feet below surface:	10.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-03-25	Feet below surface:	11.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-02-27	Feet below surface:	11.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2003-01-29	Feet below surface:	11.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-12-19	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	2002-11-21	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-10-22	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-09-26	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-08-22	Feet below surface:	12.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-07-25	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-06-20	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-05-21	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-04-23	Feet below surface:	12.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-03-21	Feet below surface:	12.59
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-02-19	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2002-01-24	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-12-20	Feet below surface:	12.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-11-21	Feet below surface:	12.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-10-22	Feet below surface:	12.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-10-02	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-08-22	Feet below surface:	12.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-07-23	Feet below surface:	12.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-06-21	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-05-29	Feet below surface:	11.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-04-23	Feet below surface:	11.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2001-03-28	Feet below surface:	11.75
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	2001-02-27	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-12-21	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-11-28	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-10-24	Feet below surface:	12.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-09-28	Feet below surface:	12.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-08-24	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-07-21	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-06-23	Feet below surface:	11.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-05-25	Feet below surface:	11.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-04-25	Feet below surface:	11.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-03-23	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-02-23	Feet below surface:	12.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	2000-01-24	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-12-21	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-11-23	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-10-21	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-09-24	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-08-24	Feet below surface:	12.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-07-21	Feet below surface:	12.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-06-21	Feet below surface:	12.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-05-20	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1999-04-27	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-03-25	Feet below surface:	11.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-02-23	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1999-01-21	Feet below surface:	12.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-12-21	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-11-24	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-10-21	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-09-25	Feet below surface:	12.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-08-25	Feet below surface:	11.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-07-29	Feet below surface:	11.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-06-25	Feet below surface:	11.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-05-20	Feet below surface:	11.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-04-22	Feet below surface:	10.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-03-24	Feet below surface:	10.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-02-26	Feet below surface:	11.10
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1998-01-21	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-12-19	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-11-20	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-10-29	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-09-25	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-08-26	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1997-07-29	Feet below surface:	11.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-06-20	Feet below surface:	11.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-05-23	Feet below surface:	11.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-04-29	Feet below surface:	10.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-03-20	Feet below surface:	11.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-02-26	Feet below surface:	11.48
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1997-01-21	Feet below surface:	11.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-12-23	Feet below surface:	10.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-11-21	Feet below surface:	10.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-10-23	Feet below surface:	11.32
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-09-24	Feet below surface:	11.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-08-22	Feet below surface:	12.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-07-24	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-06-26	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-05-24	Feet below surface:	11.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-04-25	Feet below surface:	11.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-03-27	Feet below surface:	11.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-02-23	Feet below surface:	11.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1996-01-23	Feet below surface:	11.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-12-28	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-11-21	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1995-10-20	Feet below surface:	12.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-09-20	Feet below surface:	12.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-08-25	Feet below surface:	12.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-07-20	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-06-23	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-05-24	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-04-24	Feet below surface:	11.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-03-23	Feet below surface:	12.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-02-23	Feet below surface:	12.03
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1995-01-20	Feet below surface:	12.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-12-20	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-11-23	Feet below surface:	12.43
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-10-25	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-09-21	Feet below surface:	12.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-08-24	Feet below surface:	12.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-07-20	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-06-22	Feet below surface:	11.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-05-20	Feet below surface:	11.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-04-20	Feet below surface:	11.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-03-24	Feet below surface:	10.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1994-02-22	Feet below surface:	11.69
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1994-01-21	Feet below surface:	11.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-12-20	Feet below surface:	11.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-11-29	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-10-24	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-09-23	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-08-26	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-07-21	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-06-23	Feet below surface:	11.59
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-05-24	Feet below surface:	11.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-04-21	Feet below surface:	10.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-03-27	Feet below surface:	11.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-02-24	Feet below surface:	11.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1993-01-21	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-12-28	Feet below surface:	12.03
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-11-24	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-10-22	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-09-23	Feet below surface:	12.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-08-25	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-07-22	Feet below surface:	12.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-06-23	Feet below surface:	11.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-05-21	Feet below surface:	12.09
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1992-04-22	Feet below surface:	11.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-03-20	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-02-20	Feet below surface:	11.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1992-01-22	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-12-20	Feet below surface:	12.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-11-20	Feet below surface:	12.13
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-10-22	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-09-25	Feet below surface:	12.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-08-27	Feet below surface:	12.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-07-25	Feet below surface:	12.43
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-06-21	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-05-21	Feet below surface:	11.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-04-25	Feet below surface:	11.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-03-27	Feet below surface:	11.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-02-26	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1991-01-28	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-12-26	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-11-28	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-10-25	Feet below surface:	12.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-09-20	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-08-29	Feet below surface:	12.48
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1990-07-25	Feet below surface:	12.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-06-22	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-05-24	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-04-24	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-03-26	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-02-21	Feet below surface:	12.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-01-23	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-12-27	Feet below surface:	12.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-11-27	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-10-26	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-08-22	Feet below surface:	12.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-07-24	Feet below surface:	12.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-06-27	Feet below surface:	12.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-05-24	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-04-25	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-03-23	Feet below surface:	12.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-02-22	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1989-01-25	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-12-21	Feet below surface:	12.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-11-23	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-10-27	Feet below surface:	12.47
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1988-09-22	Feet below surface:	12.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-08-26	Feet below surface:	12.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-07-21	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-06-22	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-05-26	Feet below surface:	11.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-04-26	Feet below surface:	11.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-03-24	Feet below surface:	11.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-02-22	Feet below surface:	11.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1988-01-25	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-12-23	Feet below surface:	11.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-11-24	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-10-23	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-09-24	Feet below surface:	11.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-08-25	Feet below surface:	12.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-07-21	Feet below surface:	11.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-06-24	Feet below surface:	11.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-05-20	Feet below surface:	10.59
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-04-23	Feet below surface:	10.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-03-25	Feet below surface:	11.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1987-01-28	Feet below surface:	11.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-12-24	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1986-11-25	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-10-22	Feet below surface:	12.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-09-23	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-08-20	Feet below surface:	12.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-07-28	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-06-24	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-05-21	Feet below surface:	11.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-04-25	Feet below surface:	11.86
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-03-24	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-02-24	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1986-01-28	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-12-20	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-11-22	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-10-23	Feet below surface:	12.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-09-25	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-08-22	Feet below surface:	12.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-07-23	Feet below surface:	12.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-06-24	Feet below surface:	12.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-05-20	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-04-23	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-03-21	Feet below surface:	12.32
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1985-02-22	Feet below surface:	12.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1985-01-24	Feet below surface:	12.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-12-19	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-11-27	Feet below surface:	12.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-10-26	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-09-25	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-08-21	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-07-25	Feet below surface:	11.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-07-03	Feet below surface:	11.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-05-22	Feet below surface:	11.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-04-25	Feet below surface:	10.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-03-26	Feet below surface:	11.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-02-27	Feet below surface:	11.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1984-01-25	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-12-27	Feet below surface:	11.88
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-11-22	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-10-25	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-09-26	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-08-25	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-07-25	Feet below surface:	11.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-06-22	Feet below surface:	11.27
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1983-05-26	Feet below surface:	10.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-04-25	Feet below surface:	10.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-03-23	Feet below surface:	10.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-02-23	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1983-01-26	Feet below surface:	12.33
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-12-22	Feet below surface:	12.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-11-23	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-10-25	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-09-23	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-08-27	Feet below surface:	12.21
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-07-26	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-06-25	Feet below surface:	11.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-05-26	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-04-26	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-03-23	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-02-23	Feet below surface:	11.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1982-01-25	Feet below surface:	12.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-12-29	Feet below surface:	11.97
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-11-21	Feet below surface:	12.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-10-27	Feet below surface:	12.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-09-25	Feet below surface:	12.59
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1981-08-26	Feet below surface:	12.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-07-28	Feet below surface:	12.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-06-25	Feet below surface:	12.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-05-26	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-04-22	Feet below surface:	11.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-03-24	Feet below surface:	11.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-03-18	Feet below surface:	11.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-02-24	Feet below surface:	12.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-02-04	Feet below surface:	12.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1981-01-26	Feet below surface:	12.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-12-21	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-12-17	Feet below surface:	12.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-11-23	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-11-13	Feet below surface:	12.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-10-27	Feet below surface:	12.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-10-08	Feet below surface:	12.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-09-24	Feet below surface:	12.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-09-10	Feet below surface:	12.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-08-24	Feet below surface:	12.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-08-17	Feet below surface:	12.76
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-07-28	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1980-07-10	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-06-25	Feet below surface:	12.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-06-12	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-05-23	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-05-08	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-04-27	Feet below surface:	12.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-04-09	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-03-26	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-03-19	Feet below surface:	12.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-02-25	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-02-21	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-01-28	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-12-22	Feet below surface:	12.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-11-26	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-11-25	Feet below surface:	12.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-11-14	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-10-29	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-10-22	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-09-25	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-08-28	Feet below surface:	12.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-08-20	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1979-07-27	Feet below surface:	12.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-07-19	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-06-28	Feet below surface:	11.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-06-24	Feet below surface:	11.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-06-14	Feet below surface:	11.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-05-28	Feet below surface:	11.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-05-03	Feet below surface:	11.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-04-25	Feet below surface:	11.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-03-27	Feet below surface:	11.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-02-27	Feet below surface:	11.43
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-01-24	Feet below surface:	11.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-12-26	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-11-27	Feet below surface:	12.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-10-27	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-10-13	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-09-25	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-09-21	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-08-24	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-08-17	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-08-03	Feet below surface:	12.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-07-27	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1978-07-19	Feet below surface:	12.10
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-06-28	Feet below surface:	11.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-05-25	Feet below surface:	11.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-04-25	Feet below surface:	11.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-03-24	Feet below surface:	10.88
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-02-27	Feet below surface:	10.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-01-26	Feet below surface:	10.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-12-27	Feet below surface:	11.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-11-28	Feet below surface:	11.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-10-27	Feet below surface:	11.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-09-27	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-08-25	Feet below surface:	12.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-07-26	Feet below surface:	12.32
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-06-23	Feet below surface:	12.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-05-25	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-04-26	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-03-29	Feet below surface:	11.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-02-23	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-01-26	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-12-27	Feet below surface:	12.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-11-29	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1976-10-27	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-09-28	Feet below surface:	12.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-26	Feet below surface:	12.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-07-27	Feet below surface:	12.48
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-06-28	Feet below surface:	12.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-05-25	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-28	Feet below surface:	11.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-03-24	Feet below surface:	11.32
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-02-25	Feet below surface:	11.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-01-29	Feet below surface:	11.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-12-29	Feet below surface:	11.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-11-24	Feet below surface:	11.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-10-29	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-29	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-25	Feet below surface:	12.43
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-26	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-19	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-07-23	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-07-22	Feet below surface:	12.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-06-25	Feet below surface:	12.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-05-28	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1975-05-19	Feet below surface:	11.91
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-04-29	Feet below surface:	11.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-04-24	Feet below surface:	11.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-03-26	Feet below surface:	11.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-03-24	Feet below surface:	12.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-25	Feet below surface:	11.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-19	Feet below surface:	12.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-01-29	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-27	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-17	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-26	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-23	Feet below surface:	12.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-29	Feet below surface:	12.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-22	Feet below surface:	12.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-26	Feet below surface:	12.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-16	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-28	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-13	Feet below surface:	12.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-30	Feet below surface:	12.21
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-06-26	Feet below surface:	11.94
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1974-05-29	Feet below surface:	11.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	11.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-25	Feet below surface:	11.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	11.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-28	Feet below surface:	11.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	11.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-26	Feet below surface:	11.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-21	Feet below surface:	11.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-29	Feet below surface:	11.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	11.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-12-20	Feet below surface:	11.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-28	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-27	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-28	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-27	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	11.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-27	Feet below surface:	11.72
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-06-13	Feet below surface:	11.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-25	Feet below surface:	11.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	11.24
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-26	Feet below surface:	11.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	11.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-27	Feet below surface:	11.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	11.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-26	Feet below surface:	11.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	11.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-01-26	Feet below surface:	11.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-12-27	Feet below surface:	11.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-27	Feet below surface:	11.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-10-26	Feet below surface:	11.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-09-27	Feet below surface:	11.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-08-29	Feet below surface:	12.10
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-07-27	Feet below surface:	11.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-27	Feet below surface:	11.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	11.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-25	Feet below surface:	11.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-04-26	Feet below surface:	11.46
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-04-07	Feet below surface:	11.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-03-28	Feet below surface:	11.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-02-25	Feet below surface:	12.13
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-01-27	Feet below surface:	12.33
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-12-27	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-11-26	Feet below surface:	12.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-10-27	Feet below surface:	12.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-09-27	Feet below surface:	12.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-08-26	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-07-28	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-06-25	Feet below surface:	11.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-05-24	Feet below surface:	11.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-04-27	Feet below surface:	11.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-03-26	Feet below surface:	11.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-02-24	Feet below surface:	11.78
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1971-01-27	Feet below surface:	11.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-12-28	Feet below surface:	11.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-11-24	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-10-28	Feet below surface:	12.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-09-28	Feet below surface:	12.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-08-27	Feet below surface:	12.48
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1970-07-29	Feet below surface:	12.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-06-26	Feet below surface:	11.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-05-20	Feet below surface:	11.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-04-24	Feet below surface:	11.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-03-25	Feet below surface:	11.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-02-24	Feet below surface:	11.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1970-01-26	Feet below surface:	11.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-12-30	Feet below surface:	11.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-11-25	Feet below surface:	11.88
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-10-29	Feet below surface:	12.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-09-26	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-08-27	Feet below surface:	12.41
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-07-29	Feet below surface:	12.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-06-27	Feet below surface:	11.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-05-26	Feet below surface:	11.48
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-04-28	Feet below surface:	11.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-03-27	Feet below surface:	10.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-02-26	Feet below surface:	11.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1969-01-27	Feet below surface:	12.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-12-26	Feet below surface:	12.14
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-11-25	Feet below surface:	12.26
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1968-10-29	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-09-25	Feet below surface:	12.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-08-27	Feet below surface:	12.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-07-26	Feet below surface:	12.36
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-06-26	Feet below surface:	12.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-05-27	Feet below surface:	11.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-04-22	Feet below surface:	11.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-03-27	Feet below surface:	11.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-02-27	Feet below surface:	11.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1968-01-29	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-12-26	Feet below surface:	12.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-11-27	Feet below surface:	12.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-10-26	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-09-27	Feet below surface:	12.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-08-23	Feet below surface:	11.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-08-22	Feet below surface:	11.74
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-08-08	Feet below surface:	11.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-07-26	Feet below surface:	11.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-06-27	Feet below surface:	10.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-05-24	Feet below surface:	11.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-04-25	Feet below surface:	11.28
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1967-03-29	Feet below surface:	11.49
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-02-28	Feet below surface:	12.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1967-01-27	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-12-21	Feet below surface:	12.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-11-28	Feet below surface:	12.12
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-11-26	Feet below surface:	12.18
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-10-25	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-09-27	Feet below surface:	12.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-08-25	Feet below surface:	12.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-07-22	Feet below surface:	12.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-06-23	Feet below surface:	12.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-05-29	Feet below surface:	12.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-04-25	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-03-21	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-02-28	Feet below surface:	12.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1966-01-31	Feet below surface:	12.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-12-26	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-11-23	Feet below surface:	12.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-10-27	Feet below surface:	12.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-09-28	Feet below surface:	12.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-08-26	Feet below surface:	12.95
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1965-07-28	Feet below surface:	12.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-06-28	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-05-28	Feet below surface:	12.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-04-27	Feet below surface:	12.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-03-29	Feet below surface:	12.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-02-28	Feet below surface:	12.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1965-01-29	Feet below surface:	12.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-12-29	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-11-24	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-10-27	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-09-28	Feet below surface:	12.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-09-01	Feet below surface:	12.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-07-29	Feet below surface:	12.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-06-30	Feet below surface:	12.19
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-05-27	Feet below surface:	11.88
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-04-28	Feet below surface:	11.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-03-30	Feet below surface:	11.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-02-28	Feet below surface:	11.71
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1964-01-31	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-12-30	Feet below surface:	12.07
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-12-02	Feet below surface:	12.11
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1963-10-25	Feet below surface:	12.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-09-30	Feet below surface:	12.53
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-08-29	Feet below surface:	12.56
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-07-31	Feet below surface:	12.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-06-28	Feet below surface:	12.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-05-29	Feet below surface:	11.77
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-04-30	Feet below surface:	11.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-04-01	Feet below surface:	11.34
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-02-28	Feet below surface:	11.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1963-01-31	Feet below surface:	11.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1962-12-28	Feet below surface:	11.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1962-11-29	Feet below surface:	11.61
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1962-10-30	Feet below surface:	11.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1962-09-26	Feet below surface:	12.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1957-09-24	Feet below surface:	13.38
Feet to sea level:	Not Reported	Note:	Not Reported

G40
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000464270**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 241	Type:	Well
Description:	USED AS AUXILIARY WELL FOR TSW 89		
HUC:	01090002	Drainage Area:	Not Reported
Drainage Area Units:	Not Reported	Contrib Drainage Area:	Not Reported
Contrib Drainage Area Unts:	Not Reported	Aquifer:	Not Reported
Formation Type:	Not Reported	Aquifer Type:	Unconfined single aquifer
Construction Date:	19891113	Well Depth:	26.15
Well Depth Units:	ft	Well Hole Depth:	30
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	3	Level reading date:	1990-04-24
Feet below surface:	14.16	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1990-03-26	Feet below surface:	14.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1990-02-21	Feet below surface:	14.15
Feet to sea level:	Not Reported	Note:	Not Reported

41
East
1/2 - 1 Mile
Higher

MA WELLS **MA9000000002567**

PWS ID:	4242000	Site Name:	NORTH UNION FIELD WELL NO. 2
Type:	Community Groundwater Well		
Facility Name:	Not Reported	SubBasin:	CAPE COD
Basemap:	DOQ	Accuracy Estimate (ft):	100
Feature Type:	WF	Location Method:	MAP
Primary Location Source:	MS_OTH	Secondary Location Source:	MS_LMTQ
Tertiary Location Source:	Not Reported		
Source ID:	4242000-07G	PWS Name:	PROVINCETOWN WATER DEPARTMENT
Source Name:	NORTH UNION FIELD WELL NO. 2		
PWS Status:	A	Source Status:	A
PWS Class:	COM	Source Availability:	ACTIVE
Well Name:	NORTH UNION FIELD WELL NO. 2		
Purveyor:	PROVINCETOWN WATER DEPARTMENT		
Basin:	BLACKSTONE	Region:	4

42
NW
1/2 - 1 Mile
Lower

FED USGS **USGS40000464170**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 141	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720518	Well Depth:	13.3
Well Depth Units:	ft	Well Hole Depth:	13.3
Well Hole Depth Units:	ft		
Ground water levels,Number of Measurements:	19	Level reading date:	1975-05-21
Feet below surface:	1.28	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1974-09-04	Feet below surface:	2.51

Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	0.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	0.98
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	0.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-21	Feet below surface:	0.76
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-30	Feet below surface:	0.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	0.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	1.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-18	Feet below surface:	1.09
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	1.00
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	0.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-14	Feet below surface:	0.67
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	0.55
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	0.87
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	0.65
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	0.73
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	0.76
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-18	Feet below surface:	0.55
Feet to sea level:	Not Reported	Note:	Not Reported

F43
East
1/2 - 1 Mile
Higher

MA WELLS **MA9000000002566**

PWS ID:	4242000	Site Name:	NORTH UNION FIELD WELL NO. 1
Type:	Community Groundwater Well		
Facility Name:	Not Reported	SubBasin:	CAPE COD

Basemap:	DOQ	Accuracy Estimate (ft):	100
Feature Type:	WF	Location Method:	MAP
Primary Location Source:	MS_OTH	Secondary Location Source:	MS_LMTQ
Tertiary Location Source:	Not Reported		

Source ID:	4242000-06G	PWS Name:	PROVINCETOWN WATER DEPARTMENT
Source Name:	NORTH UNION FIELD WELL NO. 1		
PWS Status:	A	Source Status:	A
PWS Class:	COM	Source Availability:	ACTIVE

Well Name:	NORTH UNION FIELD WELL NO. 1		
Purveyor:	PROVINCETOWN WATER DEPARTMENT		
Basin:	UNK	Region:	4

44
South **FED USGS** **USGS40000463837**
1/2 - 1 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 161	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720519	Well Depth:	9.5
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	4	Level reading date:	1973-02-08
Feet below surface:	6.66	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1972-11-10	Feet below surface:	6.39
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-06-05	Feet below surface:	6.94
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1972-05-19	Feet below surface:	6.71
Feet to sea level:	Not Reported	Note:	Not Reported

45
NE **FED USGS** **USGS40000464215**
1/2 - 1 Mile
Lower

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 153	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		

Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720525	Well Depth:	45.4
Well Depth Units:	ft	Well Hole Depth:	45.4
Well Hole Depth Units:	ft		

Ground water levels,Number of Measurements:	71	Level reading date:	1980-08-17
Feet below surface:	39.08	Feet to sea level:	Not Reported
Note:	Not Reported		

Level reading date:	1980-07-10	Feet below surface:	38.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-06-12	Feet below surface:	38.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-05-08	Feet below surface:	38.51
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-04-09	Feet below surface:	38.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-03-19	Feet below surface:	38.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1980-02-21	Feet below surface:	38.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-11-26	Feet below surface:	38.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-11-14	Feet below surface:	38.79
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-10-22	Feet below surface:	38.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-10-09	Feet below surface:	38.66
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-08-20	Feet below surface:	38.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-07-19	Feet below surface:	39.57
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-06-28	Feet below surface:	39.01
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-06-14	Feet below surface:	37.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1979-05-03	Feet below surface:	38.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-10-13	Feet below surface:	38.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-09-21	Feet below surface:	38.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-08-17	Feet below surface:	38.36

Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1978-08-03	Feet below surface:	38.30
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-05-31	Feet below surface:	38.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-04-11	Feet below surface:	38.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1977-03-01	Feet below surface:	38.46
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-12-06	Feet below surface:	39.26
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-29	Feet below surface:	39.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-10-04	Feet below surface:	39.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-31	Feet below surface:	39.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-08-03	Feet below surface:	39.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-07-02	Feet below surface:	38.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-05-24	Feet below surface:	37.93
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-28	Feet below surface:	37.92
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-04-05	Feet below surface:	37.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-03-01	Feet below surface:	37.54
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1976-01-29	Feet below surface:	38.81
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-12-29	Feet below surface:	38.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-11-26	Feet below surface:	38.68
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-10-22	Feet below surface:	38.90
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-09-29	Feet below surface:	39.15
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-08-19	Feet below surface:	39.21
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1975-07-22	Feet below surface:	39.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-06-25	Feet below surface:	38.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-05-19	Feet below surface:	38.38
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-04-24	Feet below surface:	40.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-03-24	Feet below surface:	38.50
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-02-19	Feet below surface:	38.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1975-01-17	Feet below surface:	39.02
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-12-17	Feet below surface:	39.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-11-23	Feet below surface:	39.11
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-10-22	Feet below surface:	39.06
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-09-16	Feet below surface:	39.16
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-14	Feet below surface:	38.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	38.47
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	37.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-08	Feet below surface:	38.70
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	37.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	37.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	38.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	38.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	38.64
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	38.62
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1973-09-12	Feet below surface:	38.63
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	38.52
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	38.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	37.75
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	37.42
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	37.40
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	37.69
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	37.37
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-11	Feet below surface:	38.28
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	38.05
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-31	Feet below surface:	38.04
Feet to sea level:	Not Reported	Note:	Not Reported

H46
SSE
1/2 - 1 Mile
Higher

MA WELLS **MA9000000001955**

PWS ID:	4300026	Site Name:	TRURO MOTOR INN
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	16
Feature Type:	GW	Location Method:	GP_2
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300026-02G	PWS Name:	TRURO MOTOR INN
Source Name:	WELL #2	PWS Status:	A
Source Status:	A	PWS Class:	NC
Source Availability:	ACTIVE		

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

H47
SSE
1/2 - 1 Mile
Higher

MA WELLS **MA9000000003627**

PWS ID:	4300026	Site Name:	TRURO MOTOR INN
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	100
Feature Type:	GW	Location Method:	GP_6
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300026-01G	PWS Name:	TRURO MOTOR INN
Source Name:	WELL #1	PWS Status:	A
Source Status:	A	PWS Class:	NC
Source Availability:	ACTIVE		

48
SE
1/2 - 1 Mile
Higher

FED USGS **USGS40000463868**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 289	Type:	Well
Description:	CCC OBS WELL A7	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Stratified Deposits, Undifferentiated		
Aquifer Type:	Unconfined single aquifer	Construction Date:	20020401
Well Depth:	63	Well Depth Units:	ft
Well Hole Depth:	63	Well Hole Depth Units:	ft

49
North
1/2 - 1 Mile
Lower

FED USGS **USGS40000464319**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 149	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19720529	Well Depth:	43.2
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		

Ground water levels,Number of Measurements:	24	Level reading date:	1975-05-21
Feet below surface:	34.78	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1974-09-04	Feet below surface:	35.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-13	Feet below surface:	35.25
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-07-10	Feet below surface:	34.84
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	34.45
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	34.44
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	34.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	34.23
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	34.39
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	34.58
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	34.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	34.96
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	34.94
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	34.89
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-17	Feet below surface:	34.60
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-13	Feet below surface:	34.29
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	33.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-04-13	Feet below surface:	33.80
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-03-14	Feet below surface:	34.22
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-02-08	Feet below surface:	33.85
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-11-10	Feet below surface:	34.63

Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-05	Feet below surface:	34.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-06-02	Feet below surface:	34.35
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1972-05-31	Feet below surface:	34.29
Feet to sea level:	Not Reported	Note:	Not Reported

50
NNW
1/2 - 1 Mile
Lower

MA WELLS **MA9000000001405**

PWS ID:	4300033	Site Name:	BABES BAKERY AND RESTAURANT
Type:	Transient Non-Community	Facility Name:	Not Reported
SubBasin:	CAPE COD		
Basemap:	NA	Accuracy Estimate (ft):	16
Feature Type:	GW	Location Method:	GP_2
Primary Location Source:	SV	Secondary Location Source:	Not Reported
Tertiary Location Source:	Not Reported		
Source ID:	4300033-01G	PWS Name:	BABES BAKERY AND RESTAURANT
Source Name:	WELL # 1	PWS Status:	A
Source Status:	A	PWS Class:	NC
Source Availability:	ACTIVE		

51
South
1/2 - 1 Mile
Lower

FED USGS **USGS40000463806**

Organization ID:	USGS-MA		
Organization Name:	USGS Massachusetts Water Science Center		
Monitor Location:	MA-TSW 164	Type:	Well
Description:	Not Reported	HUC:	01090002
Drainage Area:	Not Reported	Drainage Area Units:	Not Reported
Contrib Drainage Area:	Not Reported	Contrib Drainage Area Unts:	Not Reported
Aquifer:	Sand and gravel aquifers (glaciated regions)		
Formation Type:	Not Reported	Aquifer Type:	Not Reported
Construction Date:	19730515	Well Depth:	13.1
Well Depth Units:	ft	Well Hole Depth:	Not Reported
Well Hole Depth Units:	Not Reported		
Ground water levels,Number of Measurements:	17	Level reading date:	1975-05-21
Feet below surface:	3.26	Feet to sea level:	Not Reported
Note:	Not Reported		
Level reading date:	1974-09-04	Feet below surface:	3.62
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-08-14	Feet below surface:	3.62
Feet to sea level:	Not Reported	Note:	Not Reported

Level reading date:	1974-07-10	Feet below surface:	3.31
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-05-15	Feet below surface:	3.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-04-07	Feet below surface:	3.04
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-03-13	Feet below surface:	2.82
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-02-19	Feet below surface:	2.72
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-28	Feet below surface:	2.83
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1974-01-02	Feet below surface:	2.88
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-11-20	Feet below surface:	3.17
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-10-17	Feet below surface:	3.20
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-09-12	Feet below surface:	2.99
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-08-14	Feet below surface:	3.27
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-07-22	Feet below surface:	3.08
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-06-12	Feet below surface:	2.95
Feet to sea level:	Not Reported	Note:	Not Reported
Level reading date:	1973-05-15	Feet below surface:	2.68
Feet to sea level:	Not Reported	Note:	Not Reported

52
NE
1/2 - 1 Mile
Higher

FRDS PWS **MA4300001**

Epa region:	01	State:	MA
Pwsid:	MA4300001		
Pwsname:	ADVENTURE BOUND CAMPING, CC @ HORTONS		
Cityserved:	Not Reported	Stateserved:	MA
Zipserved:	Not Reported	Fipscounty:	25001
Status:	Active	Retpopsrvd:	438
Pwssvcconn:	1	Psource longname:	Groundwater
Pwstype:	TNCWS	Owner:	Private
Contact:	WAYNE KLEKAMP		
Contactorgname:	ADVENTURE BOUND CAMPING, CC @ HORTON'S		
Contactphone:	5084871847	Contactaddress1:	ADVENTURE BOUND CAMPING, INC.
Contactaddress2:	905 16TH PLACE	Contactcity:	VERO BEACH
Contactstate:	FL	Contactzip:	32960
Pwsactivitycode:	A		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

PWS ID:	MA4300001	PWS type:	Mailing
PWS name:	ROBERT S HORTON	PWS address:	71 SO. HIGHLAND ROAD
PWS city:	NORTH TRURO	PWS state:	MA
PWS zip:	026520000	PWS ID:	MA4300001
Activity status:	Active	Date system activated:	9003
Date system deactivated:	Not Reported	Retail population:	00000250
System name:	HORTONS TRAILER PARK	System address:	71 SO. HIGHLAND ROAD
System city:	NORTH TRURO	System state:	MA
System zip:	026520000		
Population served:	101 - 500 Persons	Treatment:	Untreated
Latitude:	420200	Longitude:	0700400
Violation id:	4	Orig code:	S
State:	MA	Violation Year:	2011
Contamination code:	3100	Contamination Name:	Coliform (TCR)
Violation code:	23	Violation name:	Monitoring, Routine Major (TCR)
Rule code:	110	Rule name:	TCR
Violation measur:	Not Reported	Unit of measure:	Not Reported
State mcl:	Not Reported	Cmp bdt:	10/01/2011
Cmp edt:	12/31/2011		
Violation ID:	4	Orig Code:	S
Enforcemnt FY:	2012	Enforcement Action:	02/29/2012
Enforcement Detail:	St AO (w/o penalty) issued		
Enforcement Category:	Formal		

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

State Database: MA Radon

Radon Test Results

County	% of sites>4 pCi/L	Median
BARNSTABLE	15	1.6

Federal EPA Radon Zone for BARNSTABLE County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 02652

Number of sites tested: 1

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	Not Reported	Not Reported	Not Reported	Not Reported
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	1.900 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Current USGS 7.5 Minute Topographic Map
Source: U.S. Geological Survey

HYDROLOGIC INFORMATION

Flood Zone Data: This data was obtained from the Federal Emergency Management Agency (FEMA). It depicts 100-year and 500-year flood zones as defined by FEMA. It includes the National Flood Hazard Layer (NFHL) which incorporates Flood Insurance Rate Map (FIRM) data and Q3 data from FEMA in areas not covered by NFHL.
Source: FEMA
Telephone: 877-336-2627
Date of Government Version: 2003, 2015

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002, 2005, 2010 and 2015 from the U.S. Fish and Wildlife Service.

State Wetlands Data: Wetland Inventory
Source: MassDEP
Telephone: 617-292-5907

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Service (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Service, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Massachusetts Geographic Information System (MassGIS) Datalayers
Source: Executive Office of Environmental Affairs
Telephone:

Public Water Supply Database

Telephone:
The Public Water Supply datalayer contains the locations of public community surface and groundwater supply sources and public non-community supply sources as defined in 310 CMR 22.00.

Areas of Critical Environmental Concern

Telephone:
The Areas of Critical Environmental Concern (ACEC) datalayer shows the location of areas that have been designated ACECs by the Secretary of Environmental Affairs. ACEC designation requires greater environmental review of certain kinds of proposed development under state jurisdiction within the ACEC boundaries. The ACEC Program is administered by the Department of Environmental Management (DEM) on behalf of the Secretary of Environmental Affairs. The Massachusetts Coastal Zone Management (MCZM) Office managed the original Coastal ACEC Program from 1978 to 1993, and continues to play a key role in monitoring coastal ACECs. Procedures for ACEC designation and the general policies governing the effects of designation are contained in the ACEC regulations (301 CMR 12.00). The ACEC datalayer has been compiled by MCZM and DEM and includes both coastal and inland areas.

EPA Designated Sole Source Aquifers

Telephone:
The Sole Source Aquifer datalayer was compiled by the Department of Environmental Protection (DEP) Division of Water Supply (DWS). Seven Sole Source Aquifers have been designated by the US Environmental Protection Agency (EPA) for Massachusetts. A Sole Source Aquifer (SSA) is an aquifer designated by US EPA as the sole or principal source of drinking water for a given aquifer service area; that is, an aquifer which is needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should that aquifer become contaminated. The aquifers were defined by an EPA hydrogeologist.

Aquifers

Telephone:
MassGIS produced an aquifer datalayer composed of 20 individual panels, generally based on the boundaries of the major drainage basins. Areas of high and medium yield were mapped. This datalayer includes polygon attribute coding to help in the identification of areas in which cleanup of hazardous waste sites must meet drinking water standards, as defined in the Massachusetts Contingency Plan (MCP) (310 CMR 40.00000).

Non-Potential Drinking Water Source Areas

Telephone:
Non-Potential Drinking Water Source Areas (NPDWSA) are regulatory in nature representing one of many considerations used in determining the standards to which ground water must be cleaned in the event of a release of oil or hazardous material. NPDWSAs are not based on existing water quality and do not indicate poor ambient conditions.

DEP Approved Zone IIs

Telephone:
The Department of Environmental Protection (DEP) approved Zone IIs datalayer was compiled by the DEP Division of Water Supply (DWS). The database contains 281 approved Zone IIs statewide. As stated in 310 CMR 22.02, a Zone II is 'that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation.) It is bounded by the groundwater divides which result from pumping the well and by the contact of the aquifer with less permeable materials such as till or bedrock. In some cases, streams or lakes may act as recharge boundaries. In all cases, Zone IIs shall extend up gradient to its point of intersection with prevailing hydrogeologic boundaries (a groundwater flow divide, a contact with till or bedrock, or a recharge boundary).' These data are used in association with the Public Water Supplies datalayer. The following describes certain unique features of this association.\n - Any proposed new well which will pump at least 100,000 gallons per day must have a Zone II delineation completed and approved by DEP prior to the well coming on line. \n- Additionally, a new source may not be on-line yet, but other, older wells may fall within its Zone II boundary.\n - Further, existing wells must have a Zone II delineated as a condition of receiving a water withdrawal permit under the Water Management Act.

OTHER STATE DATABASE INFORMATION

RADON

State Database: MA Radon
Source: Department of Health
Telephone: 413-586-7525
Radon Test Results

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary faultlines, prepared in 1975 by the United State Geological Survey

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

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Sand Pit Road

2 Sand Pit Rd

North Truro, MA 02652

Inquiry Number: 7207544.3

December 19, 2022

Certified Sanborn® Map Report

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

12/19/22

Site Name:

Sand Pit Road
2 Sand Pit Rd
North Truro, MA 02652
EDR Inquiry # 7207544.3

Client Name:

Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Contact: Caroline Armstrong

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The Sanborn Library is continually enhanced with newly identified map archives. This report accesses all maps in the collection as of the day this report was generated.

Certified Sanborn Results:

Certification # 341B-4492-82E7

PO # 22129

Project Sand Pit Road Truro

UNMAPPED PROPERTY

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Sanborn® Library search results

Certification #: 341B-4492-82E7

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- ☑ Library of Congress
- ☑ University Publications of America
- ☑ EDR Private Collection

The Sanborn Library LLC Since 1866™

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Sand Pit Road

2 Sand Pit Rd

North Truro, MA 02652

Inquiry Number: 7207544.8

December 20, 2022

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

12/20/22

Site Name:

Sand Pit Road
2 Sand Pit Rd
North Truro, MA 02652
EDR Inquiry # 7207544.8

Client Name:

Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Contact: Caroline Armstrong

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	*Scale*	*Details*	*Source*
2018	1"=500'	Flight Year: 2018	USDA/NAIP
2014	1"=500'	Flight Year: 2014	USDA/NAIP
2010	1"=500'	Flight Year: 2010	USDA/NAIP
1995	1"=500'	Acquisition Date: April 03, 1995	USGS/DOQQ
1991	1"=500'	Flight Date: April 04, 1991	USGS
1985	1"=500'	Flight Date: March 26, 1985	USDA
1977	1"=500'	Flight Date: April 01, 1977	USGS
1971	1"=500'	Flight Date: May 07, 1971	USGS
1960	1"=500'	Flight Date: May 19, 1960	USGS
1952	1"=500'	Flight Date: July 25, 1952	USDA
1938	1"=500'	Flight Date: November 21, 1938	USGS

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INQUIRY #: 7207544.8

YEAR: 2018

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 2014

= 500'

N

EDR


INQUIRY #: 7207544.8
YEAR: 2010
= 500'
N
EDR



INQUIRY #: 7207544.8

YEAR: 1995

= 500'

N

EDR



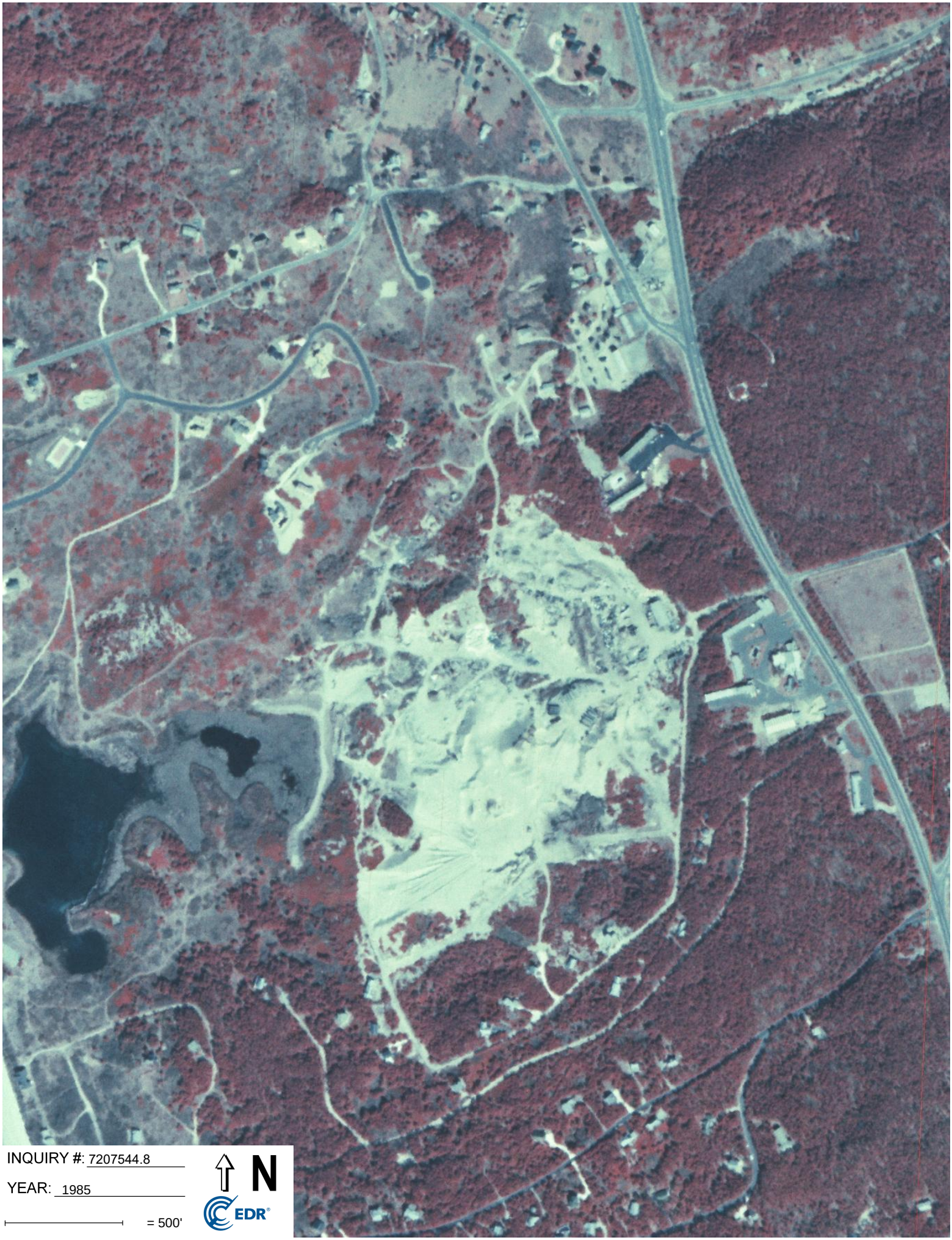
INQUIRY #: 7207544.8

YEAR: 1991

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1985

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1977

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1971

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1960

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1952

= 500'

N

EDR



INQUIRY #: 7207544.8

YEAR: 1938

= 500'

N

EDR

Sand Pit Road

2 Sand Pit Rd

North Truro, MA 02652

Inquiry Number: 7207544.4

December 19, 2022

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

12/19/22

Site Name:

Sand Pit Road
2 Sand Pit Rd
North Truro, MA 02652
EDR Inquiry # 7207544.4

Client Name:

Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563
Contact: Caroline Armstrong

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Horsley Witten Group, Inc. were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# 22129

Project: Sand Pit Road Truro

Coordinates:

Latitude:	42.023493 42° 1' 25" North
Longitude:	-70.079727 -70° 4' 47" West
UTM Zone:	Zone 19 North
UTM X Meters:	410611.92
UTM Y Meters:	4652948.50
Elevation:	46.51' above sea level

Maps Provided:

2018
2015
2012
1977
1972
1958
1948, 1949
1944
1898
1889

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Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2018 Source Sheets



North Truro
2018
7.5-minute, 24000



Wellfleet
2018
7.5-minute, 24000

2015 Source Sheets



North Truro
2015
7.5-minute, 24000



Wellfleet
2015
7.5-minute, 24000

2012 Source Sheets

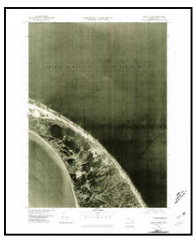


North Truro
2012
7.5-minute, 24000



Wellfleet
2012
7.5-minute, 24000

1977 Source Sheets



North Truro
1977
7.5-minute, 25000
Aerial Photo Revised 1977



Wellfleet
1977
7.5-minute, 25000
Aerial Photo Revised 1977

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1972 Source Sheets



North Truro
1972
7.5-minute, 24000
Aerial Photo Revised 1971



Wellfleet
1972
7.5-minute, 24000
Aerial Photo Revised 1971

1958 Source Sheets



Wellfleet
1958
7.5-minute, 24000



North Truro
1958
7.5-minute, 24000

1948, 1949 Source Sheets



North Truro
1948
7.5-minute, 24000



Wellfleet
1949
7.5-minute, 24000

1944 Source Sheets



North Truro
1944
7.5-minute, 31680



Wellfleet
1944
7.5-minute, 31680

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1898 Source Sheets



Provincetown
1898
15-minute, 62500

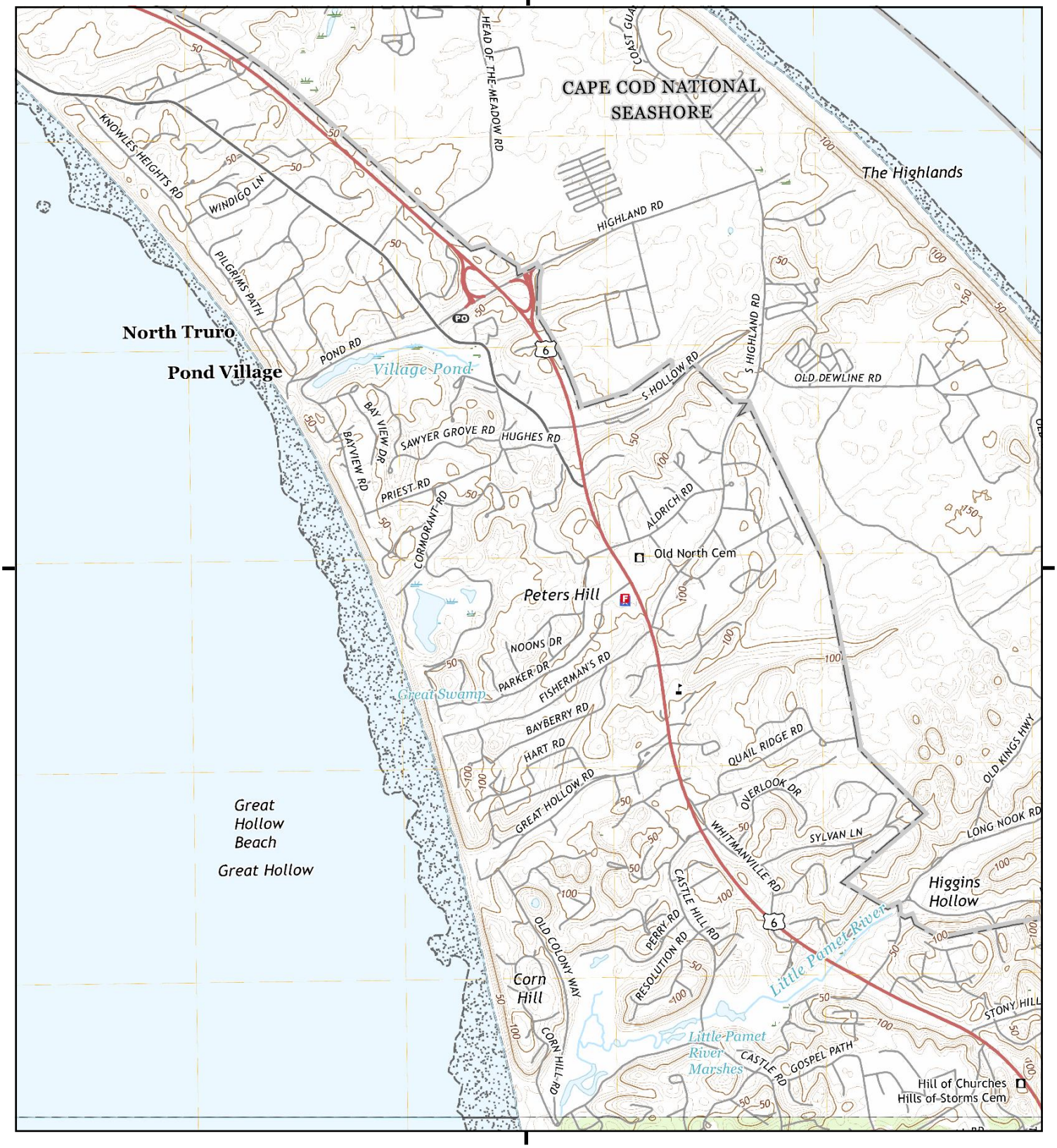
1889 Source Sheets



Provincetown
1889
15-minute, 62500



Wellfleet
1889
15-minute, 62500



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 2018, 7.5-minute
S, Wellfleet, 2018, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N

Historical Topo Map

2015



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

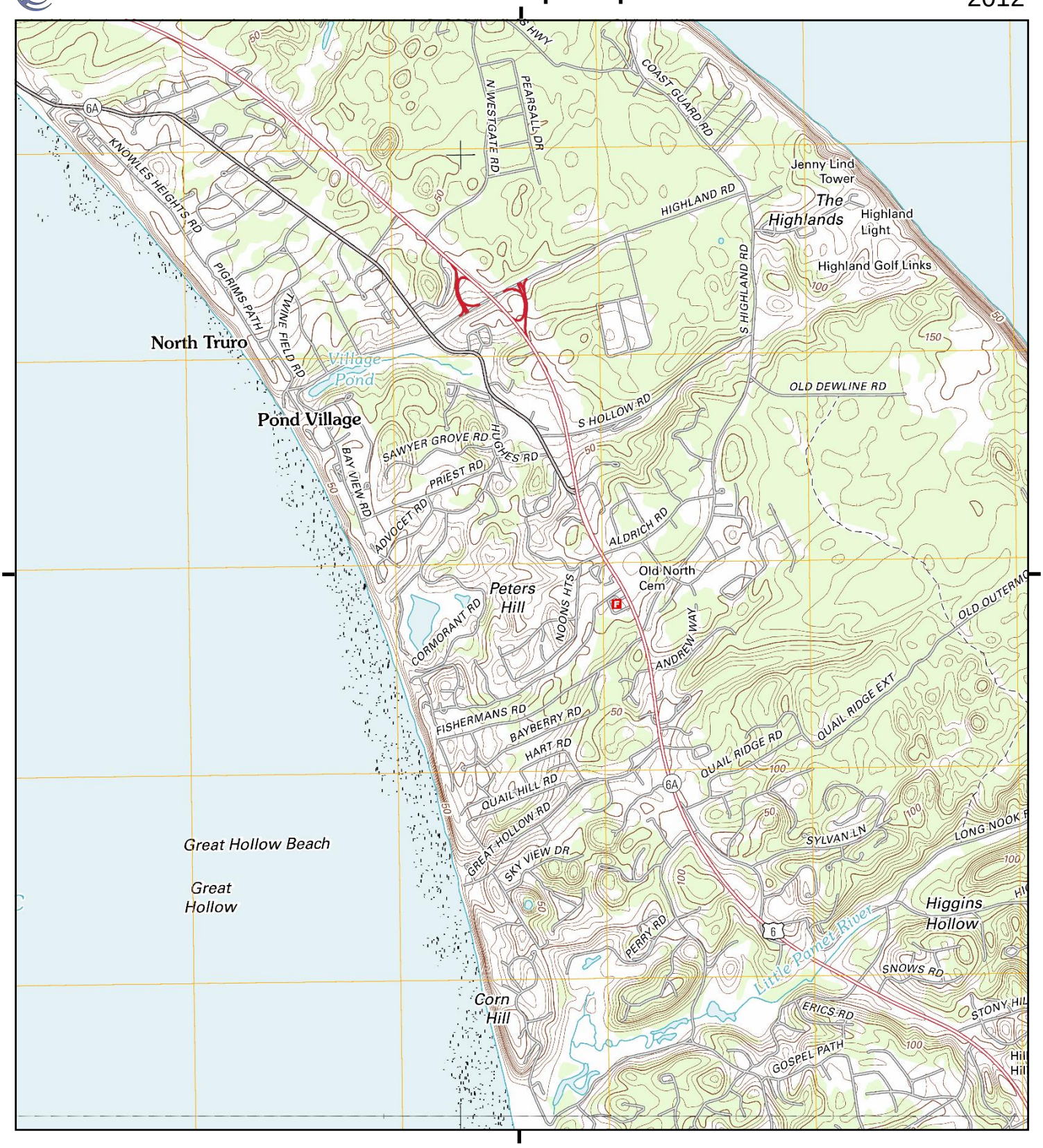
TP, North Truro, 2015, 7.5-minute
S, Wellfleet, 2015, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N

Historical Topo Map

2012



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 2012, 7.5-minute
S, Wellfleet, 2012, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

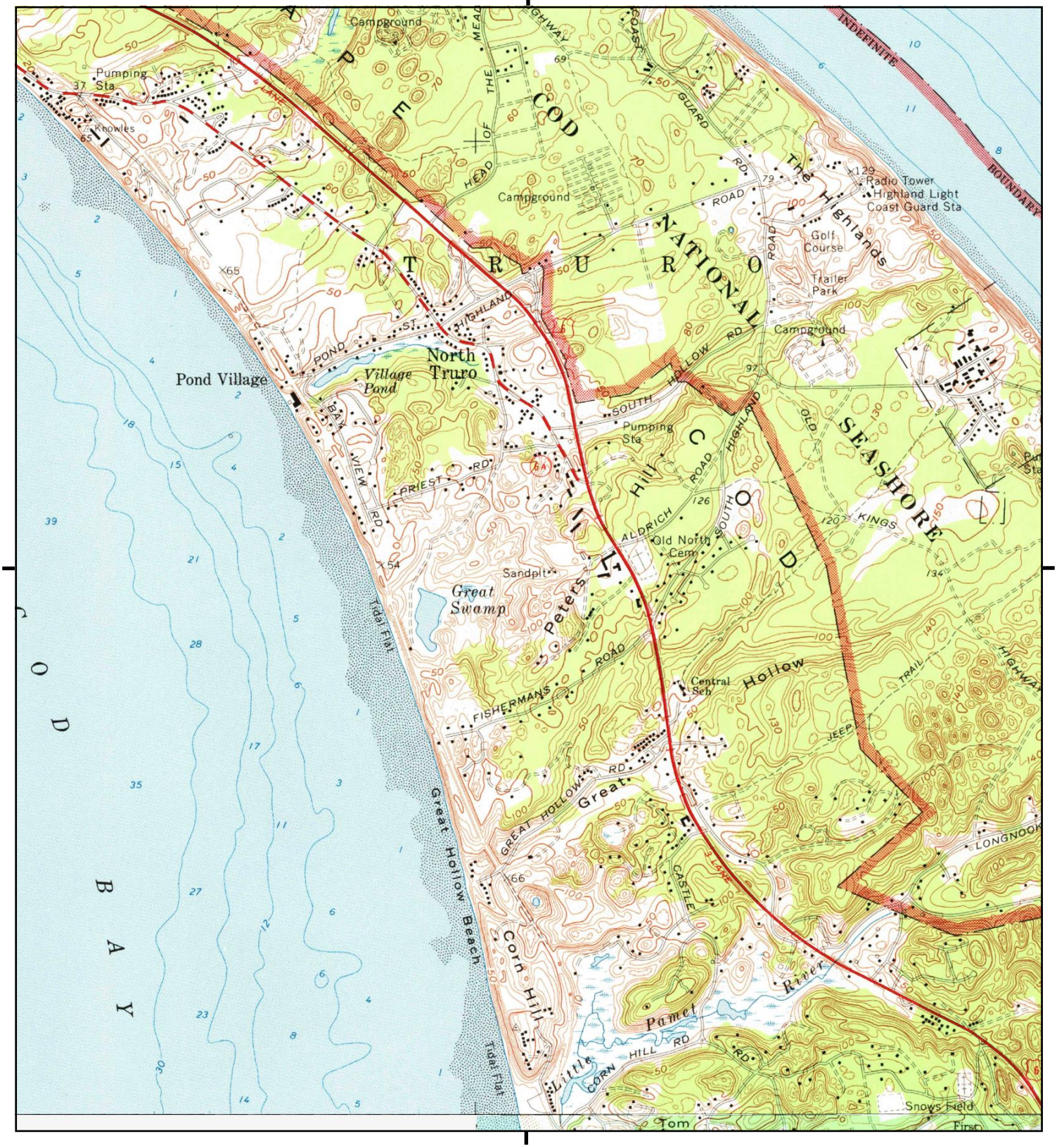
TP, North Truro, 1977, 7.5-minute
SE, Wellfleet, 1977, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N

Historical Topo Map

1972



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 1972, 7.5-minute
SE, Wellfleet, 1972, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 1958, 7.5-minute
SE, Wellfleet, 1958, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 1948, 7.5-minute
SE, Wellfleet, 1949, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

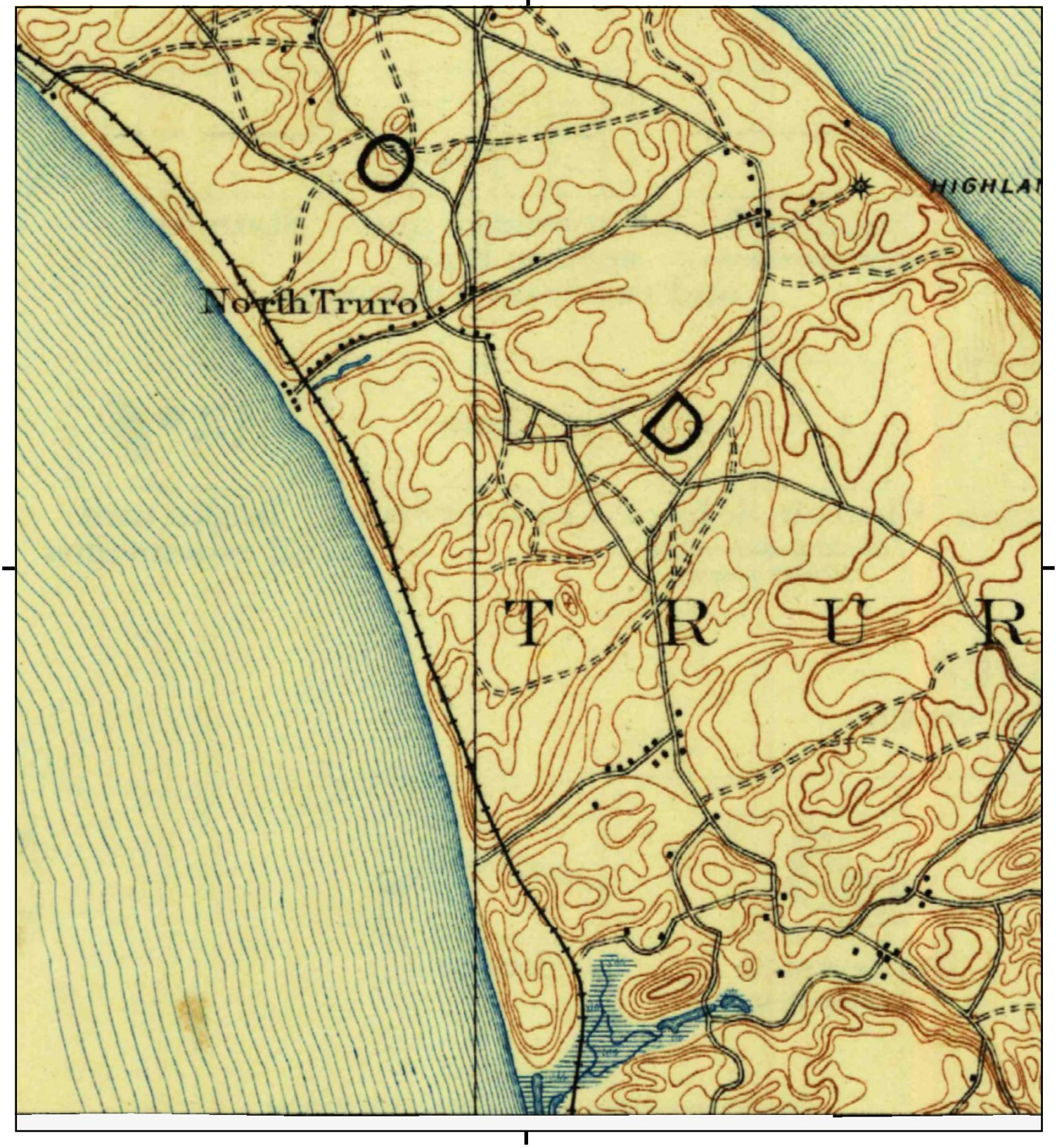
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, North Truro, 1944, 7.5-minute
SE, Wellfleet, 1944, 7.5-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Provincetown, 1898, 15-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, Provincetown, 1889, 15-minute
S, Wellfleet, 1889, 15-minute

SITE NAME: Sand Pit Road
ADDRESS: 2 Sand Pit Rd
North Truro, MA 02652
CLIENT: Horsley Witten Group, Inc.

N

Sand Pit Road
2 Sand Pit Rd
North Truro, MA 02652

Inquiry Number: 7207544.5
December 20, 2022

The EDR-City Directory Image Report

EDR® Environmental Data Resources Inc

6 Armstrong Road
Shelton, CT 06484
800.352.0050
www.edrnet.com

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SECTION

Executive Summary

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City Directory Images

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EXECUTIVE SUMMARY

DESCRIPTION

Environmental Data Resources, Inc.'s (EDR) City Directory Report is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Report includes a search of available city directory data at 5 year intervals.

RECORD SOURCES

EDR's Digital Archive combines historical directory listings from sources such as Cole Information and Dun & Bradstreet. These standard sources of property information complement and enhance each other to provide a more comprehensive report.

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RESEARCH SUMMARY

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Year	*Target Street*	*Cross Street*	*Source*
2017	☐	☐	EDR Digital Archive
2014	☐	☐	EDR Digital Archive
2010	☐	☐	EDR Digital Archive
2005	☐	☐	EDR Digital Archive
2000	☐	☐	EDR Digital Archive
1995	☐	☐	EDR Digital Archive
1992	☐	☐	EDR Digital Archive
1989	☑	☐	Cole Criss-Cross Directory
1984	☑	☐	Cole Criss-Cross Directory

FINDINGS

TARGET PROPERTY STREET

2 Sand Pit Rd
North Truro, MA 02652

Year	*CD Image*	*Source*	
SAND PIT RD			
2017	-	EDR Digital Archive	Street not listed in Source
2014	-	EDR Digital Archive	Street not listed in Source
2010	-	EDR Digital Archive	Street not listed in Source
2005	-	EDR Digital Archive	Street not listed in Source
2000	-	EDR Digital Archive	Street not listed in Source
1995	-	EDR Digital Archive	Street not listed in Source
1992	-	EDR Digital Archive	Street not listed in Source
1989	pg A1	Cole Criss-Cross Directory	
1984	pg A2	Cole Criss-Cross Directory	

FINDINGS

CROSS STREETS

No Cross Streets Identified

City Directory Images

Target Street	Cross Street	Source
✓	-	Cole Criss-Cross Directory

SAND PIT RD 1989

North Truro

NO # Leonard J Hansen . . .71 487-9410
NO # ★ The Window Washers . - 487-2330
1 RESIDENCE 1 BUSINESS

SANDPIPER AVE 02652

New Street-1985.

North Truro

1- END CT 145 $C..A 6

7 Vincent Dalo 86 487-4192
NO # Donald Berch 85 487-4573
NO # Henry Greenblatt 85 487-2848
3 RESIDENCE

SANDPIPER RD 02666

1- 99 CT 148 $A..A 6

8 Paul Severino 87 349-1832
20 ★ Dr R A Cooper 78 349-9484
NO # Richard D Colombo . . .87 349-1985
NO # Paul Kolton 83 349-7229
NO # Susan S Lapidus 80 349-9039
NO # Richard Lettieri 82 349-9662
NO # Walter Londergan . . .87 487-9054
NO # Sten Lukin 82 349-3606
NO # Nathan Richman 82 349-3606
8 RESIDENCE 1 BUSINESS

SANDPIT RD 02652

North Truro

NO # Alan S Bergman 72 487-1429
NO # Kenneth S Brock 77 487-3502
NO # A Freed 79 487-2158
NO # Morris Gerber 72 487-1559
NO # Leonard Howard 78 487-3342
5 RESIDENCE

SANDY LN 02666

New Street-1988.

1- END CT 144 $A..A 6

NO # Melissa Cohen . . . . . ¤ 487-4990
NO # Michael Jerace . . . . . - 487-4990
2 RESIDENCE

SCRIMSHAW RD 02666

O 1- 99 CT 149 $A..A 6
E 2- 98 CT 147 $B..A 6

7 Arnold W Williams . . .85 349-2118
9 Michael S Rice 73 349-6602
2 RESIDENCE

SHORE RD 02652

North Truro

1- END CT 145 $C..A 6

538 Edward J Sheats . . . . - 487-2494
NO # Jos Amodio 87 487-3254
NO # M E Coughlan . . . . . ¤ 487-3126
NO # Mark Dionne . . . . . ¤ 487-0999
NO # David Ditacchio 86 487-1165
NO # David Fleming 87 487-3670
NO # David Foster Jr 87 487-3087
NO # Angelo Garofalo 87 487-2635
NO # Gerard J Kinahan . . .87 487-3645
NO # Valinda J McClure . . . - 487-1141
NO # Robin E Morin 87 487-9211
NO # Laura L Murphy . . . . ¤ 487-4514
NO # Gerald Nelson 87 487-1464
NO # Daniel Prelack 87 487-0236
NO # Stephen Robbins . . . . ¤ 487-4260
NO # D Russell . . . . . ¤ 487-4659
NO # John W Sieverding . . . ¤ 487-4263
NO # Francis Veara 87 487-4891

Target Street	Cross Street	Source
✓	-	Cole Criss-Cross Directory

SANDPIPER RD 02666
Truro
073680

20★	**Dr R A Cooper**		**349-9484**
No #	Paul Kolton	.¤	349-7229
No #	Roy Lapidus	.80	349-9039
No #	Richard Lettieri	.82	349-9662
No #	Sten Lukin	.82	349-3606
No #	Nathan Richman	.82	349-3606

5 Residence 1 Business

SANDPIPER RD 02667
Wellfleet
073690

No #	Anthony Francoline	.80	349-9607
No #	David Kuzmak	.80	349-9607

2 Residence

SANDPIT RD 02652
North Truro
073700

No #	Alan S Bergman	.72	487-1429
No #	Kenneth S Brock	.77	487-3502
No #	A Freed	.79	487-2158
No #	Morris Gerber	.72	487-1559
No #	Leonard Howard	.78	487-3342

5 Residence

SAND PT SHORES DR 02536
East Falmouth
073710

4	Ernest J Butler	.¤	540-4954
9★	**Solartec Developer**		**548-8861**
	Richard W Yarosh	.78	540-2897
10	Fabian Aylward	.78	548-7188
22	Edward J Curley	.79	548-9367
40	Richard McIntosh	.79	548-6015
52	59	.NP	
60	Wilfred J Mendosa	.68	540-0265
96	Lillian Monacci	.72	540-2449
99	Stephen O Swain	.80	548-0852
100	Alfred C Bourbeau	.77	548-7374
164		.NP	
No #	James L Sullivan	.82	540-3943

13 Residence 1 Business

SANDS COVE 02534
Cataumet
073720

	Arthur F Sands	.68	563-2841

1 Residence

SANDS RD 02642
Eastham
073730

11	George McCarthy	.79	255-4623
No #	Warren R Berg	.69	255-2043

APPENDIX D

TEST PIT AND SOIL BORING LOGS

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

BORING LOG: MW-1/SB-1

Project: 22129
Client: Truro DPW
Drilling Contractor: Desmond Well Driling
Drilling Equipment: Split-spoon
Drilling Location: SB-1/MW-1

Date: 2/10/2023
Completion Depth: 77' BGS
Elevation: N/A
Inspector: CA
Depth to Water: 72' BGS

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat	Fine = (f)	Fragments (frag.)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Clays, Sandy Clays of High Plasticity (CH)	Medium = (m)	Cement (cem.)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)	Organic Silts and Clays of Low to Medium	Coarse = (c)	Below Ground Surface (BGS)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures	Plasticity, Sandy Organic Silts, and Clays	Dark = (dk)	Total Organic Vapors (TOV)
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity,	Fine to Coarse = (f-c)	Parts per million (PPM)
		Brown (Br)	Poorly-Graded Sand (SP)	Sandy Organic Silts and Clays (OH)	Very = (v)	Not Available (N/A)
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)	More/Less = (+/-)	Depth to Water (DTW)
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	TOV (PPM)	Recovery	USCS Code	Color	Comments	Well Details	Depth Feet
						Stand Pipe ~3.5' above grade		
0-2	DRY, brown, f to m sand, trace gravel	0.10	24"	SW	lt. Br			
2-4	DRY, brown, f to m sand	0.10	20"	SW	lt. Br			
4-6	DRY, blue-gray clay, bottom 3" is f to m red/brown sand	0.20	22"	CH/SW	Bl/G/Br			
6-8	DRY light brown fine-medium coarse sand, trace blue clay	<0.1	18"	SW	lt. Br			
8-10	DRY, red/brown to light brown, f to m sand	<0.1	15"	SW	R/Br/lt Br			
10-12	DRY, light brown, f to m sand	<0.1	16"	SW	lt. Br			
12-14	DRY, light brown, f to c sand	<0.1	15"	SW	lt. Br			
14-16	DRY, light brown, f to c sand	<0.1	18"	SW	lt. Br			
16-18	DRY, light brown, f to c sand	0.10	15"	SW	lt. Br			
18-20	DRY, light brown, f to c sand	0.20	15"	SW	lt. Br			
20-21	NA	NA	NA	NA	NA			
21-22	NA	NA	NA	NA	NA			
22-24	DRY, light brown, f to c sand	<0.1	15"	SW	lt. Br			
24-25	NA	NA	NA	NA	NA			
25-26	NA	NA	NA	NA	NA			
26-27	NA	NA	NA	NA	NA			
27-29	DRY, light brown, f to c sand	0.10	18"	SW	Br			
29-30	NA	NA	NA	NA	NA			
30-31	NA	NA	NA	NA	NA			
31-32	NA	NA	NA	NA	NA			
32-34	DRY, light brown, f to c sand	<0.1	17"	SW	Br			
34-35	NA	NA	NA	NA	NA			
35-36	NA	NA	NA	NA	NA			
36-37	NA	NA	NA	NA	NA			
37-39	DRY, light brown, f to c sand	0.10	20"	SW	Br			
39-40	NA	NA	NA	NA	NA			
40-41	NA	NA	NA	NA	NA			
41-42	NA	NA	NA	NA	NA			
42-44	DRY, light brown, f to c sand	0.30	19"	SW	Br			
44-45	NA	NA	NA	NA	NA			
45-46	NA	NA	NA	NA	NA			
46-47	NA	NA	NA	NA	NA			
47-49	DRY, light brown, f to c sand	0.30	16"	SW	Br			
49-50	NA	NA	NA	NA	NA			

Horsley Witten Group
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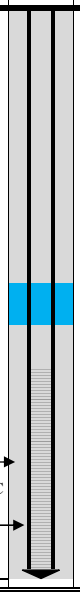
BORING LOG: MW-1/SB-1

Project: 22129
Client: Truro DPW
Drilling Contractor: Desmond Well Driling
Drilling Equipment: Split-spoon
Drilling Location: SB-1/MW-1

Date: 2/10/2023
Completion Depth: 77' BGS
Elevation: N/A
Inspector: CA
Depth to Water: 72' BGS

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat	Fine = (f)	Fragments (frag.)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Clays, Sandy Clays of High Plasticity (CH)	Medium = (m)	Cement (cem.)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)	Organic Silts and Clays of Low to Medium	Coarse = (c)	Below Ground Surface (BGS)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures	Plasticity, Sandy Organic Silts, and Clays	Dark = (dk)	Total Organic Vapors (TOV)
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity,	Fine to Coarse = (f-c)	Parts per million (PPM)
		Brown (Br)	Poorly-Graded Sand (SP)	Sandy Organic Silts and Clays (OH)	Very = (v)	Not Available (N/A)
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)	More/Less = (+/-)	Depth to Water (DTW)
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	TOV (PPM)	Recovery	USCS Code	Color	Comments	Well Details	Depth Feet
50-51	NA	NA	NA	NA	NA			
51-52	NA	NA	NA	NA	NA			
52-54	DRY, light brown, f to c sand	0.20	19"	SW	Br			
54-55	NA	NA	NA	NA	NA			
55-56	NA	NA	NA	NA	NA			
56-57	NA	NA	NA	NA	NA			
57-59	DRY, light brown, f to c sand	0.10	14"	SW	Br			
59-60	NA	NA	NA	NA	NA			
60-61	NA	NA	NA	NA	NA			
61-62	NA	NA	NA	NA	NA			
62-64	DRY, light brown, f to c sand	0.20	18"	SW	Br			
64-65	NA	NA	NA	NA	NA			2' Betonite
65-66	NA	NA	NA	NA	NA			
66-67	NA	NA	NA	NA	NA			
67-69	DRY, light brown, f to c sand	0.10	19"	SW	Br			
69-70	NA	NA	NA	NA	NA			
70-71	NA	NA	NA	NA	NA	DTW = 72'		12' Sand
71-72	NA	NA	NA	NA	NA			
72-74	No recover	NA	0"	NA	NA	2-inch 0.010 slot PVC screen (10-feet)		
74-75	NA	NA	NA	NA	NA			
75-76	NA	NA	NA	NA	NA			
76-77	NA	NA	NA	NA	NA	2-inch well set at 77'		



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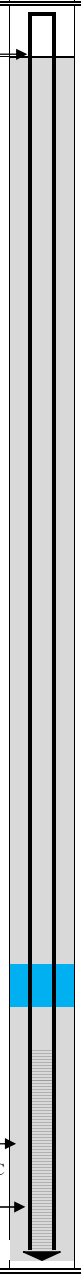
BORING LOG: MW-2/SB-2

Project: 22129
Client: Truro DPW
Drilling Contractor: Desmond Well Driling
Drilling Equipment: Split-spoon
Drilling Location: SB-2/MW-2

Date: 2/10-14/2023
Completion Depth: 57' BGS
Elevation: N/A
Inspector: JG/CA
Depth to Water: 52' BGS

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays, Sandy Clays of High Plasticity (CH)	Fine = (f)	Fragments (frag.)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)		Medium = (m)	Cement (cem.)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays	Coarse = (c)	Below Ground Surface (BGS)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures		Dark = (dk)	Total Organic Vapors (TOV)
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy Organic Silts and Clays (OH)	Fine to Coarse = (f-c)	Parts per million (PPM)
		Brown (Br)	Poorly-Graded Sand (SP)		Very = (v)	Not Available (N/A)
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)	More/Less = (+/-)	Depth to Water (DTW)
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	TOV (PPM)	Recovery	USCS Code	Color	Comments	Well Details	Depth Feet
						Stand Pipe ~2' above grade		
0-2	DRY, brown, f to m sand, trace silt	0.60	24"	SW/SM	Br			
2-4	DRY, brown, f sand	0.20	20"	SW	Br			
4-6	DRY, brown, f to m sand	0.20	18"	SW	Br			
6-8	DRY, brown, f to m sand	0.20	16"	SW	Br			
8-10	DRY, brown, f to c sand	0.20	17"	SW	Br			
10-12	DRY, brown, f to m sand	0.20	15"	SW	Br			
12-14	DRY brown fine sand	0.20	21"	SW	Br			
14-16	DRY, brown, f to c sand	0.20	14"	SW	Br			
16-18	DRY, light brown, f to c sand	0.30	17"	SW	lt Br			
18-20	DRY, brown, f to c sand	0.60	16"	SW	Br			
20-21	NA	NA	NA	NA	NA			
21-22	NA	NA	NA	NA	NA			
22-23	NA	NA	NA	NA	NA			
23-25	DRY, brown, f to c sand	<0.1	14"	SW	Br			
25-26	NA	NA	NA	NA	NA			
26-27	NA	NA	NA	NA	NA			
27-28	NA	NA	NA	NA	NA			
28-30	DRY, brown, f to c sand	0.10	16"	SW	Br			
30-31	NA	NA	NA	NA	NA			
31-32	NA	NA	NA	NA	NA			
32-33	NA	NA	NA	NA	NA			
33-35	DRY, brown, f to c sand	<0.1	16"	SW	Br			
35-36	NA	NA	NA	NA	NA			
36-37	NA	NA	NA	NA	NA			
37-38	NA	NA	NA	NA	NA			
38-40	DRY, brown, m to c sand	<0.1	N/A	SW	Br			
40-41	NA	NA	NA	NA	NA			
41-42	NA	NA	NA	NA	NA			
42-43	NA	NA	NA	NA	NA			
43-45	DRY, brown, f to c sand	<0.1	N/A	SW	Br			2' Betonite
45-46	NA	NA	NA	NA	NA			
46-47	NA	NA	NA	NA	NA			
47-48	NA	NA	NA	NA	NA			
48-50	DRY, brown, f to c sand	<0.1	N/A	SW	Br			
50-51	NA	NA	NA	NA	NA	DTW = 52'		12' Sand
51-52	NA	NA	NA	NA	NA			
52-53	NA	NA	NA	NA	NA			
53-55	Saturated, brown, f to c sand, trace cobbles	0.10	12"	SW	Br	2-inch 0.010 slot PVC screen (10-feet)		
55-56	NA	NA	NA	NA	NA			
56-57	NA	NA	NA	NA	NA	2-inch well set at 57'		



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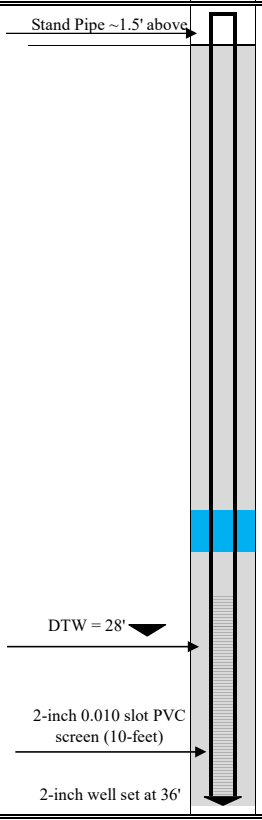
BORING LOG: MW-2/SB-2

Project: 22129
Client: Truro DPW
Drilling Contractor: Desmond Well Driling
Drilling Equipment: Split-spoon
Drilling Location: SB-2/MW-2

Date: 2/14-15/2023
Completion Depth: 36' BGS
Elevation: N/A
Inspector: CA
Depth to Water: 28' BGS

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat	Fine = (f)	Fragments (frag.)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Clays, Sandy Clays of High Plasticity (CH)	Medium = (m)	Cement (cem.)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)	Organic Silts and Clays of Low to Medium	Coarse = (c)	Below Ground Surface (BGS)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures	Plasticity, Sandy Organic Silts, and Clays	Dark = (dk)	Total Organic Vapors (TOV)
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity,	Fine to Coarse = (f-c)	Parts per million (PPM)
		Brown (Br)	Poorly-Graded Sand (SP)	Sandy Organic Silts and Clays (OH)	Very = (v)	Not Available (N/A)
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)	More/Less = (+/-)	Depth to Water (DTW)
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	TOV (PPM)	Recovery	USCS Code	Color	Comments
0-2	DRY, brown, f to m sand, trace gravel, trace organics	0.20	15"	SW	lBr	
2-4	DRY, brown, f to m sand, trace gravel	<0.1	15"	SW	Br	
4-6	DRY, brown, f to m sand, trace gravel	<0.1	4"	SW	Br	
6-8	DRY, brown, f to m sand, trace gravel	<0.1	8"	SW	Br	
8-10	DRY, brown, f to m sand, trace gravel	0.10	15"	SW	Br	
10-12	DRY, brown, f to m sand, bottom 3" is light brown, f to m sand, trace gravel	0.30	17"	SW	Br/lt Br	
12-14	DRY, brown/light brown to red f to c sand, trace fines, trace gravel	0.30	19"	SW	Br/lt Br/R	
14-16	DRY brown-light brown fine medium coarse sand, trace gravel	0.20	18"	SW	Br/lt Br	
16-18	DRY brown fine medium coarse sand, trace gravel	0.10	17"	SW	Br	
18-20	DRY, brown/light brown, f to c sand, trace gravel	0.10	18"	SW	Br/lt Br	
20-21	NA	NA	NA	NA	NA	
21-22	NA	NA	NA	NA	NA	
22-23	NA	NA	NA	NA	NA	
23-25	DRY, brown, f to c sand, trace gravel	0.10	18"	SW	Br	
25-26	NA	NA	NA	NA	NA	
26-27	NA	NA	NA	NA	NA	
27-28	NA	NA	NA	NA	NA	
28-30	DRY, brown, m to c sand, trace gravel	0.20	17"	SW	Br	
30-31	NA	NA	NA	NA	NA	
31-32	NA	NA	NA	NA	NA	
32-33	NA	NA	NA	NA	NA	
33-35	Saturated, brown, f to c sand	NA	0"	SW	Br	
35-36	NA	NA	NA	NA	NA	



Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-1

Project: 22129
Client: Town of Truro
Contractor: Truro DPW
Equipment: Excavator
Location: Sand Pit Property; test pit completed near asphalt pile

Date: 2/2/23
Completion Depth: 10'
Elevation: TBD
Inspector: CA
Depth to Water: N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry, f to m sand	SW	lt Br lt Br		0.2
2-4'	Light brown, dry, f to m sand	SW	lt Br		0.2
4-6'	Light brown, dry, f to m sand	SW	lt Br	Consistent soil throughout test pit	0.2
6-8'	Light brown, dry, f to m sand	SW	lt Br		0.1
8-10'	Light brown, dry, f to m sand	SW	lt Br		0.1
				Total depth: 10'	

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-2

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near asphalt pile and lobster traps **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry m to f sand, trace silt	SW	lt Br lt Br		0.2
2-4'	Light brown, dry, f to c sand and clayey sand	SW/SC	lt Br		0.3*
4-6'	Light brown, dry sand and sandy clay	SW/SC	lt Br		0.2
6-8'	Light brown dry, sand, some orange sandy clay	SW/SC	lt Br/Or		0.1
8-10'	Light brown, dry, sand and orange sandy clay	SW	lt Br/Or		0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-3

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near trailers and lobster trap **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Dark brown, dry, c sand, trace roots, trace clay	SW	lt Br lt Br		0.1*
2-4'	Light brown, dry, c sand and f to c sand	SW	lt Br		0.1
4-6'	Light brown, dry, c sand and f to c sand	SW	lt Br		<0.1
6-8'	Light brown, dry, c sand	SW	lt Br		<0.1
8-10'	Light brown, dry, c sand	SW	lt Br		<0.1

Note:
*Sample collected from depth for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-4

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed behind compost pile **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Brown, dry, c sand	SW	Br Br		<0.1
2-4'	Brown, dry, c sand AND brown, dry, f sand	SW	Br		<0.1
4-6'	Brown, dry, c sand AND brown, dry f sand, trace cobbles	SW	Br		0.0
6-8'	Brown, dry, c sand AND brown, dry, f sand	SW	Br		0.0
8-10'	Brown, dry, c sand AND brown, dry, f sand	SW	Br		0.0
				Total depth: 10'	

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-5

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near treeline **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-1'	Dark brown/black organics	-	dk Br	Manure like odor throughout first 4' of test pit	0.2*
1-2'	Dark, dry, brown c sand	SW	dk Br		
2-4'	Brown, dry, c sand AND dry m to c sand	SW	Br		0.1
4-6'	Brown, dry, c sand AND dry f to m sand, with trace plastic and wood debris intermixed	SW	Br		0.0
6-8'	Light brown, dry, c sand	SW	Br		0.3*
8-10'	Light brown, dry, c sand	SW	Br		0.1*

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-6

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit near wooden utility poles **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-0.5'	organic topsoil	-	Br		
0.5-2'	Brown, dry, f sand, with trace wood and brick debris	SW	Br		0.3*
2-4'	Brown, dry, f sand, trace clayey sand	SW	Br		<0.1
4-6'	Brown, dry, f sand, trace wood and brick debris	SW	Br		<0.1
6-8'	Brown, dry, f sand	SW	Br		<0.1
8-10'	Brown, dry, f sand	SW	Br		<0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-7

Project: 22129
Client: Town of Truro
Contractor: Truro DPW
Equipment: Excavator
Location: Sand Pit Property; test pit completed near shell pile

Date: 2/2/23
Completion Depth: 10'
Elevation: TBD
Inspector: CA
Depth to Water: N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-0.5'	Shells and organic soil	-	Br		
0.5-2'	Light brown, dry, f sand	SW	lt Br		<0.1
2-4'	Light brown, dry, f sand, some gray c sand	SW	lt Br		<0.1
4-6'	Light brown, dry, f sand AND brown c sand	SW	lt Br		<0.1
6-8'	Light brown, dry, f sand AND brown c sand	SW	lt Br		<0.1
8-10'	Light brown, dry, f sand AND brown c sand	SW	lt Br		<0.1
				Total depth: 10'	

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-8

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near the edge of Noons Driv **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry, f sand, some organics	SW	lt Br lt Br		<0.1
2-4'	Light brown, dry, f sand, some gray clayey sand	SW/SC	lt Br		2.3*
4-6'	Light brown, dry, f sand, trace clay, trace cobbles	SW/SC	lt Br		0.7
6-8'	Light brown, dry, f sand, some coarse sand	SW	lt Br		<0.1
8-10'	Light brown, dry, f sand, some coarse sand	SW	lt Br		<0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-9

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near trees and Noons Drive by sand piles **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry, m to c sand, trace fines	SW	lt Br lt Br		0.1*
2-4'	Light brown, dry, mto c sand, trace fines	SW	lt Br		<0.1
4-6'	Light brown, dry, m to c sand, trace fines	SW	lt Br	Consistent soil throughout test pit	<0.1
6-8'	Light brown, dry, m to c sand, trace fines	SW	lt Br		<0.1
8-10'	Light brown, dry, m to c sand, trace fines	SW	lt Br		<0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-10

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed near trees and Noons Drive by sand piles **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry, m to c sand, trace fines	SW	lt br lt Br		<0.1
2-4'	Light brown, dry, m to c sand, gray sandy clay	SW/SC	lt Br		<0.1
4-6'	Light brown, dry, m to c sand, gray sandy clay	SW/SC	lt Br		<0.1
6-8'	Light brown, dry, m to c sand, gray sandy clay	SW/SC	lt Br		0.1*
8-10'	Light brown, dry, m to c sand	SW	lt Br		<0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

Horsley Witten Group
Sustainable Environmental Solutions

TEST PIT LOG: TP-11

Project: 22129 **Date:** 2/2/23
Client: Town of Truro **Completion Depth:** 10'
Contractor: Truro DPW **Elevation:** TBD
Equipment: Excavator **Inspector:** CA
Location: Sand Pit Property; test pit completed on southeast plateu of property **Depth to Water:** N/A

Proportions		Color	USCS Code		Size	Misc.
trace (trc)	0 - 10%	Blue (Bl)	Well-Graded Gravel (GW)	Inorganic Clays of High Plasticity, Fat Clays,	Fine = (f)	Fine to Coarse = (f-c)
little (li)	10 - 20%	Red (R)	Poorly-Graded Gravel (GP)	Sandy Clays of High Plasticity (CH)	Medium = (m)	Very = (v)
some (so)	20 - 35%	Light (lt)	Silty Gravels, Gravel-Sand-Silt Mixtures (GM)		Coarse = (c)	More/Less = (+/-)
and	35 - 50%	Dark (dk)	Clayey Gravels, Gravel-Sand-Clay Mixtures (GC)	Organic Silts and Clays of Low to Medium Plasticity, Sandy Organic Silts, and Clays (OL)		
		Rust (Ru)	Well-Graded Sand (SW)	Organic Silts and Clays of High Plasticity, Sandy		
		Brown (Br)	Poorly-Graded Sand (SP)	Organic Silts and Clays (OH)		
		Orange (Or)	Silty Sands, Sand Silt Mixtures (SM)	Peat (PT)		
		Black (Blk)	Clayey Sands, Sand-Clay Mixtures (SC)			
		Angular	Inorganic Silts, Clayey Silts of Low to Medium Plasticity (ML)			
		Round (rnd.)	Inorganic Silts, Micaceous, or Diatomaceous Silty Soils, Elastic Silts (MH)			
		Angular (ang.)	Inorganic Clays of Low to Medium Plasticity, Gravely, Sandy, and Silty Clays (CL)			

Depth Feet	Description	USCS Code	Color	Comments	TOV (PPM)
0-2'	Light brown, dry, m to c sand	SW	lt br lt Br		0.1*
2-4'	Light brown, dry, m to c sand	SW	lt Br		0.5
4-6'	Light brown, dry, m to c sand	SW	lt Br	Consistent soil throughout test pit	<0.1
6-8'	Light brown, dry, m to c sand	SW	lt Br		<0.1
8-10'	Light brown, dry, m to c sand	SW	lt Br		<0.1

Note:
*Sample collected for analytical purposes

Total depth: 10'

APPENDIX E

LABORATORY REPORTS

con-test®
A Pace Analytical® Laboratory

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

March 6, 2023

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Sand Pit Rd, Truro, MA
Client Job Number:
Project Number: 22129
Laboratory Work Order Number: 23B0764

Enclosed are results of analyses for samples as received by the laboratory on February 6, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Kaitlyn A. Feliciano
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 3/6/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22129

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23B0764

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Sand Pit Rd, Truro, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-2 (2-4)	23B0764-01	Soil		SM 2540G	
				SOP-466 PFAS	
TP-5 (0-2)	23B0764-02	Soil		SM 2540G	
				SOP-466 PFAS	
TP-6 (0-2)	23B0764-03	Soil		SM 2540G	
				SOP-466 PFAS	
TP-9 (0-2)	23B0764-04	Soil		SM 2540G	
				SOP-466 PFAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP-466 PFAS

Qualifications:

S-29

Extracted Internal Standard is outside of control limits.

Analyte & Samples(s) Qualified:

M2-6:2FTS
23B0764-01[TP-2 (2-4)], 23B0764-02[TP-5 (0-2)], 23B0764-03[TP-6 (0-2)]

M2PFTA
23B0764-03[TP-6 (0-2)]

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-2 (2-4) | Sampled: 2/2/2023 12:30

Sample ID: 23B0764-01

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	0.48	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorobutanesulfonic acid (PFBS)	ND	0.48	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoropentanoic acid (PFPeA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorohexanoic acid (PFHxA)	ND	0.48	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
11Cl-PF3OUdS (F53B Major)	ND	0.48	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
9Cl-PF3ONS (F53B Minor)	ND	0.48	0.26	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.48	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.48	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.48	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorodecanoic acid (PFDA)	ND	0.48	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorododecanoic acid (PFDoA)	ND	0.48	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	0.48	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.48	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
N-EtFOSAA (NEtFOSAA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
N-MeFOSAA (NMeFOSAA)	ND	0.48	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorotetradecanoic acid (PFTA)	ND	0.48	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	0.48	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.48	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	0.48	0.23	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorooctanesulfonamide (FOSA)	ND	0.48	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorononanesulfonic acid (PFNS)	ND	0.48	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.48	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.48	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorohexanesulfonic acid (PFHxS)	ND	0.48	0.22	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.48	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.48	0.24	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoropetanesulfonic acid (PFPeS)	ND	0.48	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoroundecanoic acid (PFUnA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.48	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluoroheptanoic acid (PFHpA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorooctanoic acid (PFOA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorooctanesulfonic acid (PFOS)	ND	0.48	0.29	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB
Perfluorononanoic acid (PFNA)	ND	0.48	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:16	RRB

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-2 (2-4) | Sampled: 2/2/2023 12:30

Sample ID: 23B0764-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	87.5		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0764-02

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	0.47	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorobutanesulfonic acid (PFBS)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoropentanoic acid (PFPeA)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorohexanoic acid (PFHxA)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
11Cl-PF3OUdS (F53B Major)	ND	0.47	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
9Cl-PF3ONS (F53B Minor)	ND	0.47	0.25	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.47	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.47	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.47	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorodecanoic acid (PFDA)	ND	0.47	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorododecanoic acid (PFDoA)	ND	0.47	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	0.47	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.47	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
N-EtFOSAA (NEtFOSAA)	ND	0.47	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
N-MeFOSAA (NMeFOSAA)	ND	0.47	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorotetradecanoic acid (PFTA)	ND	0.47	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	0.47	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.47	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	0.47	0.22	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorooctanesulfonamide (FOSA)	ND	0.47	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorononanesulfonic acid (PFNS)	ND	0.47	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.47	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.47	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorohexanesulfonic acid (PFHxS)	ND	0.47	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.47	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.47	0.23	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoropetanesulfonic acid (PFPeS)	ND	0.47	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoroundecanoic acid (PFUnA)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.47	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluoroheptanoic acid (PFHpA)	ND	0.47	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorooctanoic acid (PFOA)	ND	0.47	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorooctanesulfonic acid (PFOS)	ND	0.47	0.29	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB
Perfluorononanoic acid (PFNA)	ND	0.47	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:23	RRB

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0764-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	88.9		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0764-03

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	0.45	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorobutanesulfonic acid (PFBS)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoropentanoic acid (PFPeA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorohexanoic acid (PFHxA)	ND	0.45	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
11Cl-PF3OUdS (F53B Major)	ND	0.45	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
9Cl-PF3ONS (F53B Minor)	ND	0.45	0.24	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.45	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.45	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.45	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorodecanoic acid (PFDA)	ND	0.45	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorododecanoic acid (PFDoA)	ND	0.45	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	0.45	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.45	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
N-EtFOSAA (NEtFOSAA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
N-MeFOSAA (NMeFOSAA)	ND	0.45	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorotetradecanoic acid (PFTA)	ND	0.45	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	0.45	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.45	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	0.45	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorooctanesulfonamide (FOSA)	ND	0.45	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorononanesulfonic acid (PFNS)	ND	0.45	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.45	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.45	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorohexanesulfonic acid (PFHxS)	ND	0.45	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.45	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.45	0.22	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoropetanesulfonic acid (PFPeS)	ND	0.45	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoroundecanoic acid (PFUnA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.45	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluoroheptanoic acid (PFHpA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorooctanoic acid (PFOA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorooctanesulfonic acid (PFOS)	ND	0.45	0.27	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB
Perfluorononanoic acid (PFNA)	ND	0.45	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:31	RRB

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0764-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.7		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-9 (0-2) | Sampled: 2/2/2023 11:00

Sample ID: 23B0764-04

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	0.43	0.17	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorobutanesulfonic acid (PFBS)	ND	0.43	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoropentanoic acid (PFPeA)	ND	0.43	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorohexanoic acid (PFHxA)	ND	0.43	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
11Cl-PF3OUdS (F53B Major)	ND	0.43	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
9Cl-PF3ONS (F53B Minor)	ND	0.43	0.23	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.43	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.43	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.43	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorodecanoic acid (PFDA)	ND	0.43	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorododecanoic acid (PFDoA)	ND	0.43	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	0.43	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.43	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
N-EtFOSAA (NEtFOSAA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
N-MeFOSAA (NMeFOSAA)	ND	0.43	0.18	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorotetradecanoic acid (PFTA)	ND	0.43	0.13	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorotridecanoic acid (PFTrDA)	ND	0.43	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.43	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorodecanesulfonic acid (PFDS)	ND	0.43	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorooctanesulfonamide (FOSA)	ND	0.43	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorononanesulfonic acid (PFNS)	ND	0.43	0.19	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.43	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorohexanesulfonic acid (PFHxS)	ND	0.43	0.20	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.43	0.21	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoropetanesulfonic acid (PFPeS)	ND	0.43	0.16	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoroundecanoic acid (PFUnA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.43	0.12	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluoroheptanoic acid (PFHpA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorooctanoic acid (PFOA)	ND	0.43	0.14	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorooctanesulfonic acid (PFOS)	ND	0.43	0.26	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB
Perfluorononanoic acid (PFNA)	ND	0.43	0.15	µg/kg dry	1		SOP-466 PFAS	2/17/23	2/24/23 2:38	RRB

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0764

Date Received: 2/6/2023

Field Sample #: TP-9 (0-2) | Sampled: 2/2/2023 11:00

Sample ID: 23B0764-04

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	96.6		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Sample Extraction Data

Prep Method: % Solids **Analytical Method: SM 2540G**

Lab Number [Field ID]	Batch	Date
23B0764-01 [TP-2 (2-4)]	B330944	02/08/23
23B0764-02 [TP-5 (0-2)]	B330944	02/08/23
23B0764-03 [TP-6 (0-2)]	B330944	02/08/23
23B0764-04 [TP-9 (0-2)]	B330944	02/08/23

Prep Method: SOP 465-PFAAS **Analytical Method: SOP-466 PFAS**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0764-01 [TP-2 (2-4)]	B330939	5.92	5.00	02/17/23
23B0764-02 [TP-5 (0-2)]	B330939	5.96	5.00	02/17/23
23B0764-03 [TP-6 (0-2)]	B330939	5.91	5.00	02/17/23
23B0764-04 [TP-9 (0-2)]	B330939	5.96	5.00	02/17/23

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330939 - SOP 465-PFAAS										
Blank (B330939-BLK1)				Prepared: 02/17/23 Analyzed: 02/23/23						
Perfluorobutanoic acid (PFBA)	ND	0.44	µg/kg wet							
Perfluorobutanesulfonic acid (PFBS)	ND	0.44	µg/kg wet							
Perfluoropentanoic acid (PFPeA)	ND	0.44	µg/kg wet							
Perfluorohexanoic acid (PFHxA)	ND	0.44	µg/kg wet							
11Cl-PF3OUdS (F53B Major)	ND	0.44	µg/kg wet							
9Cl-PF3ONS (F53B Minor)	ND	0.44	µg/kg wet							
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.44	µg/kg wet							
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	0.44	µg/kg wet							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.44	µg/kg wet							
Perfluorodecanoic acid (PFDA)	ND	0.44	µg/kg wet							
Perfluorododecanoic acid (PFDoA)	ND	0.44	µg/kg wet							
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	ND	0.44	µg/kg wet							
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.44	µg/kg wet							
N-EtFOSAA (NEtFOSAA)	ND	0.44	µg/kg wet							
N-MeFOSAA (NMeFOSAA)	ND	0.44	µg/kg wet							
Perfluorotetradecanoic acid (PFTA)	ND	0.44	µg/kg wet							
Perfluorotridecanoic acid (PFTrDA)	ND	0.44	µg/kg wet							
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.44	µg/kg wet							
Perfluorodecanesulfonic acid (PFDS)	ND	0.44	µg/kg wet							
Perfluorooctanesulfonamide (FOSA)	ND	0.44	µg/kg wet							
Perfluorononanesulfonic acid (PFNS)	ND	0.44	µg/kg wet							
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.44	µg/kg wet							
Perfluoro-1-butanesulfonamide (FBSA)	ND	0.44	µg/kg wet							
Perfluorohexanesulfonic acid (PFHxS)	ND	0.44	µg/kg wet							
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.44	µg/kg wet							
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.44	µg/kg wet							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.44	µg/kg wet							
Perfluoropetanesulfonic acid (PFPeS)	ND	0.44	µg/kg wet							
Perfluoroundecanoic acid (PFUnA)	ND	0.44	µg/kg wet							
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.44	µg/kg wet							
Perfluoroheptanoic acid (PFHpA)	ND	0.44	µg/kg wet							
Perfluorooctanoic acid (PFOA)	ND	0.44	µg/kg wet							
Perfluorooctanesulfonic acid (PFOS)	ND	0.44	µg/kg wet							
Perfluorononanoic acid (PFNA)	ND	0.44	µg/kg wet							
LCS (B330939-BS1)				Prepared: 02/17/23 Analyzed: 02/23/23						
Perfluorobutanoic acid (PFBA)	2.07	0.44	µg/kg wet	2.22		93.1	71-135			
Perfluorobutanesulfonic acid (PFBS)	1.76	0.44	µg/kg wet	1.97		89.5	72-128			
Perfluoropentanoic acid (PFPeA)	2.03	0.44	µg/kg wet	2.22		91.3	69-132			
Perfluorohexanoic acid (PFHxA)	2.08	0.44	µg/kg wet	2.22		93.4	70-132			
11Cl-PF3OUdS (F53B Major)	2.01	0.44	µg/kg wet	2.10		95.7	41.8-128			
9Cl-PF3ONS (F53B Minor)	1.83	0.44	µg/kg wet	2.07		88.4	51.1-141			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	1.89	0.44	µg/kg wet	2.10		90.0	55.2-122			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	1.84	0.44	µg/kg wet	2.22		82.8	27.6-137			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.99	0.44	µg/kg wet	2.14		93.4	65-137			
Perfluorodecanoic acid (PFDA)	1.90	0.44	µg/kg wet	2.22		85.5	69-133			
Perfluorododecanoic acid (PFDoA)	1.91	0.44	µg/kg wet	2.22		85.8	69-135			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	2.03	0.44	µg/kg wet	1.98		103	56.7-133			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330939 - SOP 465-PFAAS										
LCS (B330939-BS1)				Prepared: 02/17/23 Analyzed: 02/23/23						
Perfluoroheptanesulfonic acid (PFHpS)	1.95	0.44	µg/kg wet	2.13		91.5	70-132			
N-EtFOSAA (NEtFOSAA)	1.73	0.44	µg/kg wet	2.22		77.6	61-139			
N-MeFOSAA (NMeFOSAA)	2.43	0.44	µg/kg wet	2.22		109	63-144			
Perfluorotetradecanoic acid (PFTA)	1.94	0.44	µg/kg wet	2.22		87.0	69-133			
Perfluorotridecanoic acid (PFTrDA)	1.99	0.44	µg/kg wet	2.22		89.2	66-139			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	1.79	0.44	µg/kg wet	2.08		86.0	62-145			
Perfluorodecanesulfonic acid (PFDS)	1.80	0.44	µg/kg wet	2.14		83.8	59-134			
Perfluorooctanesulfonamide (FOSA)	1.95	0.44	µg/kg wet	2.22		87.6	67-137			
Perfluorononanesulfonic acid (PFNS)	1.85	0.44	µg/kg wet	2.14		86.4	69-125			
Perfluoro-1-hexanesulfonamide (FHxSA)	1.97	0.44	µg/kg wet	2.22		88.5	51.4-142			
Perfluoro-1-butanesulfonamide (FBSA)	2.05	0.44	µg/kg wet	2.22		92.2	53.5-129			
Perfluorohexanesulfonic acid (PFHxS)	1.77	0.44	µg/kg wet	2.04		87.0	67-130			
Perfluoro-4-oxapentanoic acid (PFMPA)	2.06	0.44	µg/kg wet	2.22		92.4	57.8-127			
Perfluoro-5-oxahexanoic acid (PFMBA)	2.22	0.44	µg/kg wet	2.22		99.6	56.5-132			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.11	0.44	µg/kg wet	2.11		99.8	64-140			
Perfluoropetanesulfonic acid (PFPeS)	1.80	0.44	µg/kg wet	2.09		86.3	73-123			
Perfluoroundecanoic acid (PFUnA)	1.97	0.44	µg/kg wet	2.22		88.4	64-136			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	2.36	0.44	µg/kg wet	2.22		106	54.5-128			
Perfluoroheptanoic acid (PFHpA)	2.12	0.44	µg/kg wet	2.22		95.5	71-131			
Perfluorooctanoic acid (PFOA)	1.91	0.44	µg/kg wet	2.22		85.9	69-133			
Perfluorooctanesulfonic acid (PFOS)	1.94	0.44	µg/kg wet	2.06		94.3	68-136			
Perfluorononanoic acid (PFNA)	2.06	0.44	µg/kg wet	2.22		92.6	72-129			
Matrix Spike (B330939-MS1)		**Source: 23B0764-01**		Prepared: 02/17/23 Analyzed: 02/23/23						
Perfluorobutanoic acid (PFBA)	2.84	0.50	µg/kg dry	2.53	ND	112	71-135			
Perfluorobutanesulfonic acid (PFBS)	2.33	0.50	µg/kg dry	2.24	ND	104	72-128			
Perfluoropentanoic acid (PFPeA)	2.67	0.50	µg/kg dry	2.53	ND	106	69-132			
Perfluorohexanoic acid (PFHxA)	2.79	0.50	µg/kg dry	2.53	ND	110	70-132			
11Cl-PF3OUdS (F53B Major)	2.92	0.50	µg/kg dry	2.39	ND	122	4.02-158			
9Cl-PF3ONS (F53B Minor)	2.60	0.50	µg/kg dry	2.36	ND	110	52.5-150			
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	2.60	0.50	µg/kg dry	2.39	ND	109	50.7-124			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	2.75	0.50	µg/kg dry	2.53	ND	109	29.2-146			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.67	0.50	µg/kg dry	2.43	ND	110	65-137			
Perfluorodecanoic acid (PFDA)	2.52	0.50	µg/kg dry	2.53	ND	99.5	69-133			
Perfluorododecanoic acid (PFDoA)	2.51	0.50	µg/kg dry	2.53	ND	99.0	69-135			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	2.64	0.50	µg/kg dry	2.26	ND	117	60.7-135			
Perfluoroheptanesulfonic acid (PFHpS)	2.57	0.50	µg/kg dry	2.42	ND	106	70-132			
N-EtFOSAA (NEtFOSAA)	2.48	0.50	µg/kg dry	2.53	ND	97.9	61-139			
N-MeFOSAA (NMeFOSAA)	3.33	0.50	µg/kg dry	2.53	ND	131	63-144			
Perfluorotetradecanoic acid (PFTA)	2.70	0.50	µg/kg dry	2.53	ND	106	69-133			
Perfluorotridecanoic acid (PFTrDA)	2.71	0.50	µg/kg dry	2.53	ND	107	66-139			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	2.30	0.50	µg/kg dry	2.37	ND	97.1	62-145			
Perfluorodecanesulfonic acid (PFDS)	2.39	0.50	µg/kg dry	2.44	ND	97.7	59-134			
Perfluorooctanesulfonamide (FOSA)	2.40	0.50	µg/kg dry	2.53	ND	94.7	67-137			
Perfluorononanesulfonic acid (PFNS)	2.48	0.50	µg/kg dry	2.43	ND	102	69-125			
Perfluoro-1-hexanesulfonamide (FHxSA)	2.68	0.50	µg/kg dry	2.53	ND	106	18.9-162			
Perfluoro-1-butanesulfonamide (FBSA)	2.66	0.50	µg/kg dry	2.53	ND	105	49.8-135			
Perfluorohexanesulfonic acid (PFHxS)	2.52	0.50	µg/kg dry	2.32	ND	109	67-130			
Perfluoro-4-oxapentanoic acid (PFMPA)	2.73	0.50	µg/kg dry	2.53	ND	108	62-155			
Perfluoro-5-oxahexanoic acid (PFMBA)	2.96	0.50	µg/kg dry	2.53	ND	117	52.1-148			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330939 - SOP 465-PFAAS										
Matrix Spike (B330939-MS1)	**Source: 23B0764-01**			Prepared: 02/17/23 Analyzed: 02/23/23						
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.31	0.50	µg/kg dry	2.41	ND	96.1	64-140			
Perfluoropetanesulfonic acid (PFPeS)	2.39	0.50	µg/kg dry	2.38	ND	100	73-123			
Perfluoroundecanoic acid (PFUnA)	2.59	0.50	µg/kg dry	2.53	ND	102	64-136			
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	3.13	0.50	µg/kg dry	2.53	ND	123	54.6-133			
Perfluoroheptanoic acid (PFHpA)	2.79	0.50	µg/kg dry	2.53	ND	110	71-131			
Perfluorooctanoic acid (PFOA)	2.56	0.50	µg/kg dry	2.53	ND	101	69-133			
Perfluorooctanesulfonic acid (PFOS)	2.36	0.50	µg/kg dry	2.34	ND	101	68-136			
Perfluorononanoic acid (PFNA)	2.62	0.50	µg/kg dry	2.53	ND	103	72-129			
Matrix Spike Dup (B330939-MSD1)	**Source: 23B0764-01**			Prepared: 02/17/23 Analyzed: 02/24/23						
Perfluorobutanoic acid (PFBA)	2.90	0.50	µg/kg dry	2.53	ND	115	71-135	2.29	30	
Perfluorobutanesulfonic acid (PFBS)	2.41	0.50	µg/kg dry	2.24	ND	108	72-128	3.34	30	
Perfluoropentanoic acid (PFPeA)	2.80	0.50	µg/kg dry	2.53	ND	111	69-132	4.59	30	
Perfluorohexanoic acid (PFHxA)	2.89	0.50	µg/kg dry	2.53	ND	114	70-132	3.45	30	
11Cl-PF3OUdS (F53B Major)	2.75	0.50	µg/kg dry	2.39	ND	115	4.02-158	5.90	30	
9Cl-PF3ONS (F53B Minor)	2.34	0.50	µg/kg dry	2.36	ND	99.0	52.5-150	10.7	30	
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	2.61	0.50	µg/kg dry	2.39	ND	109	50.7-124	0.464	30	
Hexafluoropropylene oxide dimer acid (HFPO-DA)	2.79	0.50	µg/kg dry	2.53	ND	110	29.2-146	1.57	30	
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.90	0.50	µg/kg dry	2.43	ND	119	65-137	8.14	30	
Perfluorodecanoic acid (PFDA)	2.55	0.50	µg/kg dry	2.53	ND	101	69-133	1.14	30	
Perfluorododecanoic acid (PFDoA)	2.41	0.50	µg/kg dry	2.53	ND	95.3	69-135	3.86	30	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	2.70	0.50	µg/kg dry	2.25	ND	120	60.7-135	2.28	30	
Perfluoroheptanesulfonic acid (PFHpS)	2.77	0.50	µg/kg dry	2.42	ND	114	70-132	7.56	30	
N-EtFOSAA (NEtFOSAA)	3.15	0.50	µg/kg dry	2.53	ND	124	61-139	23.8	30	
N-MeFOSAA (NMeFOSAA)	3.00	0.50	µg/kg dry	2.53	ND	119	63-144	10.3	30	
Perfluorotetradecanoic acid (PFTA)	2.59	0.50	µg/kg dry	2.53	ND	102	69-133	4.22	30	
Perfluorotridecanoic acid (PFTrDA)	2.51	0.50	µg/kg dry	2.53	ND	99.1	66-139	7.57	30	
4:2 Fluorotelomersulfonic acid (4:2FTS A)	2.43	0.50	µg/kg dry	2.37	ND	102	62-145	5.37	30	
Perfluorodecanesulfonic acid (PFDS)	2.55	0.50	µg/kg dry	2.44	ND	105	59-134	6.70	30	
Perfluorooctanesulfonamide (FOSA)	2.30	0.50	µg/kg dry	2.53	ND	90.6	67-137	4.47	30	
Perfluorononanesulfonic acid (PFNS)	2.54	0.50	µg/kg dry	2.43	ND	105	69-125	2.32	30	
Perfluoro-1-hexanesulfonamide (FHxSA)	2.66	0.50	µg/kg dry	2.53	ND	105	18.9-162	0.767	30	
Perfluoro-1-butanesulfonamide (FBSA)	2.71	0.50	µg/kg dry	2.53	ND	107	49.8-135	1.74	30	
Perfluorohexanesulfonic acid (PFHxS)	2.33	0.50	µg/kg dry	2.32	ND	100	67-130	7.92	30	
Perfluoro-4-oxapentanoic acid (PFMPA)	2.79	0.50	µg/kg dry	2.53	ND	110	62-155	2.15	30	
Perfluoro-5-oxahexanoic acid (PFMBA)	3.02	0.50	µg/kg dry	2.53	ND	119	52.1-148	2.14	30	
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.01	0.50	µg/kg dry	2.41	ND	83.4	64-140	14.1	30	
Perfluoropetanesulfonic acid (PFPeS)	2.45	0.50	µg/kg dry	2.38	ND	103	73-123	2.59	30	
Perfluoroundecanoic acid (PFUnA)	2.93	0.50	µg/kg dry	2.53	ND	116	64-136	12.2	30	
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	3.17	0.50	µg/kg dry	2.53	ND	125	54.6-133	1.29	30	
Perfluoroheptanoic acid (PFHpA)	2.78	0.50	µg/kg dry	2.53	ND	110	71-131	0.579	30	
Perfluorooctanoic acid (PFOA)	2.67	0.50	µg/kg dry	2.53	ND	106	69-133	4.52	30	
Perfluorooctanesulfonic acid (PFOS)	2.39	0.50	µg/kg dry	2.34	ND	102	68-136	1.13	30	
Perfluorononanoic acid (PFNA)	2.77	0.50	µg/kg dry	2.53	ND	109	72-129	5.51	30	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
S-29	Extracted Internal Standard is outside of control limits.

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
TP-2 (2-4) (23B0764-01)			Lab File ID: 23B0764-01.d			Analyzed: 02/24/23 02:16			
M8FOSA	300947	4.0845	394,923.00	4.0845	76	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	120914.2	2.62	165,484.00	2.62	73	50 - 150	0.0000	+/-0.50	
M2PFTA	601618.6	4.362167	1,024,322.00	4.362167	59	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	153685.7	3.850933	215,848.00	3.850933	71	50 - 150	0.0000	+/-0.50	
MPFBA	456304.5	1.12495	534,345.00	1.12495	85	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	97466.73	2.945967	107,660.00	2.945967	91	50 - 150	0.0000	+/-0.50	
M6PFDA	674844.6	3.851417	766,328.00	3.851417	88	50 - 150	0.0000	+/-0.50	
M3PFBS	126235.3	2.011067	149,852.00	2.011067	84	50 - 150	0.0000	+/-0.50	
M7PFUnA	749346.8	3.994	839,980.00	3.994	89	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	54052.39	3.501317	121,538.00	3.501317	44	50 - 150	0.0000	+/-0.50	*
M5PFPeA	389824.4	1.816233	446,990.00	1.816233	87	50 - 150	0.0000	+/-0.50	
M5PFHxA	630695.6	2.7145	782,300.00	2.706317	81	50 - 150	0.0082	+/-0.50	
M3PFHxS	85135.62	3.28425	128,330.00	3.28425	66	50 - 150	0.0000	+/-0.50	
M4PFHpA	600563	3.251867	884,017.00	3.251867	68	50 - 150	0.0000	+/-0.50	
M8PFOA	561433	3.51815	743,619.00	3.51815	76	50 - 150	0.0000	+/-0.50	
M8PFOS	110406.2	3.700067	128,346.00	3.700067	86	50 - 150	0.0000	+/-0.50	
M9PFNA	489055.2	3.7011	663,153.00	3.7011	74	50 - 150	0.0000	+/-0.50	
MPFDoA	597691.3	4.1288	865,995.00	4.1288	69	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	154245.8	4.001467	210,785.00	4.001467	73	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	179448.9	3.921883	266,645.00	3.9219	67	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
TP-5 (0-2) (23B0764-02)			Lab File ID: 23B0764-02.d			Analyzed: 02/24/23 02:23			
M8FOSA	302262.9	4.0845	394,923.00	4.0845	77	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	97141.35	2.62	165,484.00	2.62	59	50 - 150	0.0000	+/-0.50	
M2PFTA	634947.5	4.362167	1,024,322.00	4.362167	62	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	150172.7	3.850933	215,848.00	3.850933	70	50 - 150	0.0000	+/-0.50	
MPFBA	417459	1.12495	534,345.00	1.12495	78	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	86172.77	2.945967	107,660.00	2.945967	80	50 - 150	0.0000	+/-0.50	
M6PFDA	580702.9	3.851417	766,328.00	3.851417	76	50 - 150	0.0000	+/-0.50	
M3PFBS	120749.9	2.002783	149,852.00	2.011067	81	50 - 150	-0.0083	+/-0.50	
M7PFUnA	689776.8	3.994	839,980.00	3.994	82	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	47517.57	3.501317	121,538.00	3.501317	39	50 - 150	0.0000	+/-0.50	*
M5PFPeA	357549.3	1.816233	446,990.00	1.816233	80	50 - 150	0.0000	+/-0.50	
M5PFHxA	586050.2	2.706317	782,300.00	2.706317	75	50 - 150	0.0000	+/-0.50	
M3PFHxS	82654.92	3.28425	128,330.00	3.28425	64	50 - 150	0.0000	+/-0.50	
M4PFHpA	589917.9	3.251867	884,017.00	3.251867	67	50 - 150	0.0000	+/-0.50	
M8PFOA	517576.7	3.51815	743,619.00	3.51815	70	50 - 150	0.0000	+/-0.50	
M8PFOS	108693.4	3.700067	128,346.00	3.700067	85	50 - 150	0.0000	+/-0.50	
M9PFNA	474739.5	3.7011	663,153.00	3.7011	72	50 - 150	0.0000	+/-0.50	
MPFDoA	602464.6	4.1288	865,995.00	4.1288	70	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	159472.5	4.001467	210,785.00	4.001467	76	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	180544.5	3.921883	266,645.00	3.9219	68	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
TP-6 (0-2) (23B0764-03)			Lab File ID: 23B0764-03.d			Analyzed: 02/24/23 02:31			
M8FOSA	345409.3	4.0845	394,923.00	4.0845	87	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	90752.05	2.62	165,484.00	2.62	55	50 - 150	0.0000	+/-0.50	
M2PFTA	489346.8	4.362167	1,024,322.00	4.362167	48	50 - 150	0.0000	+/-0.50	*
M2-8:2FTS	151829.9	3.850933	215,848.00	3.850933	70	50 - 150	0.0000	+/-0.50	
MPFBA	454310.1	1.12495	534,345.00	1.12495	85	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	88611.55	2.945967	107,660.00	2.945967	82	50 - 150	0.0000	+/-0.50	
M6PFDA	655594.4	3.851417	766,328.00	3.851417	86	50 - 150	0.0000	+/-0.50	
M3PFBS	120466.8	2.002783	149,852.00	2.011067	80	50 - 150	-0.0083	+/-0.50	
M7PFUnA	695907.3	3.994	839,980.00	3.994	83	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	46419.98	3.501317	121,538.00	3.501317	38	50 - 150	0.0000	+/-0.50	*
M5PFPeA	379111.6	1.816233	446,990.00	1.816233	85	50 - 150	0.0000	+/-0.50	
M5PFHxA	589614.6	2.7145	782,300.00	2.706317	75	50 - 150	0.0082	+/-0.50	
M3PFHxS	79888.6	3.28425	128,330.00	3.28425	62	50 - 150	0.0000	+/-0.50	
M4PFHpA	558762.8	3.251867	884,017.00	3.251867	63	50 - 150	0.0000	+/-0.50	
M8PFOA	479048.1	3.51815	743,619.00	3.51815	64	50 - 150	0.0000	+/-0.50	
M8PFOS	99866.8	3.700067	128,346.00	3.700067	78	50 - 150	0.0000	+/-0.50	
M9PFNA	502964.5	3.7011	663,153.00	3.7011	76	50 - 150	0.0000	+/-0.50	
MPFDoA	524075.5	4.1288	865,995.00	4.1288	61	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	137766.5	4.001467	210,785.00	4.001467	65	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	178008.4	3.921883	266,645.00	3.9219	67	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
TP-9 (0-2) (23B0764-04)			Lab File ID: 23B0764-04.d			Analyzed: 02/24/23 02:38			
M8FOSA	310232.7	4.0845	394,923.00	4.0845	79	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	114961.9	2.62	165,484.00	2.62	69	50 - 150	0.0000	+/-0.50	
M2PFTA	515894.7	4.362167	1,024,322.00	4.362167	50	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	153474.9	3.850933	215,848.00	3.850933	71	50 - 150	0.0000	+/-0.50	
MPFBA	452856.7	1.12495	534,345.00	1.12495	85	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	99877.44	2.945967	107,660.00	2.945967	93	50 - 150	0.0000	+/-0.50	
M6PFDA	709595.2	3.851417	766,328.00	3.851417	93	50 - 150	0.0000	+/-0.50	
M3PFBS	124727.7	2.011067	149,852.00	2.011067	83	50 - 150	0.0000	+/-0.50	
M7PFUnA	649209.2	3.994	839,980.00	3.994	77	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	62043.43	3.509617	121,538.00	3.501317	51	50 - 150	0.0083	+/-0.50	
M5PFPeA	384309.6	1.816233	446,990.00	1.816233	86	50 - 150	0.0000	+/-0.50	
M5PFHxA	596509.5	2.7145	782,300.00	2.706317	76	50 - 150	0.0082	+/-0.50	
M3PFHxS	79033.83	3.28425	128,330.00	3.28425	62	50 - 150	0.0000	+/-0.50	
M4PFHpA	569208.8	3.251867	884,017.00	3.251867	64	50 - 150	0.0000	+/-0.50	
M8PFOA	478448.1	3.51815	743,619.00	3.51815	64	50 - 150	0.0000	+/-0.50	
M8PFOS	110955.8	3.700067	128,346.00	3.700067	86	50 - 150	0.0000	+/-0.50	
M9PFNA	481326.1	3.7011	663,153.00	3.7011	73	50 - 150	0.0000	+/-0.50	
MPFDoA	546628.7	4.1288	865,995.00	4.1288	63	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	147042.8	4.001467	210,785.00	4.001467	70	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	178367.7	3.921883	266,645.00	3.9219	67	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Blank (B330939-BLK1)			Lab File ID: B330939-BLK1.d			Analyzed: 02/23/23 23:51			
M8FOSA	421470.3	4.0845	394,923.00	4.0845	107	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	158113.9	2.62	165,484.00	2.628217	96	50 - 150	-0.0082	+/-0.50	
M2PFTA	1105172	4.362167	1,024,322.00	4.362184	108	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	211276	3.850933	215,848.00	3.850933	98	50 - 150	0.0000	+/-0.50	
MPFBA	649940.9	1.12495	534,345.00	1.13325	122	50 - 150	-0.0083	+/-0.50	
M3HFPO-DA	145393.9	2.93785	107,660.00	2.945967	135	50 - 150	-0.0081	+/-0.50	
M6PFDA	836222.3	3.851417	766,328.00	3.851417	109	50 - 150	0.0000	+/-0.50	
M3PFBS	180118.8	2.011067	149,852.00	2.011067	120	50 - 150	0.0000	+/-0.50	
M7PFUnA	900336.4	3.994	839,980.00	3.994	107	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	103663	3.501317	121,538.00	3.509617	85	50 - 150	-0.0083	+/-0.50	
M5PFPeA	531164.2	1.816233	446,990.00	1.824517	119	50 - 150	-0.0083	+/-0.50	
M5PFHxA	910548	2.7145	782,300.00	2.7145	116	50 - 150	0.0000	+/-0.50	
M3PFHxS	149082.2	3.28425	128,330.00	3.2923	116	50 - 150	-0.0080	+/-0.50	
M4PFHpA	1018590	3.251867	884,017.00	3.25995	115	50 - 150	-0.0081	+/-0.50	
M8PFOA	899575.7	3.51815	743,619.00	3.51815	121	50 - 150	0.0000	+/-0.50	
M8PFOS	147551.1	3.700067	128,346.00	3.700067	115	50 - 150	0.0000	+/-0.50	
M9PFNA	783860.5	3.7011	663,153.00	3.7011	118	50 - 150	0.0000	+/-0.50	
MPFDoA	937845.8	4.1288	865,995.00	4.1288	108	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	233632.3	4.001467	210,785.00	4.001467	111	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	278997.9	3.921883	266,645.00	3.9219	105	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
LCS (B330939-BS1)			Lab File ID: B330939-BS1.d			Analyzed: 02/23/23 23:44			
M8FOSA	402115.1	4.0845	394,923.00	4.0845	102	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	163821.7	2.628217	165,484.00	2.628217	99	50 - 150	0.0000	+/-0.50	
M2PFTA	1002348	4.362184	1,024,322.00	4.362184	98	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	201221	3.850933	215,848.00	3.850933	93	50 - 150	0.0000	+/-0.50	
MPFBA	574254.8	1.13325	534,345.00	1.13325	107	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	108951.7	2.945967	107,660.00	2.945967	101	50 - 150	0.0000	+/-0.50	
M6PFDA	807082.8	3.851417	766,328.00	3.851417	105	50 - 150	0.0000	+/-0.50	
M3PFBS	163993.6	2.011067	149,852.00	2.011067	109	50 - 150	0.0000	+/-0.50	
M7PFUnA	890316.9	3.994	839,980.00	3.994	106	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	103961.6	3.509617	121,538.00	3.509617	86	50 - 150	0.0000	+/-0.50	
M5PFPeA	471044.4	1.824517	446,990.00	1.824517	105	50 - 150	0.0000	+/-0.50	
M5PFHxA	804793	2.7145	782,300.00	2.7145	103	50 - 150	0.0000	+/-0.50	
M3PFHxS	142839.7	3.2923	128,330.00	3.2923	111	50 - 150	0.0000	+/-0.50	
M4PFHpA	871458.7	3.25995	884,017.00	3.25995	99	50 - 150	0.0000	+/-0.50	
M8PFOA	791614.9	3.51815	743,619.00	3.51815	106	50 - 150	0.0000	+/-0.50	
M8PFOS	124113.2	3.700067	128,346.00	3.700067	97	50 - 150	0.0000	+/-0.50	
M9PFNA	684472.9	3.7011	663,153.00	3.7011	103	50 - 150	0.0000	+/-0.50	
MPFDoA	838641	4.1288	865,995.00	4.1288	97	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	230636.5	4.001467	210,785.00	4.001467	109	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	235779	3.929883	266,645.00	3.9219	88	50 - 150	0.0080	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Matrix Spike (B330939-MS1)			Lab File ID: B330939-MS1.d			Analyzed: 02/23/23 23:58			
M8FOSA	429962.2	4.0845	394,923.00	4.0845	109	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	172599.3	2.628217	165,484.00	2.628217	104	50 - 150	0.0000	+/-0.50	
M2PFTA	1093578	4.362167	1,024,322.00	4.362184	107	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	207382.7	3.850933	215,848.00	3.850933	96	50 - 150	0.0000	+/-0.50	
MPFBA	636566.7	1.13325	534,345.00	1.13325	119	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	120884.8	2.945967	107,660.00	2.945967	112	50 - 150	0.0000	+/-0.50	
M6PFDA	833916.4	3.851417	766,328.00	3.851417	109	50 - 150	0.0000	+/-0.50	
M3PFBS	179950.6	2.011067	149,852.00	2.011067	120	50 - 150	0.0000	+/-0.50	
M7PFUnA	997589.6	3.994	839,980.00	3.994	119	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	109388.3	3.509617	121,538.00	3.509617	90	50 - 150	0.0000	+/-0.50	
M5PFPeA	523214	1.824517	446,990.00	1.824517	117	50 - 150	0.0000	+/-0.50	
M5PFHxA	894389.8	2.7145	782,300.00	2.7145	114	50 - 150	0.0000	+/-0.50	
M3PFHxS	152440.4	3.2923	128,330.00	3.2923	119	50 - 150	0.0000	+/-0.50	
M4PFHpA	976819.9	3.25995	884,017.00	3.25995	110	50 - 150	0.0000	+/-0.50	
M8PFOA	855600.1	3.51815	743,619.00	3.51815	115	50 - 150	0.0000	+/-0.50	
M8PFOS	141020.1	3.700067	128,346.00	3.700067	110	50 - 150	0.0000	+/-0.50	
M9PFNA	762739.5	3.7011	663,153.00	3.7011	115	50 - 150	0.0000	+/-0.50	
MPFDoA	919400.8	4.1288	865,995.00	4.1288	106	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	223729.1	4.001467	210,785.00	4.001467	106	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	245159.6	3.9219	266,645.00	3.9219	92	50 - 150	0.0000	+/-0.50	

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INTERNAL STANDARD AREA AND RT SUMMARY

SOP-466 PFAS

Internal Standard	Response	RT	Reference Response	Reference RT	Area %	Area % Limits	RT Diff	RT Diff Limit	Q
Matrix Spike Dup (B330939-MSD1)			Lab File ID: B330939-MSD1.d			Analyzed: 02/24/23 00:06			
M8FOSA	518139	4.0845	394,923.00	4.0845	131	50 - 150	0.0000	+/-0.50	
M2-4:2FTS	216811.2	2.628217	165,484.00	2.628217	131	50 - 150	0.0000	+/-0.50	
M2PFTA	1468173	4.362184	1,024,322.00	4.362184	143	50 - 150	0.0000	+/-0.50	
M2-8:2FTS	253457.4	3.850933	215,848.00	3.850933	117	50 - 150	0.0000	+/-0.50	
MPFBA	754265.1	1.13325	534,345.00	1.13325	141	50 - 150	0.0000	+/-0.50	
M3HFPO-DA	159801.9	2.945967	107,660.00	2.945967	148	50 - 150	0.0000	+/-0.50	
M6PFDA	1024114	3.851417	766,328.00	3.851417	134	50 - 150	0.0000	+/-0.50	
M3PFBS	214852.5	2.011067	149,852.00	2.011067	143	50 - 150	0.0000	+/-0.50	
M7PFUnA	1148830	3.994	839,980.00	3.994	137	50 - 150	0.0000	+/-0.50	
M2-6:2FTS	154677.6	3.509617	121,538.00	3.509617	127	50 - 150	0.0000	+/-0.50	
M5PFPeA	624789.1	1.824517	446,990.00	1.824517	140	50 - 150	0.0000	+/-0.50	
M5PFHxA	1076215	2.7145	782,300.00	2.7145	138	50 - 150	0.0000	+/-0.50	
M3PFHxS	187419.9	3.2923	128,330.00	3.2923	146	50 - 150	0.0000	+/-0.50	
M4PFHpA	1177118	3.25995	884,017.00	3.25995	133	50 - 150	0.0000	+/-0.50	
M8PFOA	1113367	3.51815	743,619.00	3.51815	150	50 - 150	0.0000	+/-0.50	
M8PFOS	164529.2	3.700067	128,346.00	3.700067	128	50 - 150	0.0000	+/-0.50	
M9PFNA	905596.2	3.7011	663,153.00	3.7011	137	50 - 150	0.0000	+/-0.50	
MPFDoA	1149803	4.1288	865,995.00	4.1288	133	50 - 150	0.0000	+/-0.50	
D5-NEtFOSAA	248896.2	4.001467	210,785.00	4.001467	118	50 - 150	0.0000	+/-0.50	
D3-NMeFOSAA	330357.6	3.929883	266,645.00	3.9219	124	50 - 150	0.0080	+/-0.50	

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-454 PFAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
SOP-466 PFAS in Soil	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
11Cl-PF3OUdS (F53B Major)	NH-P
9Cl-PF3ONS (F53B Minor)	NH-P
4,8-Dioxa-3H-perfluorononanoic acid (ADONA)	NH-P
Hexafluoropropylene oxide dimer acid (HFPO-DA)	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP-466 PFAS in Soil	
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	NH-P
Perfluoroheptanesulfonic acid (PFHpS)	NH-P
N-EtFOSAA (NEtFOSAA)	NH-P
N-MeFOSAA (NMeFOSAA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
4:2 Fluorotelomersulfonic acid (4:2FTS A)	NH-P
Perfluorodecanesulfonic acid (PFDS)	NH-P
Perfluorooctanesulfonamide (FOSA)	NH-P
Perfluorononanesulfonic acid (PFNS)	NH-P
Perfluoro-1-hexanesulfonamide (FHxSA)	NH-P
Perfluoro-1-butanesulfonamide (FBSA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoro-4-oxapentanoic acid (PFMPA)	NH-P
Perfluoro-5-oxahexanoic acid (PFMBA)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluoropetanesulfonic acid (PFPeS)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

23B0764

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Access COC's and Support Requests

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CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Page 1 of 1

Company Name:	Horsley Witten Group
Address:	90 Route 6A, Sandwich, MA 02563
Phone:	781-293-1527
Project Name:	Sand Pit Road, Truro
Project Location:	Sand Pit Road, Truro, MA
Project Number:	22129
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	Caroline Armstrong

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☐ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsleywitten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	PFAS
1	TP-2(2-4)	2/2/23	1230	grab	S				1			X
2	TP-5(0-2)	2/2/23	1015	grab	S				1			X
3	TP-6(0-2)	2/2/23	830	grab	S				1			X
4	TP-9(0-2)	2/2/23	1100	grab	S				1			X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? (Y) N
*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Caroline Armstrong	Date/Time: 2/6/23 1520
Received by: (signature)		Date/Time: 2/6/23 1520
Relinquished by: (signature)		Date/Time: 2/6/23 1715
Received by: (signature)		Date/Time: 2/6/23 1715
Relinquished by: (signature)		Date/Time:
Received by: (signature)		Date/Time:
Relinquished by: (signature)		Date/Time:
Received by: (signature)		Date/Time:

Client Comments:
MCP Methods
RCS-1

Detection Limit Requirements
MA: RCS-1
GW:
Other:

Special Requirements
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ *AIHA-LAP,LLC*

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

MAF

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Log In Back-Sheet

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

Pace
PEOPLE ADVANCING SCIENCE

Client Horsley Witten Group
Project Sand Pit Rd, Truro
MCP/RCP Required MA MCP
Deliverable Package Requirement RCS-1
Location Sand Pit Rd, Truro, MA
PWSID# (When Applicable) MA
Arrival Method Courier
Received By / Date / Time GL 2/6/23 1715
Back-Sheet By / Date / Time GL 2/7/23 1558
Temperature Method gun # 5
Temp < 6° C ☑ Actual Temperature 3.0
Rush Samples: Yes / No _____ Notify _____
Short Hold: Yes / No _____ Notify _____

	True	False
Received on Ice	☑	☐
Received in Cooler	☑	☐
Custody Seal: DATE TIME	☐	☑
COC Relinquished	☑	☐
COC/Samples Labels Agree	☑	☐
All Samples in Good Condition	☑	☐
Samples Received within Holding Time	☑	☐
Is there enough Volume	☑	☐
Proper Media/Container Used	☑	☐
Splitting Samples Required	☐	☑
MS/MSD	☐	☑
Trip Blanks	☐	☑
Lab to Filters	☐	☑
COC Legible	☑	☐

Notes regarding Samples/COC outside of SOP:

COC Included: (Check all included)

Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper PH N/A ☐ ☐

Container (Circle when applicable)	UnP	HCl	HNO3	H2SO4	NaOH	Trizma	NaS2O3	Other Preservative
1L Amber Plastic								
500 mL Amber Plastic								
250 mL Amber Plastic								
Other Amber Clear (Plastic)	4							
16oz Amber Clear								
8oz Amber Clear								
4oz Amber Clear								
2oz Amber Clear								
Col/Bacteria								
Flashpoint								
Plastic Bag								
SOC Kit								
Perchlorate								
Encore								
Frozen								

	Proper Headspace	UnP	HCl	MeOH	Bisulfate	DI	Thiosulfate	Sulfuric	Other
Vials									

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February 28, 2023

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Sand Pit Rd, Truro, MA
Client Job Number:
Project Number: 22129
Laboratory Work Order Number: 23B0766

Enclosed are results of analyses for samples as received by the laboratory on February 6, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Kaitlyn A. Feliciano
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 2/28/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22129

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23B0766

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Sand Pit Rd, Truro, MA

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-2 (2-4)	23B0766-01	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
TP-3 (0-2)	23B0766-02	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
TP-5 (0-2)	23B0766-03	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8260D	
				SW-846 8270E	
TP-6 (0-2)	23B0766-05	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8082A	
				SW-846 8270E	
TP-8 (2-4)	23B0766-06	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
				SW-846 8260D	
TP-9 (0-2)	23B0766-07	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
TP-10 (6-8)	23B0766-08	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	
TP-11 (0-2)	23B0766-09	Soil		MADEP EPH rev 2.1	
				SM 2540G	
				SW-846 6010D	
				SW-846 7471B	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

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SW-846 6010D

Qualifications:

MS-09

Matrix spike recovery and/or matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a low bias for reported result or non-homogeneous sample aliquots cannot be eliminated.

Analyte & Samples(s) Qualified:

Antimony
23B0766-01[TP-2 (2-4)], B330929-MS1, B330929-MSD1

SW-846 7471B

Qualifications:

R-05

Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.

Analyte & Samples(s) Qualified:

Mercury
B331047-BSD1

SW-846 8082A

Qualifications:

O-32

A dilution was performed as part of the standard analytical procedure.

Analyte & Samples(s) Qualified:

23B0766-03[TP-5 (0-2)], 23B0766-05[TP-6 (0-2)]

SW-846 8260D

Qualifications:

L-02

Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.

Analyte & Samples(s) Qualified:

Chloroethane
B330910-BS1, B330910-BSD1

V-16

Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.

Analyte & Samples(s) Qualified:

1,4-Dioxane
S083011-CCV1

V-20

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

Bromomethane
B330910-BS1, B330910-BSD1, S083011-CCV1

Chloroethane
B330910-BS1, B330910-BSD1, S083011-CCV1

Dichlorodifluoromethane (Freon 12)
B330910-BS1, B330910-BSD1, S083011-CCV1

V-36

Initial calibration verification (ICV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

Analyte & Samples(s) Qualified:

Carbon Disulfide
B330910-BS1, B330910-BSD1, S083011-CCV1

Dichlorodifluoromethane (Freon 12)
B330910-BS1, B330910-BSD1, S083011-CCV1

SW-846 8270E

Qualifications:

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V-05

Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.

Analyte & Samples(s) Qualified:

Aniline
23B0766-03[TP-5 (0-2)], 23B0766-05[TP-6 (0-2)], B330933-BLK1, B330933-BS1, B330933-BSD1, S083172-CCV1

Di-n-octylphthalate
23B0766-03[TP-5 (0-2)], 23B0766-05[TP-6 (0-2)], B330933-BLK1, B330933-BS1, B330933-BSD1, S083172-CCV1

Pentachlorophenol
23B0766-03[TP-5 (0-2)], 23B0766-05[TP-6 (0-2)], B330933-BLK1, B330933-BS1, B330933-BSD1, S083172-CCV1

The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Lisa A. Worthington
Technical Representative

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-2 (2-4) | Sampled: 2/2/2023 12:30

Sample ID: 23B0766-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 15:44	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	48.2	40-140		2/9/23 15:44
o-Terphenyl (OTP)	63.5	40-140		2/9/23 15:44
2-Bromonaphthalene	107	40-140		2/9/23 15:44
2-Fluorobiphenyl	106	40-140		2/9/23 15:44

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-2 (2-4) | Sampled: 2/2/2023 12:30

Sample ID: 23B0766-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1	MS-09	SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Arsenic	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Barium	8.2	1.8	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Beryllium	0.19	0.18	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Cadmium	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Chromium	6.5	0.72	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Lead	4.5	0.54	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:33	AAJ
Nickel	3.5	0.72	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 21:56	ATP
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Vanadium	6.9	0.72	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN
Zinc	47	0.72	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:40	HNN

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-2 (2-4) | Sampled: 2/2/2023 12:30

Sample ID: 23B0766-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	89.4		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-3 (0-2) | Sampled: 2/2/2023 12:50

Sample ID: 23B0766-02

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Unadjusted C11-C22 Aromatics	16	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
C11-C22 Aromatics	13	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Acenaphthylene	0.18	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Benzo(a)anthracene	0.21	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Benzo(a)pyrene	0.23	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Benzo(b)fluoranthene	0.39	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Benzo(g,h,i)perylene	0.18	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Benzo(k)fluoranthene	0.14	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Chrysene	0.29	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Fluoranthene	0.46	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Indeno(1,2,3-cd)pyrene	0.20	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Phenanthrene	0.22	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB
Pyrene	0.46	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:03	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	60.4	40-140		2/9/23 16:03
o-Terphenyl (OTP)	75.1	40-140		2/9/23 16:03
2-Bromonaphthalene	102	40-140		2/9/23 16:03
2-Fluorobiphenyl	102	40-140		2/9/23 16:03

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-3 (0-2) | Sampled: 2/2/2023 12:50

Sample ID: 23B0766-02

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Arsenic	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Barium	2.2	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Beryllium	ND	0.17	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Cadmium	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Chromium	1.4	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Lead	5.0	0.51	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Mercury	0.041	0.027	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:35	AAJ
Nickel	0.74	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Selenium	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Silver	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:04	ATP
Thallium	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Vanadium	2.0	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN
Zinc	3.8	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 11:58	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-3 (0-2) | Sampled: 2/2/2023 12:50

Sample ID: 23B0766-02

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	93.4		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.11	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Benzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Bromobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Bromochloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Bromodichloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Bromoform	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Bromomethane	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
2-Butanone (MEK)	ND	0.044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
n-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
sec-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
tert-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Carbon Disulfide	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Carbon Tetrachloride	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Chlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Chlorodibromomethane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Chloroethane	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Chloroform	ND	0.0044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Chloromethane	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
2-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
4-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2-Dibromoethane (EDB)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Dibromomethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,3-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,4-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1-Dichloroethylene	ND	0.0044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
cis-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
trans-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,3-Dichloropropane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
2,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1-Dichloropropene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
cis-1,3-Dichloropropene	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
trans-1,3-Dichloropropene	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Diethyl Ether	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Diisopropyl Ether (DIPE)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,4-Dioxane	ND	0.11	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Ethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
2-Hexanone (MBK)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Isopropylbenzene (Cumene)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Methylene Chloride	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Naphthalene	ND	0.0044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
n-Propylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Styrene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1,1,2-Tetrachloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1,2,2-Tetrachloroethane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Tetrachloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Tetrahydrofuran	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Toluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2,3-Trichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2,4-Trichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1,1-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,1,2-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Trichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Trichlorofluoromethane (Freon 11)	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2,3-Trichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,2,4-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
1,3,5-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
Vinyl Chloride	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
m+p Xylene	ND	0.0044	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF
o-Xylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 6:37	MFF

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	103	70-130		2/8/23 6:37
Toluene-d8	99.9	70-130		2/8/23 6:37
4-Bromofluorobenzene	100	70-130		2/8/23 6:37

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Biphenyl	ND	0.073	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Acenaphthene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Acenaphthylene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Acetophenone	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Aniline	ND	0.37	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Benzo(a)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Benzo(a)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Benzo(b)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Benzo(g,h,i)perylene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Benzo(k)fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Bis(2-chloroethoxy)methane	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Bis(2-chloroethyl)ether	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Bis(2-chloroisopropyl)ether	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Bis(2-Ethylhexyl)phthalate	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
4-Bromophenylphenylether	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Butylbenzylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
4-Chloroaniline	ND	0.72	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2-Chloronaphthalene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2-Chlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Chrysene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Dibenz(a,h)anthracene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Dibenzofuran	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Di-n-butylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
1,2-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
1,3-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
1,4-Dichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
3,3-Dichlorobenzidine	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4-Dichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Diethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4-Dimethylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Dimethylphthalate	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4-Dinitrophenol	ND	0.72	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,6-Dinitrotoluene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Di-n-octylphthalate	ND	0.37	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:18	AR2
1,2-Diphenylhydrazine/Azobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Fluoranthene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Fluorene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Hexachlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Hexachlorobutadiene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Hexachloroethane	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Indeno(1,2,3-cd)pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Isophorone	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylnaphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
3/4-Methylphenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Naphthalene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Nitrobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2-Nitrophenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
4-Nitrophenol	ND	0.72	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Pentachlorophenol	ND	0.37	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Phenanthrene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Phenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Pyrene	ND	0.19	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
Pyridine	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
1,2,4-Trichlorobenzene	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4,5-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2
2,4,6-Trichlorophenol	ND	0.37	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:18	AR2

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	79.7	30-130		2/10/23 15:18
Phenol-d6	83.4	30-130		2/10/23 15:18
Nitrobenzene-d5	75.2	30-130		2/10/23 15:18
2-Fluorobiphenyl	78.2	30-130		2/10/23 15:18
2,4,6-Tribromophenol	91.2	30-130		2/10/23 15:18
p-Terphenyl-d14	87.9	30-130		2/10/23 15:18

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1221 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1232 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1242 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1248 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1254 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1260 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1262 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM
Aroclor-1268 [1]	ND	0.088	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:19	SFM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	91.9	30-150		2/9/23 17:19
Decachlorobiphenyl [2]	90.0	30-150		2/9/23 17:19
Tetrachloro-m-xylene [1]	84.3	30-150		2/9/23 17:19
Tetrachloro-m-xylene [2]	86.5	30-150		2/9/23 17:19

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Unadjusted C11-C22 Aromatics	15	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
C11-C22 Aromatics	15	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Benzo(g,h,i)perylene	0.14	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:22	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	59.4	40-140		2/9/23 16:22
o-Terphenyl (OTP)	79.6	40-140		2/9/23 16:22
2-Bromonaphthalene	105	40-140		2/9/23 16:22
2-Fluorobiphenyl	107	40-140		2/9/23 16:22

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Arsenic	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Barium	7.2	1.8	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Beryllium	ND	0.18	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Cadmium	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Chromium	3.0	0.71	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Lead	8.3	0.53	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Mercury	ND	0.028	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:37	AAJ
Nickel	1.9	0.71	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:11	ATP
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Vanadium	4.0	0.71	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN
Zinc	14	0.71	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:12	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-5 (0-2) | Sampled: 2/2/2023 10:15

Sample ID: 23B0766-03

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.3		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Biphenyl	ND	0.071	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Acenaphthene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Acenaphthylene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Acetophenone	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Aniline	ND	0.36	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Benzo(a)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Benzo(a)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Benzo(b)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Benzo(g,h,i)perylene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Benzo(k)fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Bis(2-chloroethoxy)methane	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Bis(2-chloroethyl)ether	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Bis(2-chloroisopropyl)ether	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Bis(2-Ethylhexyl)phthalate	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
4-Bromophenylphenylether	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Butylbenzylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
4-Chloroaniline	ND	0.70	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2-Chloronaphthalene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2-Chlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Chrysene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Dibenz(a,h)anthracene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Dibenzofuran	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Di-n-butylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
1,2-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
1,3-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
1,4-Dichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
3,3-Dichlorobenzidine	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4-Dichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Diethylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4-Dimethylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Dimethylphthalate	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4-Dinitrophenol	ND	0.70	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4-Dinitrotoluene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,6-Dinitrotoluene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Di-n-octylphthalate	ND	0.36	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:42	AR2
1,2-Diphenylhydrazine/Azobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Fluoranthene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Fluorene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Hexachlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Hexachlorobutadiene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Hexachloroethane	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Indeno(1,2,3-cd)pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Isophorone	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Semivolatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
2-Methylnaphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2-Methylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
3/4-Methylphenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Naphthalene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Nitrobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2-Nitrophenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
4-Nitrophenol	ND	0.70	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Pentachlorophenol	ND	0.36	mg/Kg dry	1	V-05	SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Phenanthrene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Phenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Pyrene	ND	0.18	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
Pyridine	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
1,2,4-Trichlorobenzene	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4,5-Trichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2
2,4,6-Trichlorophenol	ND	0.36	mg/Kg dry	1		SW-846 8270E	2/8/23	2/10/23 15:42	AR2

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
2-Fluorophenol	74.5	30-130		2/10/23 15:42
Phenol-d6	76.5	30-130		2/10/23 15:42
Nitrobenzene-d5	73.9	30-130		2/10/23 15:42
2-Fluorobiphenyl	71.9	30-130		2/10/23 15:42
2,4,6-Tribromophenol	83.9	30-130		2/10/23 15:42
p-Terphenyl-d14	79.5	30-130		2/10/23 15:42

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Sample Flags: O-32

Polychlorinated Biphenyls By GC/ECD

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Aroclor-1016 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1221 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1232 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1242 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1248 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1254 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1260 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1262 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM
Aroclor-1268 [1]	ND	0.085	mg/Kg dry	4		SW-846 8082A	2/8/23	2/9/23 17:37	SFM

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Decachlorobiphenyl [1]	102	30-150		2/9/23 17:37
Decachlorobiphenyl [2]	100	30-150		2/9/23 17:37
Tetrachloro-m-xylene [1]	90.7	30-150		2/9/23 17:37
Tetrachloro-m-xylene [2]	93.6	30-150		2/9/23 17:37

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 16:41	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	62.3	40-140		2/9/23 16:41
o-Terphenyl (OTP)	72.7	40-140		2/9/23 16:41
2-Bromonaphthalene	93.6	40-140		2/9/23 16:41
2-Fluorobiphenyl	92.4	40-140		2/9/23 16:41

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Arsenic	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Barium	6.2	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Beryllium	0.17	0.17	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Cadmium	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Chromium	5.4	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Lead	3.4	0.51	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Mercury	ND	0.026	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:39	AAJ
Nickel	3.0	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Selenium	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Silver	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:19	ATP
Thallium	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Vanadium	6.7	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN
Zinc	8.9	0.68	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:17	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-6 (0-2) | Sampled: 2/2/2023 08:30

Sample ID: 23B0766-05

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	94.2		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-8 (2-4) | Sampled: 2/2/2023 10:25

Sample ID: 23B0766-06

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Acetone	ND	0.11	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
tert-Amyl Methyl Ether (TAME)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Benzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Bromobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Bromochloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Bromodichloromethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Bromoform	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Bromomethane	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
2-Butanone (MEK)	ND	0.043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
n-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
sec-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
tert-Butylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
tert-Butyl Ethyl Ether (TBEE)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Carbon Disulfide	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Carbon Tetrachloride	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Chlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Chlorodibromomethane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Chloroethane	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Chloroform	ND	0.0043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Chloromethane	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
2-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
4-Chlorotoluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2-Dibromoethane (EDB)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Dibromomethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,3-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,4-Dichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Dichlorodifluoromethane (Freon 12)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2-Dichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1-Dichloroethylene	ND	0.0043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
cis-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
trans-1,2-Dichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,3-Dichloropropane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
2,2-Dichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1-Dichloropropene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
cis-1,3-Dichloropropene	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
trans-1,3-Dichloropropene	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Diethyl Ether	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Diisopropyl Ether (DIPE)	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,4-Dioxane	ND	0.11	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Ethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-8 (2-4) | Sampled: 2/2/2023 10:25

Sample ID: 23B0766-06

Sample Matrix: Soil

Volatile Organic Compounds by GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Hexachlorobutadiene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
2-Hexanone (MBK)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Isopropylbenzene (Cumene)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
p-Isopropyltoluene (p-Cymene)	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Methyl tert-Butyl Ether (MTBE)	ND	0.0043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Methylene Chloride	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
4-Methyl-2-pentanone (MIBK)	ND	0.022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Naphthalene	ND	0.0043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
n-Propylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Styrene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1,1,2-Tetrachloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1,2,2-Tetrachloroethane	ND	0.0011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Tetrachloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Tetrahydrofuran	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Toluene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2,3-Trichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2,4-Trichlorobenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1,1-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,1,2-Trichloroethane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Trichloroethylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Trichlorofluoromethane (Freon 11)	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2,3-Trichloropropane	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,2,4-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
1,3,5-Trimethylbenzene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
Vinyl Chloride	ND	0.011	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
m+p Xylene	ND	0.0043	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF
o-Xylene	ND	0.0022	mg/Kg dry	1		SW-846 8260D	2/8/23	2/8/23 7:02	MFF

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
1,2-Dichloroethane-d4	102	70-130		2/8/23 7:02
Toluene-d8	97.0	70-130		2/8/23 7:02
4-Bromofluorobenzene	100	70-130		2/8/23 7:02

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-8 (2-4) | Sampled: 2/2/2023 10:25

Sample ID: 23B0766-06

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
C19-C36 Aliphatics	ND	12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Unadjusted C11-C22 Aromatics	ND	12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
C11-C22 Aromatics	ND	12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Acenaphthene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Acenaphthylene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Anthracene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Benzo(a)anthracene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Benzo(a)pyrene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Benzo(b)fluoranthene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Benzo(g,h,i)perylene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Benzo(k)fluoranthene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Chrysene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Dibenz(a,h)anthracene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Fluoranthene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Fluorene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Indeno(1,2,3-cd)pyrene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
2-Methylnaphthalene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Naphthalene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Phenanthrene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB
Pyrene	ND	0.12	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:29	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	56.8	40-140		2/9/23 13:29
o-Terphenyl (OTP)	74.3	40-140		2/9/23 13:29
2-Bromonaphthalene	103	40-140		2/9/23 13:29
2-Fluorobiphenyl	99.4	40-140		2/9/23 13:29

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-8 (2-4) | Sampled: 2/2/2023 10:25

Sample ID: 23B0766-06

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	2.0	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Arsenic	ND	4.0	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Barium	9.6	2.0	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Beryllium	0.27	0.20	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Cadmium	ND	0.40	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Chromium	6.0	0.80	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Lead	3.0	0.60	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Mercury	ND	0.031	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:41	AAJ
Nickel	4.0	0.80	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Selenium	ND	4.0	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Silver	ND	0.40	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:27	ATP
Thallium	ND	2.0	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Vanadium	7.4	0.80	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN
Zinc	11	0.80	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:23	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-8 (2-4) | Sampled: 2/2/2023 10:25

Sample ID: 23B0766-06

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	81.2		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-9 (0-2) | Sampled: 2/2/2023 11:00

Sample ID: 23B0766-07

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
C19-C36 Aliphatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
C11-C22 Aromatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Acenaphthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Acenaphthylene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Benzo(a)anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Benzo(a)pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Benzo(b)fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Benzo(g,h,i)perylene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Benzo(k)fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Chrysene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Dibenz(a,h)anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Fluorene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
2-Methylnaphthalene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Naphthalene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Phenanthrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB
Pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:46	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	65.7	40-140		2/9/23 14:46
o-Terphenyl (OTP)	73.9	40-140		2/9/23 14:46
2-Bromonaphthalene	91.6	40-140		2/9/23 14:46
2-Fluorobiphenyl	90.1	40-140		2/9/23 14:46

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-9 (0-2) | Sampled: 2/2/2023 11:00

Sample ID: 23B0766-07

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Arsenic	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Barium	2.3	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Beryllium	ND	0.17	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Cadmium	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Chromium	1.7	0.69	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Lead	1.2	0.51	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Mercury	ND	0.026	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:51	AAJ
Nickel	1.8	0.69	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Selenium	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Silver	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:35	ATP
Thallium	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Vanadium	2.6	0.69	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN
Zinc	5.8	0.69	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:28	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-9 (0-2) | Sampled: 2/2/2023 11:00

Sample ID: 23B0766-07

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	97.2		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-10 (6-8) | Sampled: 2/2/2023 11:40

Sample ID: 23B0766-08

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Benzo(g,h,i)perylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 13:48	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	62.3	40-140		2/9/23 13:48
o-Terphenyl (OTP)	83.2	40-140		2/9/23 13:48
2-Bromonaphthalene	107	40-140		2/9/23 13:48
2-Fluorobiphenyl	106	40-140		2/9/23 13:48

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-10 (6-8) | Sampled: 2/2/2023 11:40

Sample ID: 23B0766-08

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Arsenic	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Barium	3.6	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Beryllium	ND	0.17	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Cadmium	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Chromium	1.7	0.67	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Lead	1.4	0.51	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:52	AAJ
Nickel	2.4	0.67	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Selenium	ND	3.4	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Silver	ND	0.34	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 22:42	ATP
Thallium	ND	1.7	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Vanadium	2.5	0.67	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN
Zinc	6.6	0.67	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:34	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-10 (6-8) | Sampled: 2/2/2023 11:40

Sample ID: 23B0766-08

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	95.1		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-11 (0-2) | Sampled: 2/2/2023 14:00

Sample ID: 23B0766-09

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
C19-C36 Aliphatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
C11-C22 Aromatics	ND	10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Acenaphthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Acenaphthylene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Benzo(a)anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Benzo(a)pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Benzo(b)fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Benzo(g,h,i)perylene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Benzo(k)fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Chrysene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Dibenz(a,h)anthracene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Fluoranthene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Fluorene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
2-Methylnaphthalene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Naphthalene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Phenanthrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB
Pyrene	ND	0.10	mg/Kg dry	1		MADEP EPH rev 2.1	2/8/23	2/9/23 14:07	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	60.7	40-140		2/9/23 14:07
o-Terphenyl (OTP)	72.4	40-140		2/9/23 14:07
2-Bromonaphthalene	93.6	40-140		2/9/23 14:07
2-Fluorobiphenyl	92.8	40-140		2/9/23 14:07

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-11 (0-2) | Sampled: 2/2/2023 14:00

Sample ID: 23B0766-09

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Arsenic	ND	3.2	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Barium	2.1	1.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Beryllium	ND	0.16	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Cadmium	ND	0.32	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Chromium	3.1	0.64	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Lead	1.6	0.48	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Mercury	ND	0.026	mg/Kg dry	1		SW-846 7471B	2/9/23	2/9/23 14:54	AAJ
Nickel	3.1	0.64	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Selenium	ND	3.2	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Silver	ND	0.32	mg/Kg dry	1		SW-846 6010D	2/8/23	2/14/23 23:06	ATP
Thallium	ND	1.6	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Vanadium	3.7	0.64	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN
Zinc	6.8	0.64	mg/Kg dry	1		SW-846 6010D	2/8/23	2/10/23 12:39	HNN

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Project Location: Sand Pit Rd, Truro, MA | Sample Description: | Work Order: 23B0766

Date Received: 2/6/2023

Field Sample #: TP-11 (0-2) | Sampled: 2/2/2023 14:00

Sample ID: 23B0766-09

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	97.8		% Wt	1		SM 2540G	2/8/23	2/8/23 12:49	WDC

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Sample Extraction Data

Prep Method: SW-846 3546 **Analytical Method: MADEP EPH rev 2.1**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-01 [TP-2 (2-4)]	B330895	20.0	2.00	02/08/23
23B0766-02 [TP-3 (0-2)]	B330895	20.0	2.00	02/08/23
23B0766-03 [TP-5 (0-2)]	B330895	20.0	2.00	02/08/23
23B0766-05 [TP-6 (0-2)]	B330895	20.0	2.00	02/08/23
23B0766-06 [TP-8 (2-4)]	B330895	20.0	2.00	02/08/23
23B0766-07 [TP-9 (0-2)]	B330895	20.0	2.00	02/08/23
23B0766-08 [TP-10 (6-8)]	B330895	20.0	2.00	02/08/23
23B0766-09 [TP-11 (0-2)]	B330895	20.0	2.00	02/08/23

Prep Method: % Solids **Analytical Method: SM 2540G**

Lab Number [Field ID]	Batch	Date
23B0766-01 [TP-2 (2-4)]	B330944	02/08/23
23B0766-02 [TP-3 (0-2)]	B330944	02/08/23
23B0766-03 [TP-5 (0-2)]	B330944	02/08/23
23B0766-05 [TP-6 (0-2)]	B330944	02/08/23
23B0766-06 [TP-8 (2-4)]	B330944	02/08/23
23B0766-07 [TP-9 (0-2)]	B330944	02/08/23
23B0766-08 [TP-10 (6-8)]	B330944	02/08/23
23B0766-09 [TP-11 (0-2)]	B330944	02/08/23

Prep Method: SW-846 3050B **Analytical Method: SW-846 6010D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-01 [TP-2 (2-4)]	B330929	1.55	50.0	02/08/23
23B0766-02 [TP-3 (0-2)]	B330929	1.58	50.0	02/08/23
23B0766-03 [TP-5 (0-2)]	B330929	1.54	50.0	02/08/23
23B0766-05 [TP-6 (0-2)]	B330929	1.56	50.0	02/08/23
23B0766-06 [TP-8 (2-4)]	B330929	1.54	50.0	02/08/23
23B0766-07 [TP-9 (0-2)]	B330929	1.50	50.0	02/08/23
23B0766-08 [TP-10 (6-8)]	B330929	1.56	50.0	02/08/23
23B0766-09 [TP-11 (0-2)]	B330929	1.59	50.0	02/08/23

Prep Method: SW-846 7470A/7471A **Analytical Method: SW-846 7471B**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-01 [TP-2 (2-4)]	B331047	0.599	50.0	02/09/23
23B0766-02 [TP-3 (0-2)]	B331047	0.585	50.0	02/09/23
23B0766-03 [TP-5 (0-2)]	B331047	0.592	50.0	02/09/23
23B0766-05 [TP-6 (0-2)]	B331047	0.605	50.0	02/09/23
23B0766-06 [TP-8 (2-4)]	B331047	0.589	50.0	02/09/23
23B0766-07 [TP-9 (0-2)]	B331047	0.602	50.0	02/09/23
23B0766-08 [TP-10 (6-8)]	B331047	0.587	50.0	02/09/23
23B0766-09 [TP-11 (0-2)]	B331047	0.599	50.0	02/09/23

Prep Method: SW-846 3546 **Analytical Method: SW-846 8082A**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-03 [TP-5 (0-2)]	B330896	10.0	10.0	02/08/23
23B0766-05 [TP-6 (0-2)]	B330896	10.0	10.0	02/08/23

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Sample Extraction Data

Prep Method: SW-846 5035 **Analytical Method: SW-846 8260D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-03 [TP-5 (0-2)]	B330910	4.95	10.0	02/08/23
23B0766-06 [TP-8 (2-4)]	B330910	5.66	10.0	02/08/23

Prep Method: SW-846 3546 **Analytical Method: SW-846 8270E**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B0766-03 [TP-5 (0-2)]	B330933	30.0	1.00	02/08/23
23B0766-05 [TP-6 (0-2)]	B330933	30.0	1.00	02/08/23

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330910 - SW-846 5035										
Blank (B330910-BLK1)				Prepared & Analyzed: 02/08/23						
Acetone	ND	0.10	mg/Kg wet							
tert-Amyl Methyl Ether (TAME)	ND	0.0010	mg/Kg wet							
Benzene	ND	0.0020	mg/Kg wet							
Bromobenzene	ND	0.0020	mg/Kg wet							
Bromochloromethane	ND	0.0020	mg/Kg wet							
Bromodichloromethane	ND	0.0020	mg/Kg wet							
Bromoform	ND	0.0020	mg/Kg wet							
Bromomethane	ND	0.010	mg/Kg wet							
2-Butanone (MEK)	ND	0.040	mg/Kg wet							
n-Butylbenzene	ND	0.0020	mg/Kg wet							
sec-Butylbenzene	ND	0.0020	mg/Kg wet							
tert-Butylbenzene	ND	0.0020	mg/Kg wet							
tert-Butyl Ethyl Ether (TBEE)	ND	0.0010	mg/Kg wet							
Carbon Disulfide	ND	0.010	mg/Kg wet							
Carbon Tetrachloride	ND	0.0020	mg/Kg wet							
Chlorobenzene	ND	0.0020	mg/Kg wet							
Chlorodibromomethane	ND	0.0010	mg/Kg wet							
Chloroethane	ND	0.020	mg/Kg wet							
Chloroform	ND	0.0040	mg/Kg wet							
Chloromethane	ND	0.010	mg/Kg wet							
2-Chlorotoluene	ND	0.0020	mg/Kg wet							
4-Chlorotoluene	ND	0.0020	mg/Kg wet							
1,2-Dibromo-3-chloropropane (DBCP)	ND	0.0020	mg/Kg wet							
1,2-Dibromoethane (EDB)	ND	0.0010	mg/Kg wet							
Dibromomethane	ND	0.0020	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.0020	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.0020	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.0020	mg/Kg wet							
Dichlorodifluoromethane (Freon 12)	ND	0.020	mg/Kg wet							
1,1-Dichloroethane	ND	0.0020	mg/Kg wet							
1,2-Dichloroethane	ND	0.0020	mg/Kg wet							
1,1-Dichloroethylene	ND	0.0040	mg/Kg wet							
cis-1,2-Dichloroethylene	ND	0.0020	mg/Kg wet							
trans-1,2-Dichloroethylene	ND	0.0020	mg/Kg wet							
1,2-Dichloropropane	ND	0.0020	mg/Kg wet							
1,3-Dichloropropane	ND	0.0010	mg/Kg wet							
2,2-Dichloropropane	ND	0.0020	mg/Kg wet							
1,1-Dichloropropene	ND	0.0020	mg/Kg wet							
cis-1,3-Dichloropropene	ND	0.0010	mg/Kg wet							
trans-1,3-Dichloropropene	ND	0.0010	mg/Kg wet							
Diethyl Ether	ND	0.020	mg/Kg wet							
Diisopropyl Ether (DIPE)	ND	0.0010	mg/Kg wet							
1,4-Dioxane	ND	0.10	mg/Kg wet							
Ethylbenzene	ND	0.0020	mg/Kg wet							
Hexachlorobutadiene	ND	0.0020	mg/Kg wet							
2-Hexanone (MBK)	ND	0.020	mg/Kg wet							
Isopropylbenzene (Cumene)	ND	0.0020	mg/Kg wet							
p-Isopropyltoluene (p-Cymene)	ND	0.0020	mg/Kg wet							
Methyl tert-Butyl Ether (MTBE)	ND	0.0040	mg/Kg wet							
Methylene Chloride	ND	0.020	mg/Kg wet							
4-Methyl-2-pentanone (MIBK)	ND	0.020	mg/Kg wet							
Naphthalene	ND	0.0040	mg/Kg wet							

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B330910 - SW-846 5035												
Blank (B330910-BLK1)				Prepared & Analyzed: 02/08/23								
n-Propylbenzene	ND	0.0020	mg/Kg wet									
Styrene	ND	0.0020	mg/Kg wet									
1,1,1,2-Tetrachloroethane	ND	0.0020	mg/Kg wet									
1,1,2,2-Tetrachloroethane	ND	0.0010	mg/Kg wet									
Tetrachloroethylene	ND	0.0020	mg/Kg wet									
Tetrahydrofuran	ND	0.010	mg/Kg wet									
Toluene	ND	0.0020	mg/Kg wet									
1,2,3-Trichlorobenzene	ND	0.0020	mg/Kg wet									
1,2,4-Trichlorobenzene	ND	0.0020	mg/Kg wet									
1,1,1-Trichloroethane	ND	0.0020	mg/Kg wet									
1,1,2-Trichloroethane	ND	0.0020	mg/Kg wet									
Trichloroethylene	ND	0.0020	mg/Kg wet									
Trichlorofluoromethane (Freon 11)	ND	0.010	mg/Kg wet									
1,2,3-Trichloropropane	ND	0.0020	mg/Kg wet									
1,2,4-Trimethylbenzene	ND	0.0020	mg/Kg wet									
1,3,5-Trimethylbenzene	ND	0.0020	mg/Kg wet									
Vinyl Chloride	ND	0.010	mg/Kg wet									
m+p Xylene	ND	0.0040	mg/Kg wet									
o-Xylene	ND	0.0020	mg/Kg wet									
Surrogate: 1,2-Dichloroethane-d4	*0.0501*		mg/Kg wet	0.0500		100		70-130				
Surrogate: Toluene-d8	*0.0500*		mg/Kg wet	0.0500		100		70-130				
Surrogate: 4-Bromofluorobenzene	*0.0492*		mg/Kg wet	0.0500		98.5		70-130				
LCS (B330910-BS1)				Prepared & Analyzed: 02/08/23								
Acetone	0.198	0.10	mg/Kg wet	0.200		99.1		40-160				†
tert-Amyl Methyl Ether (TAME)	0.0202	0.0010	mg/Kg wet	0.0200		101		70-130				
Benzene	0.0195	0.0020	mg/Kg wet	0.0200		97.4		70-130				
Bromobenzene	0.0231	0.0020	mg/Kg wet	0.0200		116		70-130				
Bromochloromethane	0.0210	0.0020	mg/Kg wet	0.0200		105		70-130				
Bromodichloromethane	0.0199	0.0020	mg/Kg wet	0.0200		99.3		70-130				
Bromoform	0.0199	0.0020	mg/Kg wet	0.0200		99.6		70-130				
Bromomethane	0.0258	0.010	mg/Kg wet	0.0200		129		40-160			V-20	†
2-Butanone (MEK)	0.226	0.040	mg/Kg wet	0.200		113		40-160				†
n-Butylbenzene	0.0189	0.0020	mg/Kg wet	0.0200		94.5		70-130				
sec-Butylbenzene	0.0187	0.0020	mg/Kg wet	0.0200		93.6		70-130				
tert-Butylbenzene	0.0188	0.0020	mg/Kg wet	0.0200		94.0		70-130				
tert-Butyl Ethyl Ether (TBEE)	0.0199	0.0010	mg/Kg wet	0.0200		99.6		70-130				
Carbon Disulfide	0.209	0.010	mg/Kg wet	0.200		105		70-130			V-36	
Carbon Tetrachloride	0.0189	0.0020	mg/Kg wet	0.0200		94.5		70-130				
Chlorobenzene	0.0205	0.0020	mg/Kg wet	0.0200		102		70-130				
Chlorodibromomethane	0.0194	0.0010	mg/Kg wet	0.0200		96.9		70-130				
Chloroethane	0.0263	0.020	mg/Kg wet	0.0200		**132**	*	70-130			L-02, V-20	
Chloroform	0.0196	0.0040	mg/Kg wet	0.0200		98.1		70-130				
Chloromethane	0.0197	0.010	mg/Kg wet	0.0200		98.7		40-160				†
2-Chlorotoluene	0.0199	0.0020	mg/Kg wet	0.0200		99.5		70-130				
4-Chlorotoluene	0.0203	0.0020	mg/Kg wet	0.0200		102		70-130				
1,2-Dibromo-3-chloropropane (DBCP)	0.0171	0.0020	mg/Kg wet	0.0200		85.3		70-130				
1,2-Dibromoethane (EDB)	0.0200	0.0010	mg/Kg wet	0.0200		100		70-130				
Dibromomethane	0.0204	0.0020	mg/Kg wet	0.0200		102		70-130				
1,2-Dichlorobenzene	0.0198	0.0020	mg/Kg wet	0.0200		99.2		70-130				
1,3-Dichlorobenzene	0.0191	0.0020	mg/Kg wet	0.0200		95.6		70-130				
1,4-Dichlorobenzene	0.0192	0.0020	mg/Kg wet	0.0200		96.1		70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B330910 - SW-846 5035											
LCS (B330910-BS1)				Prepared & Analyzed: 02/08/23							
Dichlorodifluoromethane (Freon 12)	0.0247	0.020	mg/Kg wet	0.0200		123	40-160			V-20, V-36	†
1,1-Dichloroethane	0.0199	0.0020	mg/Kg wet	0.0200		99.3	70-130				
1,2-Dichloroethane	0.0205	0.0020	mg/Kg wet	0.0200		102	70-130				
1,1-Dichloroethylene	0.0203	0.0040	mg/Kg wet	0.0200		102	70-130				
cis-1,2-Dichloroethylene	0.0197	0.0020	mg/Kg wet	0.0200		98.6	70-130				
trans-1,2-Dichloroethylene	0.0197	0.0020	mg/Kg wet	0.0200		98.4	70-130				
1,2-Dichloropropane	0.0196	0.0020	mg/Kg wet	0.0200		97.9	70-130				
1,3-Dichloropropane	0.0210	0.0010	mg/Kg wet	0.0200		105	70-130				
2,2-Dichloropropane	0.0189	0.0020	mg/Kg wet	0.0200		94.3	70-130				
1,1-Dichloropropene	0.0197	0.0020	mg/Kg wet	0.0200		98.4	70-130				
cis-1,3-Dichloropropene	0.0187	0.0010	mg/Kg wet	0.0200		93.5	70-130				
trans-1,3-Dichloropropene	0.0190	0.0010	mg/Kg wet	0.0200		95.1	70-130				
Diethyl Ether	0.0204	0.020	mg/Kg wet	0.0200		102	70-130				
Diisopropyl Ether (DIPE)	0.0212	0.0010	mg/Kg wet	0.0200		106	70-130				
1,4-Dioxane	0.196	0.10	mg/Kg wet	0.200		98.1	40-160				†
Ethylbenzene	0.0205	0.0020	mg/Kg wet	0.0200		103	70-130				
Hexachlorobutadiene	0.0181	0.0020	mg/Kg wet	0.0200		90.7	70-130				
2-Hexanone (MBK)	0.219	0.020	mg/Kg wet	0.200		109	40-160				†
Isopropylbenzene (Cumene)	0.0204	0.0020	mg/Kg wet	0.0200		102	70-130				
p-Isopropyltoluene (p-Cymene)	0.0190	0.0020	mg/Kg wet	0.0200		95.1	70-130				
Methyl tert-Butyl Ether (MTBE)	0.0199	0.0040	mg/Kg wet	0.0200		99.7	70-130				
Methylene Chloride	0.0199	0.020	mg/Kg wet	0.0200		99.4	70-130				
4-Methyl-2-pentanone (MIBK)	0.220	0.020	mg/Kg wet	0.200		110	40-160				†
Naphthalene	0.0201	0.0040	mg/Kg wet	0.0200		100	70-130				
n-Propylbenzene	0.0204	0.0020	mg/Kg wet	0.0200		102	70-130				
Styrene	0.0208	0.0020	mg/Kg wet	0.0200		104	70-130				
1,1,1,2-Tetrachloroethane	0.0206	0.0020	mg/Kg wet	0.0200		103	70-130				
1,1,2,2-Tetrachloroethane	0.0220	0.0010	mg/Kg wet	0.0200		110	70-130				
Tetrachloroethylene	0.0199	0.0020	mg/Kg wet	0.0200		99.6	70-130				
Tetrahydrofuran	0.0210	0.010	mg/Kg wet	0.0200		105	70-130				
Toluene	0.0191	0.0020	mg/Kg wet	0.0200		95.3	70-130				
1,2,3-Trichlorobenzene	0.0192	0.0020	mg/Kg wet	0.0200		95.8	70-130				
1,2,4-Trichlorobenzene	0.0184	0.0020	mg/Kg wet	0.0200		92.2	70-130				
1,1,1-Trichloroethane	0.0195	0.0020	mg/Kg wet	0.0200		97.5	70-130				
1,1,2-Trichloroethane	0.0197	0.0020	mg/Kg wet	0.0200		98.5	70-130				
Trichloroethylene	0.0197	0.0020	mg/Kg wet	0.0200		98.4	70-130				
Trichlorofluoromethane (Freon 11)	0.0227	0.010	mg/Kg wet	0.0200		114	70-130				
1,2,3-Trichloropropane	0.0217	0.0020	mg/Kg wet	0.0200		109	70-130				
1,2,4-Trimethylbenzene	0.0185	0.0020	mg/Kg wet	0.0200		92.7	70-130				
1,3,5-Trimethylbenzene	0.0206	0.0020	mg/Kg wet	0.0200		103	70-130				
Vinyl Chloride	0.0209	0.010	mg/Kg wet	0.0200		105	70-130				
m+p Xylene	0.0418	0.0040	mg/Kg wet	0.0400		104	70-130				
o-Xylene	0.0205	0.0020	mg/Kg wet	0.0200		102	70-130				
Surrogate: 1,2-Dichloroethane-d4	*0.0493*		mg/Kg wet	0.0500		98.6	70-130				
Surrogate: Toluene-d8	*0.0494*		mg/Kg wet	0.0500		98.9	70-130				
Surrogate: 4-Bromofluorobenzene	*0.0508*		mg/Kg wet	0.0500		102	70-130				

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes	
Batch B330910 - SW-846 5035												
LCS Dup (B330910-BSD1)				Prepared & Analyzed: 02/08/23								
Acetone	0.211	0.10	mg/Kg wet	0.200		106		40-160	6.34	20		†
tert-Amyl Methyl Ether (TAME)	0.0201	0.0010	mg/Kg wet	0.0200		101		70-130	0.0993	20		
Benzene	0.0202	0.0020	mg/Kg wet	0.0200		101		70-130	3.63	20		
Bromobenzene	0.0229	0.0020	mg/Kg wet	0.0200		115		70-130	0.955	20		
Bromochloromethane	0.0210	0.0020	mg/Kg wet	0.0200		105		70-130	0.381	20		
Bromodichloromethane	0.0197	0.0020	mg/Kg wet	0.0200		98.6		70-130	0.707	20		
Bromoform	0.0200	0.0020	mg/Kg wet	0.0200		99.8		70-130	0.201	20		
Bromomethane	0.0250	0.010	mg/Kg wet	0.0200		125		40-160	3.15	20	V-20	†
2-Butanone (MEK)	0.240	0.040	mg/Kg wet	0.200		120		40-160	6.20	20		†
n-Butylbenzene	0.0187	0.0020	mg/Kg wet	0.0200		93.6		70-130	0.957	20		
sec-Butylbenzene	0.0189	0.0020	mg/Kg wet	0.0200		94.5		70-130	0.957	20		
tert-Butylbenzene	0.0190	0.0020	mg/Kg wet	0.0200		94.8		70-130	0.847	20		
tert-Butyl Ethyl Ether (TBEE)	0.0200	0.0010	mg/Kg wet	0.0200		100		70-130	0.401	20		
Carbon Disulfide	0.212	0.010	mg/Kg wet	0.200		106		70-130	1.33	20	V-36	
Carbon Tetrachloride	0.0194	0.0020	mg/Kg wet	0.0200		97.0		70-130	2.61	20		
Chlorobenzene	0.0204	0.0020	mg/Kg wet	0.0200		102		70-130	0.0978	20		
Chlorodibromomethane	0.0196	0.0010	mg/Kg wet	0.0200		98.1		70-130	1.23	20		
Chloroethane	0.0273	0.020	mg/Kg wet	0.0200		**137**	*	70-130	3.73	20	L-02, V-20	
Chloroform	0.0200	0.0040	mg/Kg wet	0.0200		100		70-130	2.12	20		
Chloromethane	0.0203	0.010	mg/Kg wet	0.0200		102		40-160	2.90	20		†
2-Chlorotoluene	0.0201	0.0020	mg/Kg wet	0.0200		101		70-130	1.20	20		
4-Chlorotoluene	0.0204	0.0020	mg/Kg wet	0.0200		102		70-130	0.393	20		
1,2-Dibromo-3-chloropropane (DBCP)	0.0177	0.0020	mg/Kg wet	0.0200		88.5		70-130	3.68	20		
1,2-Dibromoethane (EDB)	0.0204	0.0010	mg/Kg wet	0.0200		102		70-130	1.98	20		
Dibromomethane	0.0204	0.0020	mg/Kg wet	0.0200		102		70-130	0.0979	20		
1,2-Dichlorobenzene	0.0199	0.0020	mg/Kg wet	0.0200		99.4		70-130	0.201	20		
1,3-Dichlorobenzene	0.0188	0.0020	mg/Kg wet	0.0200		94.1		70-130	1.58	20		
1,4-Dichlorobenzene	0.0193	0.0020	mg/Kg wet	0.0200		96.5		70-130	0.415	20		
Dichlorodifluoromethane (Freon 12)	0.0257	0.020	mg/Kg wet	0.0200		128		40-160	3.89	20	V-20, V-36	†
1,1-Dichloroethane	0.0204	0.0020	mg/Kg wet	0.0200		102		70-130	2.78	20		
1,2-Dichloroethane	0.0209	0.0020	mg/Kg wet	0.0200		105		70-130	2.22	20		
1,1-Dichloroethylene	0.0210	0.0040	mg/Kg wet	0.0200		105		70-130	3.10	20		
cis-1,2-Dichloroethylene	0.0201	0.0020	mg/Kg wet	0.0200		100		70-130	1.91	20		
trans-1,2-Dichloroethylene	0.0201	0.0020	mg/Kg wet	0.0200		100		70-130	2.11	20		
1,2-Dichloropropane	0.0196	0.0020	mg/Kg wet	0.0200		97.9		70-130	0.00	20		
1,3-Dichloropropane	0.0209	0.0010	mg/Kg wet	0.0200		105		70-130	0.0955	20		
2,2-Dichloropropane	0.0192	0.0020	mg/Kg wet	0.0200		95.8		70-130	1.58	20		
1,1-Dichloropropene	0.0205	0.0020	mg/Kg wet	0.0200		102		70-130	3.89	20		
cis-1,3-Dichloropropene	0.0190	0.0010	mg/Kg wet	0.0200		95.2		70-130	1.80	20		
trans-1,3-Dichloropropene	0.0194	0.0010	mg/Kg wet	0.0200		97.0		70-130	1.98	20		
Diethyl Ether	0.0204	0.020	mg/Kg wet	0.0200		102		70-130	0.294	20		
Diisopropyl Ether (DIPE)	0.0206	0.0010	mg/Kg wet	0.0200		103		70-130	2.87	20		
1,4-Dioxane	0.223	0.10	mg/Kg wet	0.200		112		40-160	12.9	20		†
Ethylbenzene	0.0206	0.0020	mg/Kg wet	0.0200		103		70-130	0.195	20		
Hexachlorobutadiene	0.0185	0.0020	mg/Kg wet	0.0200		92.6		70-130	2.07	20		
2-Hexanone (MBK)	0.228	0.020	mg/Kg wet	0.200		114		40-160	3.96	20		†
Isopropylbenzene (Cumene)	0.0201	0.0020	mg/Kg wet	0.0200		100		70-130	1.48	20		
p-Isopropyltoluene (p-Cymene)	0.0192	0.0020	mg/Kg wet	0.0200		95.8		70-130	0.733	20		
Methyl tert-Butyl Ether (MTBE)	0.0201	0.0040	mg/Kg wet	0.0200		101		70-130	0.998	20		
Methylene Chloride	0.0202	0.020	mg/Kg wet	0.0200		101		70-130	1.50	20		
4-Methyl-2-pentanone (MIBK)	0.227	0.020	mg/Kg wet	0.200		113		40-160	3.30	20		†
Naphthalene	0.0201	0.0040	mg/Kg wet	0.0200		100		70-130	0.199	20		

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QUALITY CONTROL

Volatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330910 - SW-846 5035										
LCS Dup (B330910-BSD1)				Prepared & Analyzed: 02/08/23						
n-Propylbenzene	0.0202	0.0020	mg/Kg wet	0.0200		101	70-130	1.28	20	
Styrene	0.0207	0.0020	mg/Kg wet	0.0200		104	70-130	0.289	20	
1,1,1,2-Tetrachloroethane	0.0199	0.0020	mg/Kg wet	0.0200		99.7	70-130	3.26	20	
1,1,2,2-Tetrachloroethane	0.0222	0.0010	mg/Kg wet	0.0200		111	70-130	0.813	20	
Tetrachloroethylene	0.0205	0.0020	mg/Kg wet	0.0200		103	70-130	2.97	20	
Tetrahydrofuran	0.0228	0.010	mg/Kg wet	0.0200		114	70-130	7.94	20	
Toluene	0.0187	0.0020	mg/Kg wet	0.0200		93.4	70-130	2.01	20	
1,2,3-Trichlorobenzene	0.0189	0.0020	mg/Kg wet	0.0200		94.6	70-130	1.26	20	
1,2,4-Trichlorobenzene	0.0177	0.0020	mg/Kg wet	0.0200		88.4	70-130	4.21	20	
1,1,1-Trichloroethane	0.0198	0.0020	mg/Kg wet	0.0200		99.2	70-130	1.73	20	
1,1,2-Trichloroethane	0.0201	0.0020	mg/Kg wet	0.0200		100	70-130	1.81	20	
Trichloroethylene	0.0199	0.0020	mg/Kg wet	0.0200		99.4	70-130	1.01	20	
Trichlorofluoromethane (Freon 11)	0.0234	0.010	mg/Kg wet	0.0200		117	70-130	2.95	20	
1,2,3-Trichloropropane	0.0217	0.0020	mg/Kg wet	0.0200		109	70-130	0.0920	20	
1,2,4-Trimethylbenzene	0.0190	0.0020	mg/Kg wet	0.0200		94.9	70-130	2.35	20	
1,3,5-Trimethylbenzene	0.0204	0.0020	mg/Kg wet	0.0200		102	70-130	0.878	20	
Vinyl Chloride	0.0217	0.010	mg/Kg wet	0.0200		108	70-130	3.66	20	
m+p Xylene	0.0416	0.0040	mg/Kg wet	0.0400		104	70-130	0.432	20	
o-Xylene	0.0204	0.0020	mg/Kg wet	0.0200		102	70-130	0.391	20	
Surrogate: 1,2-Dichloroethane-d4	*0.0500*		mg/Kg wet	0.0500		99.9	70-130			
Surrogate: Toluene-d8	*0.0491*		mg/Kg wet	0.0500		98.3	70-130			
Surrogate: 4-Bromofluorobenzene	*0.0498*		mg/Kg wet	0.0500		99.6	70-130			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330933 - SW-846 3546										
Blank (B330933-BLK1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Biphenyl	ND	0.067	mg/Kg wet							
Acenaphthene	ND	0.17	mg/Kg wet							
Acenaphthylene	ND	0.17	mg/Kg wet							
Acetophenone	ND	0.34	mg/Kg wet							
Aniline	ND	0.34	mg/Kg wet							V-05
Anthracene	ND	0.17	mg/Kg wet							
Benzo(a)anthracene	ND	0.17	mg/Kg wet							
Benzo(a)pyrene	ND	0.17	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.17	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.17	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.17	mg/Kg wet							
Bis(2-chloroethoxy)methane	ND	0.34	mg/Kg wet							
Bis(2-chloroethyl)ether	ND	0.34	mg/Kg wet							
Bis(2-chloroisopropyl)ether	ND	0.34	mg/Kg wet							
Bis(2-Ethylhexyl)phthalate	ND	0.34	mg/Kg wet							
4-Bromophenylphenylether	ND	0.34	mg/Kg wet							
Butylbenzylphthalate	ND	0.34	mg/Kg wet							
4-Chloroaniline	ND	0.66	mg/Kg wet							
2-Chloronaphthalene	ND	0.34	mg/Kg wet							
2-Chlorophenol	ND	0.34	mg/Kg wet							
Chrysene	ND	0.17	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.17	mg/Kg wet							
Dibenzofuran	ND	0.34	mg/Kg wet							
Di-n-butylphthalate	ND	0.34	mg/Kg wet							
1,2-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,3-Dichlorobenzene	ND	0.34	mg/Kg wet							
1,4-Dichlorobenzene	ND	0.34	mg/Kg wet							
3,3-Dichlorobenzidine	ND	0.17	mg/Kg wet							
2,4-Dichlorophenol	ND	0.34	mg/Kg wet							
Diethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dimethylphenol	ND	0.34	mg/Kg wet							
Dimethylphthalate	ND	0.34	mg/Kg wet							
2,4-Dinitrophenol	ND	0.66	mg/Kg wet							
2,4-Dinitrotoluene	ND	0.34	mg/Kg wet							
2,6-Dinitrotoluene	ND	0.34	mg/Kg wet							
Di-n-octylphthalate	ND	0.34	mg/Kg wet							V-05
1,2-Diphenylhydrazine/Azobenzene	ND	0.34	mg/Kg wet							
Fluoranthene	ND	0.17	mg/Kg wet							
Fluorene	ND	0.17	mg/Kg wet							
Hexachlorobenzene	ND	0.34	mg/Kg wet							
Hexachlorobutadiene	ND	0.34	mg/Kg wet							
Hexachloroethane	ND	0.34	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.17	mg/Kg wet							
Isophorone	ND	0.34	mg/Kg wet							
2-Methylnaphthalene	ND	0.17	mg/Kg wet							
2-Methylphenol	ND	0.34	mg/Kg wet							
3/4-Methylphenol	ND	0.34	mg/Kg wet							
Naphthalene	ND	0.17	mg/Kg wet							
Nitrobenzene	ND	0.34	mg/Kg wet							
2-Nitrophenol	ND	0.34	mg/Kg wet							
4-Nitrophenol	ND	0.66	mg/Kg wet							
Pentachlorophenol	ND	0.34	mg/Kg wet							V-05

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330933 - SW-846 3546										
Blank (B330933-BLK1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Phenanthrene	ND	0.17	mg/Kg wet							
Phenol	ND	0.34	mg/Kg wet							
Pyrene	ND	0.17	mg/Kg wet							
Pyridine	ND	0.34	mg/Kg wet							
1,2,4-Trichlorobenzene	ND	0.34	mg/Kg wet							
2,4,5-Trichlorophenol	ND	0.34	mg/Kg wet							
2,4,6-Trichlorophenol	ND	0.34	mg/Kg wet							
Surrogate: 2-Fluorophenol	*5.67*		mg/Kg wet	6.67		85.0	30-130			
Surrogate: Phenol-d6	*5.73*		mg/Kg wet	6.67		85.9	30-130			
Surrogate: Nitrobenzene-d5	*2.60*		mg/Kg wet	3.33		78.0	30-130			
Surrogate: 2-Fluorobiphenyl	*2.65*		mg/Kg wet	3.33		79.5	30-130			
Surrogate: 2,4,6-Tribromophenol	*5.52*		mg/Kg wet	6.67		82.7	30-130			
Surrogate: p-Terphenyl-d14	*2.78*		mg/Kg wet	3.33		83.3	30-130			
LCS (B330933-BS1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Biphenyl	1.53	0.067	mg/Kg wet	1.67		91.9	40-140			
Acenaphthene	1.36	0.17	mg/Kg wet	1.67		81.7	40-140			
Acenaphthylene	1.45	0.17	mg/Kg wet	1.67		87.1	40-140			
Acetophenone	1.44	0.34	mg/Kg wet	1.67		86.7	40-140			
Aniline	1.13	0.34	mg/Kg wet	1.67		67.7	40-140			V-05
Anthracene	1.52	0.17	mg/Kg wet	1.67		91.3	40-140			
Benzo(a)anthracene	1.47	0.17	mg/Kg wet	1.67		88.1	40-140			
Benzo(a)pyrene	1.39	0.17	mg/Kg wet	1.67		83.1	40-140			
Benzo(b)fluoranthene	1.51	0.17	mg/Kg wet	1.67		90.5	40-140			
Benzo(g,h,i)perylene	1.07	0.17	mg/Kg wet	1.67		64.2	40-140			
Benzo(k)fluoranthene	1.59	0.17	mg/Kg wet	1.67		95.7	40-140			
Bis(2-chloroethoxy)methane	1.39	0.34	mg/Kg wet	1.67		83.6	40-140			
Bis(2-chloroethyl)ether	1.53	0.34	mg/Kg wet	1.67		91.9	40-140			
Bis(2-chloroisopropyl)ether	1.44	0.34	mg/Kg wet	1.67		86.6	40-140			
Bis(2-Ethylhexyl)phthalate	1.33	0.34	mg/Kg wet	1.67		79.8	40-140			
4-Bromophenylphenylether	1.44	0.34	mg/Kg wet	1.67		86.5	40-140			
Butylbenzylphthalate	1.34	0.34	mg/Kg wet	1.67		80.7	40-140			
4-Chloroaniline	1.20	0.66	mg/Kg wet	1.67		72.1	15-140			†
2-Chloronaphthalene	1.45	0.34	mg/Kg wet	1.67		86.9	40-140			
2-Chlorophenol	1.44	0.34	mg/Kg wet	1.67		86.3	30-130			
Chrysene	1.49	0.17	mg/Kg wet	1.67		89.2	40-140			
Dibenz(a,h)anthracene	1.13	0.17	mg/Kg wet	1.67		67.8	40-140			
Dibenzofuran	1.47	0.34	mg/Kg wet	1.67		88.4	40-140			
Di-n-butylphthalate	1.43	0.34	mg/Kg wet	1.67		85.6	40-140			
1,2-Dichlorobenzene	1.33	0.34	mg/Kg wet	1.67		79.8	40-140			
1,3-Dichlorobenzene	1.28	0.34	mg/Kg wet	1.67		76.7	40-140			
1,4-Dichlorobenzene	1.25	0.34	mg/Kg wet	1.67		75.0	40-140			
3,3-Dichlorobenzidine	1.69	0.17	mg/Kg wet	1.67		101	40-140			
2,4-Dichlorophenol	1.39	0.34	mg/Kg wet	1.67		83.3	30-130			
Diethylphthalate	1.36	0.34	mg/Kg wet	1.67		81.8	40-140			
2,4-Dimethylphenol	1.42	0.34	mg/Kg wet	1.67		85.0	30-130			
Dimethylphthalate	1.48	0.34	mg/Kg wet	1.67		89.0	40-140			
2,4-Dinitrophenol	1.05	0.66	mg/Kg wet	1.67		62.7	15-140			†
2,4-Dinitrotoluene	1.59	0.34	mg/Kg wet	1.67		95.4	40-140			
2,6-Dinitrotoluene	1.56	0.34	mg/Kg wet	1.67		93.4	40-140			
Di-n-octylphthalate	1.29	0.34	mg/Kg wet	1.67		77.6	40-140			V-05
1,2-Diphenylhydrazine/Azobenzene	1.44	0.34	mg/Kg wet	1.67		86.1	40-140			

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B330933 - SW-846 3546											
LCS (B330933-BS1)				Prepared: 02/08/23 Analyzed: 02/10/23							
Fluoranthene	1.66	0.17	mg/Kg wet	1.67		99.8	40-140				
Fluorene	1.47	0.17	mg/Kg wet	1.67		88.1	40-140				
Hexachlorobenzene	1.48	0.34	mg/Kg wet	1.67		88.6	40-140				
Hexachlorobutadiene	1.28	0.34	mg/Kg wet	1.67		76.9	40-140				
Hexachloroethane	1.29	0.34	mg/Kg wet	1.67		77.6	40-140				
Indeno(1,2,3-cd)pyrene	1.35	0.17	mg/Kg wet	1.67		81.0	40-140				
Isophorone	1.48	0.34	mg/Kg wet	1.67		89.0	40-140				
2-Methylnaphthalene	1.32	0.17	mg/Kg wet	1.67		78.9	40-140				
2-Methylphenol	1.53	0.34	mg/Kg wet	1.67		92.0	30-130				
3/4-Methylphenol	1.61	0.34	mg/Kg wet	1.67		96.6	30-130				
Naphthalene	1.39	0.17	mg/Kg wet	1.67		83.3	40-140				
Nitrobenzene	1.40	0.34	mg/Kg wet	1.67		83.9	40-140				
2-Nitrophenol	1.35	0.34	mg/Kg wet	1.67		80.9	30-130				
4-Nitrophenol	1.73	0.66	mg/Kg wet	1.67		104	15-140				†
Pentachlorophenol	1.12	0.34	mg/Kg wet	1.67		67.0	30-130			V-05	
Phenanthrene	1.52	0.17	mg/Kg wet	1.67		91.4	40-140				
Phenol	1.60	0.34	mg/Kg wet	1.67		96.0	15-140				†
Pyrene	1.32	0.17	mg/Kg wet	1.67		79.5	40-140				
Pyridine	0.914	0.34	mg/Kg wet	1.67		54.9	30-140				†
1,2,4-Trichlorobenzene	1.30	0.34	mg/Kg wet	1.67		78.1	40-140				
2,4,5-Trichlorophenol	1.52	0.34	mg/Kg wet	1.67		91.3	30-130				
2,4,6-Trichlorophenol	1.49	0.34	mg/Kg wet	1.67		89.3	30-130				
Surrogate: 2-Fluorophenol	*6.28*		mg/Kg wet	6.67		94.3	30-130				
Surrogate: Phenol-d6	*6.48*		mg/Kg wet	6.67		97.2	30-130				
Surrogate: Nitrobenzene-d5	*2.95*		mg/Kg wet	3.33		88.6	30-130				
Surrogate: 2-Fluorobiphenyl	*3.01*		mg/Kg wet	3.33		90.3	30-130				
Surrogate: 2,4,6-Tribromophenol	*6.65*		mg/Kg wet	6.67		99.8	30-130				
Surrogate: p-Terphenyl-d14	*2.95*		mg/Kg wet	3.33		88.6	30-130				
LCS Dup (B330933-BSD1)				Prepared: 02/08/23 Analyzed: 02/10/23							
Biphenyl	1.36	0.067	mg/Kg wet	1.67		81.8	40-140	11.6	20		
Acenaphthene	1.24	0.17	mg/Kg wet	1.67		74.5	40-140	9.32	30		
Acenaphthylene	1.31	0.17	mg/Kg wet	1.67		78.3	40-140	10.6	30		
Acetophenone	1.29	0.34	mg/Kg wet	1.67		77.4	40-140	11.3	30		
Aniline	0.868	0.34	mg/Kg wet	1.67		52.1	40-140	26.1	30	V-05	
Anthracene	1.36	0.17	mg/Kg wet	1.67		81.7	40-140	11.1	30		
Benzo(a)anthracene	1.29	0.17	mg/Kg wet	1.67		77.4	40-140	12.9	30		
Benzo(a)pyrene	1.19	0.17	mg/Kg wet	1.67		71.6	40-140	14.9	30		
Benzo(b)fluoranthene	1.30	0.17	mg/Kg wet	1.67		78.1	40-140	14.7	30		
Benzo(g,h,i)perylene	0.989	0.17	mg/Kg wet	1.67		59.3	40-140	7.90	30		
Benzo(k)fluoranthene	1.36	0.17	mg/Kg wet	1.67		81.6	40-140	15.9	30		
Bis(2-chloroethoxy)methane	1.25	0.34	mg/Kg wet	1.67		75.2	40-140	10.6	30		
Bis(2-chloroethyl)ether	1.35	0.34	mg/Kg wet	1.67		81.0	40-140	12.7	30		
Bis(2-chloroisopropyl)ether	1.30	0.34	mg/Kg wet	1.67		77.9	40-140	10.6	30		
Bis(2-Ethylhexyl)phthalate	1.16	0.34	mg/Kg wet	1.67		69.4	40-140	14.0	30		
4-Bromophenylphenylether	1.30	0.34	mg/Kg wet	1.67		78.0	40-140	10.4	30		
Butylbenzylphthalate	1.20	0.34	mg/Kg wet	1.67		72.2	40-140	11.1	30		
4-Chloroaniline	0.911	0.66	mg/Kg wet	1.67		54.7	15-140	27.5	30		†
2-Chloronaphthalene	1.18	0.34	mg/Kg wet	1.67		71.0	40-140	20.2	30		
2-Chlorophenol	1.29	0.34	mg/Kg wet	1.67		77.7	30-130	10.5	30		
Chrysene	1.30	0.17	mg/Kg wet	1.67		78.0	40-140	13.4	30		
Dibenz(a,h)anthracene	1.06	0.17	mg/Kg wet	1.67		63.7	40-140	6.23	30		

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QUALITY CONTROL

Semivolatile Organic Compounds by GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes	
Batch B330933 - SW-846 3546											
LCS Dup (B330933-BSD1)				Prepared: 02/08/23 Analyzed: 02/10/23							
Dibenzofuran	1.32	0.34	mg/Kg wet	1.67		79.0	40-140	11.3	30		
Di-n-butylphthalate	1.31	0.34	mg/Kg wet	1.67		78.5	40-140	8.73	30		
1,2-Dichlorobenzene	1.22	0.34	mg/Kg wet	1.67		73.3	40-140	8.44	30		
1,3-Dichlorobenzene	1.16	0.34	mg/Kg wet	1.67		69.5	40-140	9.85	30		
1,4-Dichlorobenzene	1.19	0.34	mg/Kg wet	1.67		71.2	40-140	5.25	30		
3,3-Dichlorobenzidine	1.27	0.17	mg/Kg wet	1.67		76.0	40-140	28.7	30		
2,4-Dichlorophenol	1.26	0.34	mg/Kg wet	1.67		75.6	30-130	9.74	30		
Diethylphthalate	1.26	0.34	mg/Kg wet	1.67		75.3	40-140	8.27	30		
2,4-Dimethylphenol	1.29	0.34	mg/Kg wet	1.67		77.6	30-130	9.17	30		
Dimethylphthalate	1.35	0.34	mg/Kg wet	1.67		81.3	40-140	9.11	30		
2,4-Dinitrophenol	0.961	0.66	mg/Kg wet	1.67		57.6	15-140	8.44	30		†
2,4-Dinitrotoluene	1.43	0.34	mg/Kg wet	1.67		85.7	40-140	10.8	30		
2,6-Dinitrotoluene	1.49	0.34	mg/Kg wet	1.67		89.4	40-140	4.42	30		
Di-n-octylphthalate	1.12	0.34	mg/Kg wet	1.67		67.2	40-140	14.4	30	V-05	
1,2-Diphenylhydrazine/Azobenzene	1.27	0.34	mg/Kg wet	1.67		76.0	40-140	12.5	30		
Fluoranthene	1.48	0.17	mg/Kg wet	1.67		89.1	40-140	11.4	30		
Fluorene	1.33	0.17	mg/Kg wet	1.67		79.7	40-140	10.0	30		
Hexachlorobenzene	1.39	0.34	mg/Kg wet	1.67		83.5	40-140	5.93	30		
Hexachlorobutadiene	1.19	0.34	mg/Kg wet	1.67		71.5	40-140	7.22	30		
Hexachloroethane	1.21	0.34	mg/Kg wet	1.67		72.5	40-140	6.79	30		
Indeno(1,2,3-cd)pyrene	1.22	0.17	mg/Kg wet	1.67		73.3	40-140	10.0	30		
Isophorone	1.34	0.34	mg/Kg wet	1.67		80.7	40-140	9.83	30		
2-Methylnaphthalene	1.21	0.17	mg/Kg wet	1.67		72.7	40-140	8.23	30		
2-Methylphenol	1.35	0.34	mg/Kg wet	1.67		80.9	30-130	12.9	30		
3/4-Methylphenol	1.42	0.34	mg/Kg wet	1.67		85.1	30-130	12.7	30		
Naphthalene	1.26	0.17	mg/Kg wet	1.67		75.6	40-140	9.72	30		
Nitrobenzene	1.26	0.34	mg/Kg wet	1.67		75.4	40-140	10.7	30		
2-Nitrophenol	1.24	0.34	mg/Kg wet	1.67		74.5	30-130	8.26	30		
4-Nitrophenol	1.53	0.66	mg/Kg wet	1.67		92.1	15-140	12.0	30		†
Pentachlorophenol	1.05	0.34	mg/Kg wet	1.67		62.8	30-130	6.56	30	V-05	
Phenanthrene	1.36	0.17	mg/Kg wet	1.67		81.3	40-140	11.7	30		
Phenol	1.35	0.34	mg/Kg wet	1.67		81.1	15-140	16.8	30		†
Pyrene	1.19	0.17	mg/Kg wet	1.67		71.6	40-140	10.4	30		
Pyridine	0.828	0.34	mg/Kg wet	1.67		49.7	30-140	9.91	30		†
1,2,4-Trichlorobenzene	1.20	0.34	mg/Kg wet	1.67		72.1	40-140	7.99	30		
2,4,5-Trichlorophenol	1.39	0.34	mg/Kg wet	1.67		83.5	30-130	8.97	30		
2,4,6-Trichlorophenol	1.34	0.34	mg/Kg wet	1.67		80.4	30-130	10.5	30		
Surrogate: 2-Fluorophenol	*5.63*		mg/Kg wet	6.67		84.5	30-130				
Surrogate: Phenol-d6	*5.72*		mg/Kg wet	6.67		85.7	30-130				
Surrogate: Nitrobenzene-d5	*2.64*		mg/Kg wet	3.33		79.1	30-130				
Surrogate: 2-Fluorobiphenyl	*2.72*		mg/Kg wet	3.33		81.5	30-130				
Surrogate: 2,4,6-Tribromophenol	*6.02*		mg/Kg wet	6.67		90.3	30-130				
Surrogate: p-Terphenyl-d14	*2.62*		mg/Kg wet	3.33		78.6	30-130				

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QUALITY CONTROL

Polychlorinated Biphenyls By GC/ECD - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330896 - SW-846 3546										
Blank (B330896-BLK1)				Prepared: 02/08/23 Analyzed: 02/09/23						
Aroclor-1016	ND	0.020	mg/Kg wet							
Aroclor-1016 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1221	ND	0.020	mg/Kg wet							
Aroclor-1221 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1232	ND	0.020	mg/Kg wet							
Aroclor-1232 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1242	ND	0.020	mg/Kg wet							
Aroclor-1242 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1248	ND	0.020	mg/Kg wet							
Aroclor-1248 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1254	ND	0.020	mg/Kg wet							
Aroclor-1254 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1260	ND	0.020	mg/Kg wet							
Aroclor-1260 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1262	ND	0.020	mg/Kg wet							
Aroclor-1262 [2C]	ND	0.020	mg/Kg wet							
Aroclor-1268	ND	0.020	mg/Kg wet							
Aroclor-1268 [2C]	ND	0.020	mg/Kg wet							
Surrogate: Decachlorobiphenyl	*0.188*		mg/Kg wet	0.200		94.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.200*		mg/Kg wet	0.200		100	30-150			
Surrogate: Tetrachloro-m-xylene	*0.161*		mg/Kg wet	0.200		80.5	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.183*		mg/Kg wet	0.200		91.6	30-150			
LCS (B330896-BS1)				Prepared: 02/08/23 Analyzed: 02/09/23						
Aroclor-1016	0.17	0.020	mg/Kg wet	0.200		84.8	40-140			
Aroclor-1016 [2C]	0.16	0.020	mg/Kg wet	0.200		77.9	40-140			
Aroclor-1260	0.17	0.020	mg/Kg wet	0.200		84.8	40-140			
Aroclor-1260 [2C]	0.16	0.020	mg/Kg wet	0.200		79.1	40-140			
Surrogate: Decachlorobiphenyl	*0.187*		mg/Kg wet	0.200		93.5	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.198*		mg/Kg wet	0.200		99.2	30-150			
Surrogate: Tetrachloro-m-xylene	*0.159*		mg/Kg wet	0.200		79.3	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.181*		mg/Kg wet	0.200		90.5	30-150			
LCS Dup (B330896-BSD1)				Prepared: 02/08/23 Analyzed: 02/09/23						
Aroclor-1016	0.16	0.020	mg/Kg wet	0.200		80.2	40-140	5.54	30	
Aroclor-1016 [2C]	0.15	0.020	mg/Kg wet	0.200		74.9	40-140	3.85	30	
Aroclor-1260	0.16	0.020	mg/Kg wet	0.200		80.7	40-140	4.91	30	
Aroclor-1260 [2C]	0.15	0.020	mg/Kg wet	0.200		76.1	40-140	3.92	30	
Surrogate: Decachlorobiphenyl	*0.184*		mg/Kg wet	0.200		92.2	30-150			
Surrogate: Decachlorobiphenyl [2C]	*0.196*		mg/Kg wet	0.200		98.2	30-150			
Surrogate: Tetrachloro-m-xylene	*0.158*		mg/Kg wet	0.200		78.9	30-150			
Surrogate: Tetrachloro-m-xylene [2C]	*0.181*		mg/Kg wet	0.200		90.5	30-150			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330895 - SW-846 3546										
Blank (B330895-BLK1)				Prepared: 02/08/23 Analyzed: 02/09/23						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.70*		mg/Kg wet	5.00		74.0	40-140			
Surrogate: o-Terphenyl (OTP)	*3.94*		mg/Kg wet	5.00		78.8	40-140			
Surrogate: 2-Bromonaphthalene	*4.87*		mg/Kg wet	5.00		97.4	40-140			
Surrogate: 2-Fluorobiphenyl	*4.83*		mg/Kg wet	5.00		96.7	40-140			
LCS (B330895-BS1)				Prepared: 02/08/23 Analyzed: 02/09/23						
C9-C18 Aliphatics	25.1	10	mg/Kg wet	30.0		83.7	40-140			
C19-C36 Aliphatics	35.2	10	mg/Kg wet	40.0		88.0	40-140			
Unadjusted C11-C22 Aromatics	72.0	10	mg/Kg wet	85.0		84.7	40-140			
Acenaphthene	4.02	0.10	mg/Kg wet	5.00		80.4	40-140			
Acenaphthylene	3.72	0.10	mg/Kg wet	5.00		74.4	40-140			
Anthracene	3.99	0.10	mg/Kg wet	5.00		79.8	40-140			
Benzo(a)anthracene	4.11	0.10	mg/Kg wet	5.00		82.2	40-140			
Benzo(a)pyrene	4.20	0.10	mg/Kg wet	5.00		84.1	40-140			
Benzo(b)fluoranthene	4.04	0.10	mg/Kg wet	5.00		80.8	40-140			
Benzo(g,h,i)perylene	3.98	0.10	mg/Kg wet	5.00		79.7	40-140			
Benzo(k)fluoranthene	3.89	0.10	mg/Kg wet	5.00		77.8	40-140			
Chrysene	4.31	0.10	mg/Kg wet	5.00		86.1	40-140			
Dibenz(a,h)anthracene	4.10	0.10	mg/Kg wet	5.00		82.1	40-140			
Fluoranthene	4.01	0.10	mg/Kg wet	5.00		80.3	40-140			
Fluorene	3.99	0.10	mg/Kg wet	5.00		79.8	40-140			
Indeno(1,2,3-cd)pyrene	4.03	0.10	mg/Kg wet	5.00		80.5	40-140			
2-Methylnaphthalene	3.86	0.10	mg/Kg wet	5.00		77.2	40-140			
Naphthalene	3.75	0.10	mg/Kg wet	5.00		75.0	40-140			
Phenanthrene	4.06	0.10	mg/Kg wet	5.00		81.2	40-140			
Pyrene	4.10	0.10	mg/Kg wet	5.00		82.0	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.72*		mg/Kg wet	5.00		74.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330895 - SW-846 3546										
LCS (B330895-BS1)				Prepared: 02/08/23 Analyzed: 02/09/23						
Surrogate: o-Terphenyl (OTP)	*3.92*		mg/Kg wet	5.00		78.4	40-140			
Surrogate: 2-Bromonaphthalene	*4.86*		mg/Kg wet	5.00		97.2	40-140			
Surrogate: 2-Fluorobiphenyl	*4.96*		mg/Kg wet	5.00		99.2	40-140			
LCS Dup (B330895-BSD1)				Prepared: 02/08/23 Analyzed: 02/09/23						
C9-C18 Aliphatics	21.8	10	mg/Kg wet	30.0		72.7	40-140	14.1	25	
C19-C36 Aliphatics	33.1	10	mg/Kg wet	40.0		82.9	40-140	6.03	25	
Unadjusted C11-C22 Aromatics	66.1	10	mg/Kg wet	85.0		77.7	40-140	8.57	25	
Acenaphthene	3.59	0.10	mg/Kg wet	5.00		71.7	40-140	11.4	25	
Acenaphthylene	3.32	0.10	mg/Kg wet	5.00		66.3	40-140	11.5	25	
Anthracene	3.68	0.10	mg/Kg wet	5.00		73.5	40-140	8.16	25	
Benzo(a)anthracene	3.80	0.10	mg/Kg wet	5.00		76.0	40-140	7.77	25	
Benzo(a)pyrene	3.88	0.10	mg/Kg wet	5.00		77.7	40-140	7.92	25	
Benzo(b)fluoranthene	3.73	0.10	mg/Kg wet	5.00		74.7	40-140	7.90	25	
Benzo(g,h,i)perylene	3.68	0.10	mg/Kg wet	5.00		73.6	40-140	7.88	25	
Benzo(k)fluoranthene	3.60	0.10	mg/Kg wet	5.00		72.0	40-140	7.72	25	
Chrysene	3.98	0.10	mg/Kg wet	5.00		79.5	40-140	7.97	25	
Dibenz(a,h)anthracene	3.78	0.10	mg/Kg wet	5.00		75.6	40-140	8.22	25	
Fluoranthene	3.72	0.10	mg/Kg wet	5.00		74.4	40-140	7.61	25	
Fluorene	3.67	0.10	mg/Kg wet	5.00		73.4	40-140	8.38	25	
Indeno(1,2,3-cd)pyrene	3.72	0.10	mg/Kg wet	5.00		74.4	40-140	7.94	25	
2-Methylnaphthalene	3.36	0.10	mg/Kg wet	5.00		67.3	40-140	13.8	25	
Naphthalene	3.19	0.10	mg/Kg wet	5.00		63.8	40-140	16.1	25	
Phenanthrene	3.74	0.10	mg/Kg wet	5.00		74.7	40-140	8.34	25	
Pyrene	3.80	0.10	mg/Kg wet	5.00		76.0	40-140	7.63	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.51*		mg/Kg wet	5.00		70.2	40-140			
Surrogate: o-Terphenyl (OTP)	*3.59*		mg/Kg wet	5.00		71.7	40-140			
Surrogate: 2-Bromonaphthalene	*5.17*		mg/Kg wet	5.00		103	40-140			
Surrogate: 2-Fluorobiphenyl	*5.25*		mg/Kg wet	5.00		105	40-140			
Matrix Spike (B330895-MS1)	**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/09/23						
C9-C18 Aliphatics	26.7	11	mg/Kg dry	33.5	ND	79.5	40-140			
C19-C36 Aliphatics	40.9	11	mg/Kg dry	44.7	ND	91.4	40-140			
Unadjusted C11-C22 Aromatics	95.9	11	mg/Kg dry	95.0	ND	101	40-140			
Acenaphthene	4.79	0.11	mg/Kg dry	5.59	ND	85.7	40-140			
Acenaphthylene	4.38	0.11	mg/Kg dry	5.59	ND	78.3	40-140			
Anthracene	4.94	0.11	mg/Kg dry	5.59	ND	88.3	40-140			
Benzo(a)anthracene	5.74	0.11	mg/Kg dry	5.59	ND	103	40-140			
Benzo(a)pyrene	5.98	0.11	mg/Kg dry	5.59	ND	107	40-140			
Benzo(b)fluoranthene	5.89	0.11	mg/Kg dry	5.59	ND	105	40-140			
Benzo(g,h,i)perylene	5.84	0.11	mg/Kg dry	5.59	ND	105	40-140			
Benzo(k)fluoranthene	5.11	0.11	mg/Kg dry	5.59	ND	91.3	40-140			
Chrysene	5.52	0.11	mg/Kg dry	5.59	ND	98.7	40-140			
Dibenz(a,h)anthracene	5.84	0.11	mg/Kg dry	5.59	ND	104	40-140			
Fluoranthene	5.27	0.11	mg/Kg dry	5.59	ND	94.3	40-140			
Fluorene	4.91	0.11	mg/Kg dry	5.59	ND	87.9	40-140			
Indeno(1,2,3-cd)pyrene	6.08	0.11	mg/Kg dry	5.59	ND	109	40-140			
2-Methylnaphthalene	4.58	0.11	mg/Kg dry	5.59	ND	81.9	40-140			
Naphthalene	4.15	0.11	mg/Kg dry	5.59	0.0358	73.7	40-140			
Phenanthrene	5.22	0.11	mg/Kg dry	5.59	ND	93.4	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330895 - SW-846 3546										
Matrix Spike (B330895-MS1)	**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/09/23						
Pyrene	5.41	0.11	mg/Kg dry	5.59	ND	96.7	40-140			
Surrogate: Chlorooctadecane (COD)	*3.83*		mg/Kg dry	5.59		68.5	40-140			
Surrogate: o-Terphenyl (OTP)	*4.84*		mg/Kg dry	5.59		86.5	40-140			
Surrogate: 2-Bromonaphthalene	*5.77*		mg/Kg dry	5.59		103	40-140			
Surrogate: 2-Fluorobiphenyl	*5.72*		mg/Kg dry	5.59		102	40-140			
Matrix Spike Dup (B330895-MSD1)	**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/09/23						
C9-C18 Aliphatics	23.9	11	mg/Kg dry	33.5	ND	71.3	40-140	10.9	50	
C19-C36 Aliphatics	37.0	11	mg/Kg dry	44.7	ND	82.7	40-140	9.99	50	
Unadjusted C11-C22 Aromatics	92.5	11	mg/Kg dry	95.0	ND	97.3	40-140	3.63	50	
Acenaphthene	4.65	0.11	mg/Kg dry	5.59	ND	83.1	40-140	2.98	50	
Acenaphthylene	4.27	0.11	mg/Kg dry	5.59	ND	76.3	40-140	2.62	50	
Anthracene	4.77	0.11	mg/Kg dry	5.59	ND	85.4	40-140	3.40	50	
Benzo(a)anthracene	5.50	0.11	mg/Kg dry	5.59	ND	98.4	40-140	4.15	50	
Benzo(a)pyrene	5.74	0.11	mg/Kg dry	5.59	ND	103	40-140	4.14	50	
Benzo(b)fluoranthene	5.67	0.11	mg/Kg dry	5.59	ND	101	40-140	3.79	50	
Benzo(g,h,i)perylene	5.57	0.11	mg/Kg dry	5.59	ND	99.6	40-140	4.78	50	
Benzo(k)fluoranthene	4.89	0.11	mg/Kg dry	5.59	ND	87.5	40-140	4.31	50	
Chrysene	5.29	0.11	mg/Kg dry	5.59	ND	94.6	40-140	4.27	50	
Dibenz(a,h)anthracene	5.61	0.11	mg/Kg dry	5.59	ND	100	40-140	3.94	50	
Fluoranthene	5.07	0.11	mg/Kg dry	5.59	ND	90.6	40-140	3.99	50	
Fluorene	4.78	0.11	mg/Kg dry	5.59	ND	85.6	40-140	2.62	50	
Indeno(1,2,3-cd)pyrene	5.85	0.11	mg/Kg dry	5.59	ND	105	40-140	3.84	50	
2-Methylnaphthalene	4.49	0.11	mg/Kg dry	5.59	ND	80.2	40-140	2.09	50	
Naphthalene	4.09	0.11	mg/Kg dry	5.59	0.0358	72.6	40-140	1.50	50	
Phenanthrene	5.05	0.11	mg/Kg dry	5.59	ND	90.3	40-140	3.35	50	
Pyrene	5.20	0.11	mg/Kg dry	5.59	ND	93.1	40-140	3.79	50	
Surrogate: Chlorooctadecane (COD)	*3.55*		mg/Kg dry	5.59		63.5	40-140			
Surrogate: o-Terphenyl (OTP)	*4.69*		mg/Kg dry	5.59		83.8	40-140			
Surrogate: 2-Bromonaphthalene	*6.23*		mg/Kg dry	5.59		111	40-140			
Surrogate: 2-Fluorobiphenyl	*6.12*		mg/Kg dry	5.59		109	40-140			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B330929 - SW-846 3050B										
Blank (B330929-BLK1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Antimony	ND	1.6	mg/Kg wet							
Arsenic	ND	3.2	mg/Kg wet							
Barium	ND	1.6	mg/Kg wet							
Beryllium	ND	0.16	mg/Kg wet							
Cadmium	ND	0.32	mg/Kg wet							
Chromium	ND	0.64	mg/Kg wet							
Lead	ND	0.48	mg/Kg wet							
Nickel	ND	0.64	mg/Kg wet							
Selenium	ND	3.2	mg/Kg wet							
Thallium	ND	1.6	mg/Kg wet							
Vanadium	ND	0.64	mg/Kg wet							
Zinc	ND	0.64	mg/Kg wet							
Blank (B330929-BLK2)				Prepared: 02/08/23 Analyzed: 02/14/23						
Silver	ND	0.32	mg/Kg wet							
LCS (B330929-BS1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Antimony	88.0	4.9	mg/Kg wet	111		79.3	0-205.4			
Arsenic	106	9.9	mg/Kg wet	112		94.9	82-118.8			
Barium	153	4.9	mg/Kg wet	154		99.5	81.8-118.2			
Beryllium	118	0.49	mg/Kg wet	121		97.8	82.2-118.2			
Cadmium	183	0.99	mg/Kg wet	196		93.5	82.1-118.4			
Chromium	97.4	2.0	mg/Kg wet	103		94.5	80.8-118.4			
Lead	71.4	1.5	mg/Kg wet	73.2		97.5	82.8-117.3			
Nickel	242	2.0	mg/Kg wet	249		97.0	81.9-118.1			
Selenium	213	9.9	mg/Kg wet	215		99.2	78.1-121.9			
Thallium	80.5	4.9	mg/Kg wet	67.7		119	80.1-120.1			
Vanadium	173	2.0	mg/Kg wet	177		97.6	78-122			
Zinc	347	2.0	mg/Kg wet	360		96.4	79.7-120.3			
LCS (B330929-BS2)				Prepared: 02/08/23 Analyzed: 02/14/23						
Silver	87.7	0.99	mg/Kg wet	78.5		112	78.9-121.1			
LCS Dup (B330929-BSD1)				Prepared: 02/08/23 Analyzed: 02/10/23						
Antimony	81.5	4.7	mg/Kg wet	111		73.4	0-205.4	7.72	30	
Arsenic	101	9.3	mg/Kg wet	112		90.2	82-118.8	5.02	30	
Barium	142	4.7	mg/Kg wet	154		92.1	81.8-118.2	7.72	20	
Beryllium	113	0.47	mg/Kg wet	121		93.7	82.2-118.2	4.33	30	
Cadmium	173	0.93	mg/Kg wet	196		88.3	82.1-118.4	5.71	20	
Chromium	92.3	1.9	mg/Kg wet	103		89.6	80.8-118.4	5.35	30	
Lead	68.3	1.4	mg/Kg wet	73.2		93.3	82.8-117.3	4.47	30	
Nickel	228	1.9	mg/Kg wet	249		91.4	81.9-118.1	5.92	30	
Selenium	201	9.3	mg/Kg wet	215		93.7	78.1-121.9	5.67	30	
Thallium	77.5	4.7	mg/Kg wet	67.7		115	80.1-120.1	3.81	30	
Vanadium	165	1.9	mg/Kg wet	177		93.0	78-122	4.86	30	
Zinc	328	1.9	mg/Kg wet	360		91.1	79.7-120.3	5.66	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B330929 - SW-846 3050B											
LCS Dup (B330929-BSD2)					Prepared: 02/08/23 Analyzed: 02/14/23						
Silver	83.8	0.93	mg/Kg wet	78.5		107		78.9-121.1	4.55	30	
Matrix Spike (B330929-MS1)		**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/10/23						
Antimony	10.1	1.9	mg/Kg dry	18.6	ND	**54.3**	*	75-125			MS-09
Arsenic	18.1	3.7	mg/Kg dry	18.6	1.79	87.4		75-125			
Barium	25.3	1.9	mg/Kg dry	18.6	8.22	91.5		75-125			
Beryllium	17.9	0.19	mg/Kg dry	18.6	0.188	95.3		75-125			
Cadmium	16.7	0.37	mg/Kg dry	18.6	0.157	89.0		75-125			
Chromium	23.8	0.75	mg/Kg dry	18.6	6.49	93.0		75-125			
Lead	21.9	0.56	mg/Kg dry	18.6	4.54	93.3		75-125			
Nickel	20.2	0.75	mg/Kg dry	18.6	3.50	89.6		75-125			
Selenium	16.6	3.7	mg/Kg dry	18.6	ND	89.3		75-125			
Thallium	21.7	1.9	mg/Kg dry	18.6	ND	116		75-125			
Vanadium	24.0	0.75	mg/Kg dry	18.6	6.91	91.8		75-125			
Zinc	85.7	0.75	mg/Kg dry	37.3	46.9	104		75-125			
Matrix Spike (B330929-MS2)		**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/14/23						
Silver	19.6	0.37	mg/Kg dry	18.6	ND	105		75-125			
Matrix Spike Dup (B330929-MSD1)		**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/10/23						
Antimony	10.2	1.8	mg/Kg dry	18.2	ND	**55.9**	*	75-125	0.540	35	MS-09
Arsenic	18.8	3.6	mg/Kg dry	18.2	1.79	93.7		75-125	4.11	35	
Barium	26.1	1.8	mg/Kg dry	18.2	8.22	98.2		75-125	3.19	35	
Beryllium	18.2	0.18	mg/Kg dry	18.2	0.188	99.0		75-125	1.45	35	
Cadmium	16.7	0.36	mg/Kg dry	18.2	0.157	90.9		75-125	0.246	35	
Chromium	24.1	0.73	mg/Kg dry	18.2	6.49	96.5		75-125	0.950	35	
Lead	23.0	0.55	mg/Kg dry	18.2	4.54	101		75-125	4.66	35	
Nickel	20.4	0.73	mg/Kg dry	18.2	3.50	93.0		75-125	1.05	35	
Selenium	16.1	3.6	mg/Kg dry	18.2	ND	88.3		75-125	3.52	35	
Thallium	22.8	1.8	mg/Kg dry	18.2	ND	125		75-125	5.04	35	
Vanadium	25.0	0.73	mg/Kg dry	18.2	6.91	99.3		75-125	3.91	35	
Zinc	80.5	0.73	mg/Kg dry	36.4	46.9	92.4		75-125	6.22	35	
Matrix Spike Dup (B330929-MSD2)		**Source: 23B0766-01**			Prepared: 02/08/23 Analyzed: 02/14/23						
Silver	18.8	0.36	mg/Kg dry	18.2	ND	103		75-125	3.81	35	
Reference (B330929-SRM1) MRL CHECK					Prepared: 02/08/23 Analyzed: 02/14/23						
Lead	0.484	0.50	mg/Kg wet	0.499		97.0		80-120			
Batch B331047 - SW-846 7470A/7471A											
Blank (B331047-BLK1)					Prepared & Analyzed: 02/09/23						
Mercury	ND	0.025	mg/Kg wet								

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD		RPD Limit	Notes
Batch B331047 - SW-846 7470A/7471A											
LCS (B331047-BS1)				Prepared & Analyzed: 02/09/23							
Mercury	21.8	3.7	mg/Kg wet	25.6		85.0	67.2-132.8				
LCS Dup (B331047-BSD1)				Prepared & Analyzed: 02/09/23							
Mercury	31.7	3.7	mg/Kg wet	25.6		124	67.2-132.8	**37.1**	*	20	R-05

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS

Lab Sample ID: B330896-BS1

Date(s) Analyzed: 02/09/2023 02/09/2023

Instrument ID (1): ECD 9

Instrument ID (2): ECD 9

GC Column (1): ID: (mm)

GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	0.17	
	2	0.000	0.000	0.000	0.16	6.1
Aroclor-1260	1	0.000	0.000	0.000	0.17	
	2	0.000	0.000	0.000	0.16	6.1

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IDENTIFICATION SUMMARY FOR SINGLE COMPONENT ANALYTES

SW-846 8082A

LCS Dup

Lab Sample ID: B330896-BSD1 Date(s) Analyzed: 02/09/2023 02/09/2023

Instrument ID (1): ECD 9 Instrument ID (2): ECD 9

GC Column (1): ID: (mm) GC Column (2): ID: (mm)

ANALYTE	COL	RT	RT WINDOW		CONCENTRATION	%RPD
			FROM	TO		
Aroclor-1016	1	0.000	0.000	0.000	0.16	
	2	0.000	0.000	0.000	0.15	6.5
Aroclor-1260	1	0.000	0.000	0.000	0.16	
	2	0.000	0.000	0.000	0.15	6.5

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-02	Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side.
MS-09	Matrix spike recovery and/or matrix spike duplicate recovery outside of control limits. Possibility of sample matrix effects that lead to a low bias for reported result or non-homogeneous sample aliquots cannot be eliminated.
O-32	A dilution was performed as part of the standard analytical procedure.
R-05	Laboratory fortified blank duplicate RPD is outside of control limits. Reduced precision is anticipated for any reported value for this compound.
V-05	Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound.
V-16	Response factor is less than method specified minimum acceptable value. Reduced precision and accuracy may be associated with reported result.
V-20	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.
V-36	Initial calibration verification (ICV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP EPH rev 2.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP EPH rev 2.1 in Water	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 6010D in Soil	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 6010D in Soil	
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,AIHA,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 6010D in Water	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,RI,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA
SW-846 8082A in Soil	
Aroclor-1016	CT,NH,NY,NC,ME,VA,PA
Aroclor-1016 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1221	CT,NH,NY,NC,ME,VA,PA
Aroclor-1221 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1232	CT,NH,NY,NC,ME,VA,PA
Aroclor-1232 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1242	CT,NH,NY,NC,ME,VA,PA
Aroclor-1242 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1248	CT,NH,NY,NC,ME,VA,PA
Aroclor-1248 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1254	CT,NH,NY,NC,ME,VA,PA
Aroclor-1254 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1260	CT,NH,NY,NC,ME,VA,PA
Aroclor-1260 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1262	NH,NY,NC,ME,VA,PA
Aroclor-1262 [2C]	NH,NY,NC,ME,VA,PA
Aroclor-1268	NH,NY,NC,ME,VA,PA
Aroclor-1268 [2C]	NH,NY,NC,ME,VA,PA

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8082A in Water	
Aroclor-1016	CT,NH,NY,NC,ME,VA,PA
Aroclor-1016 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1221	CT,NH,NY,NC,ME,VA,PA
Aroclor-1221 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1232	CT,NH,NY,NC,ME,VA,PA
Aroclor-1232 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1242	CT,NH,NY,NC,ME,VA,PA
Aroclor-1242 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1248	CT,NH,NY,NC,ME,VA,PA
Aroclor-1248 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1254	CT,NH,NY,NC,ME,VA,PA
Aroclor-1254 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1260	CT,NH,NY,NC,ME,VA,PA
Aroclor-1260 [2C]	CT,NH,NY,NC,ME,VA,PA
Aroclor-1262	NH,NY,NC,ME,VA,PA
Aroclor-1262 [2C]	NH,NY,NC,ME,VA,PA
Aroclor-1268	NH,NY,NC,ME,VA,PA
Aroclor-1268 [2C]	NH,NY,NC,ME,VA,PA
SW-846 8260D in Soil	
Acetone	CT,NH,NY,ME
Benzene	CT,NH,NY,ME
Bromobenzene	NH,NY,ME
Bromochloromethane	NH,NY,ME
Bromodichloromethane	CT,NH,NY,ME
Bromoform	CT,NH,NY,ME
Bromomethane	CT,NH,NY,ME
2-Butanone (MEK)	CT,NH,NY,ME
n-Butylbenzene	CT,NH,NY,ME
sec-Butylbenzene	CT,NH,NY,ME
tert-Butylbenzene	CT,NH,NY,ME
Carbon Disulfide	CT,NH,NY,ME
Carbon Tetrachloride	CT,NH,NY,ME
Chlorobenzene	CT,NH,NY,ME
Chlorodibromomethane	CT,NH,NY,ME
Chloroethane	CT,NH,NY,ME
Chloroform	CT,NH,NY,ME
Chloromethane	CT,NH,NY,ME
2-Chlorotoluene	CT,NH,NY,ME
4-Chlorotoluene	CT,NH,NY,ME
1,2-Dibromo-3-chloropropane (DBCP)	NY
1,2-Dibromoethane (EDB)	NY
Dibromomethane	NH,NY,ME
1,2-Dichlorobenzene	CT,NH,NY,ME
1,3-Dichlorobenzene	CT,NH,NY,ME
1,4-Dichlorobenzene	CT,NH,NY,ME
Dichlorodifluoromethane (Freon 12)	NY,ME

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8260D in Soil	
1,1-Dichloroethane	CT,NH,NY,ME
1,2-Dichloroethane	CT,NH,NY,ME
1,1-Dichloroethylene	CT,NH,NY,ME
cis-1,2-Dichloroethylene	CT,NH,NY,ME
trans-1,2-Dichloroethylene	CT,NH,NY,ME
1,2-Dichloropropane	CT,NH,NY,ME
1,3-Dichloropropane	NH,NY,ME
2,2-Dichloropropane	NH,NY,ME
1,1-Dichloropropene	NH,NY,ME
cis-1,3-Dichloropropene	CT,NH,NY,ME
trans-1,3-Dichloropropene	CT,NH,NY,ME
1,4-Dioxane	NY
Ethylbenzene	CT,NH,NY,ME
Hexachlorobutadiene	NH,NY,ME
2-Hexanone (MBK)	CT,NH,NY,ME
Isopropylbenzene (Cumene)	CT,NH,NY,ME
p-Isopropyltoluene (p-Cymene)	NH,NY
Methyl tert-Butyl Ether (MTBE)	NH,NY
Methylene Chloride	CT,NH,NY,ME
4-Methyl-2-pentanone (MIBK)	CT,NH,NY
Naphthalene	NH,NY,ME
n-Propylbenzene	NH,NY
Styrene	CT,NH,NY,ME
1,1,1,2-Tetrachloroethane	CT,NH,NY,ME
1,1,2,2-Tetrachloroethane	CT,NH,NY,ME
Tetrachloroethylene	CT,NH,NY,ME
Toluene	CT,NH,NY,ME
1,2,3-Trichlorobenzene	NY
1,2,4-Trichlorobenzene	NH,NY,ME
1,1,1-Trichloroethane	CT,NH,NY,ME
1,1,2-Trichloroethane	CT,NH,NY,ME
Trichloroethylene	CT,NH,NY,ME
Trichlorofluoromethane (Freon 11)	CT,NH,NY,ME
1,2,3-Trichloropropane	NH,NY,ME
1,2,4-Trimethylbenzene	CT,NH,NY,ME
1,3,5-Trimethylbenzene	CT,NH,NY,ME
Vinyl Chloride	CT,NH,NY,ME
m+p Xylene	CT,NH,NY,ME
o-Xylene	CT,NH,NY,ME
SW-846 8270E in Soil	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY,NH
Aniline	NY,NH
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270E in Soil	
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	NY,NH
1,3-Dichlorobenzene	NY,NH
1,4-Dichlorobenzene	NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine/Azobenzene	NY,NH
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270E in Soil	
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH
SW-846 8270E in Water	
Acenaphthene	CT,NY,NH
Acenaphthylene	CT,NY,NH
Acetophenone	NY
Aniline	CT,NY
Anthracene	CT,NY,NH
Benzo(a)anthracene	CT,NY,NH
Benzo(a)pyrene	CT,NY,NH
Benzo(b)fluoranthene	CT,NY,NH
Benzo(g,h,i)perylene	CT,NY,NH
Benzo(k)fluoranthene	CT,NY,NH
Bis(2-chloroethoxy)methane	CT,NY,NH
Bis(2-chloroethyl)ether	CT,NY,NH
Bis(2-chloroisopropyl)ether	CT,NY,NH
Bis(2-Ethylhexyl)phthalate	CT,NY,NH
4-Bromophenylphenylether	CT,NY,NH
Butylbenzylphthalate	CT,NY,NH
4-Chloroaniline	CT,NY,NH
2-Chloronaphthalene	CT,NY,NH
2-Chlorophenol	CT,NY,NH
Chrysene	CT,NY,NH
Dibenz(a,h)anthracene	CT,NY,NH
Dibenzofuran	CT,NY,NH
Di-n-butylphthalate	CT,NY,NH
1,2-Dichlorobenzene	CT,NY,NH
1,3-Dichlorobenzene	CT,NY,NH
1,4-Dichlorobenzene	CT,NY,NH
3,3-Dichlorobenzidine	CT,NY,NH
2,4-Dichlorophenol	CT,NY,NH
Diethylphthalate	CT,NY,NH
2,4-Dimethylphenol	CT,NY,NH
Dimethylphthalate	CT,NY,NH
2,4-Dinitrophenol	CT,NY,NH
2,4-Dinitrotoluene	CT,NY,NH
2,6-Dinitrotoluene	CT,NY,NH
Di-n-octylphthalate	CT,NY,NH
1,2-Diphenylhydrazine/Azobenzene	NY
Fluoranthene	CT,NY,NH
Fluorene	NY,NH
Hexachlorobenzene	CT,NY,NH
Hexachlorobutadiene	CT,NY,NH
Hexachloroethane	CT,NY,NH

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 8270E in Water	
Indeno(1,2,3-cd)pyrene	CT,NY,NH
Isophorone	CT,NY,NH
2-Methylnaphthalene	CT,NY,NH
2-Methylphenol	CT,NY,NH
3/4-Methylphenol	CT,NY,NH
Naphthalene	CT,NY,NH
Nitrobenzene	CT,NY,NH
2-Nitrophenol	CT,NY,NH
4-Nitrophenol	CT,NY,NH
Pentachlorophenol	CT,NY,NH
Phenanthrene	CT,NY,NH
Phenol	CT,NY,NH
Pyrene	CT,NY,NH
1,2,4-Trichlorobenzene	CT,NY,NH
2,4,5-Trichlorophenol	CT,NY,NH
2,4,6-Trichlorophenol	CT,NY,NH

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO 17025:2017	100033	03/1/2024
CT	Connecticut Department of Public Health	PH-0821	12/31/2024
NY	New York State Department of Health	10899 NELAP	04/1/2023
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2024
RI	Rhode Island Department of Health	LAO00373	12/30/2023
NC	North Carolina Div. of Water Quality	652	12/31/2023
ME	State of Maine	MA00100	06/9/2023
VA	Commonwealth of Virginia	460217	12/14/2023
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2023

23B0766

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Access COC's and Support Requests

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CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021

Page 1 of 1

Company Name:	Horsley Witten Group
Address:	90 Route 6A, Sandwich, MA 02563
Phone:	781-243-1527
Project Name:	Sand Pit Road, Truro
Project Location:	Sand Pit Road, Truro
Project Number:	22129
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	Caroline Armstrong

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☐ Due Date:

Rush-Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsley witten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	[1]Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	EPH w/ PAHs	MCP 14 metals	SVOCs	VOCs	PCBs
1	TP-2(2-4)	2/2/23	1230	grab	S			1				X	X			
2	TP-3(0-2)	2/2/23	1250	grab	S			1				X	X			
3	TP-5(0-2)	2/2/23	10:15	grab	S		3	1				X	X	X	X	X
4	TP-5(6-8)	2/2/23	10:15	grab	S			1				X	X			
5	TP-6(0-2)	2/2/23	830	grab	S			1				X	X	X		X
6	TP-8(2-4)	2/2/23	1025	grab	S		3	1				X	X		X	
7	TP-9(0-2)	2/2/23	1100	grab	S			1				X	X			
8	TP-10(6-8)	2/2/23	1140	grab	S			1				X	X			
9	TP-11(0-2)	2/2/23	1400	grab	S			1				X	X			

Relinquished by: (signature)	Caroline Armstrong	Date/Time: 2/6/23 1520
Received by: (signature)	[illegible]	Date/Time: 2/6/23 1520
Relinquished by: (signature)	[illegible]	Date/Time: 2/6/23 1715
Received by: (signature)	[illegible]	Date/Time: 2/6/23 1715
Relinquished by: (signature)		Date/Time:
Received by: (signature)		Date/Time:
Relinquished by: (signature)		Date/Time:
Received by: (signature)		Date/Time:

Client Comments:
MCP methods
RCS-1

Detection Limit Requirements
MA: RCS-1
CT:
Other:

Special Requirements
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ *AIHA-LAP,LLC*

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? (Y) N
Glassware in freezer? Y / N
Prepackaged Cooler? (Y) / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

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Log In Back-Sheet

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

Pace
PEOPLE ADVANCING SCIENCE

Client: Horsley Witten Group
Project: Sand Pit Rd, Truro
MCP/RCP Required: MA MCP
Deliverable Package Requirement: RCS-1
Location: Sand Pit Rd, Truro
PWSID# (When Applicable): NA
Arrival Method: Courier
Received By / Date / Time: GF 2/6/23 1715
Back-Sheet By / Date / Time: GF 2/7/23 1836
Temperature Method: Gun # 5
Temp ≤ 6° C [✓] Actual Temperature: 2.9
Rush Samples: Yes / (No) Notify
Short Hold: Yes / (No) Notify

Notes regarding Samples/COC outside of SOP:

	True	False
Received on Ice	✓	
Received in Cooler	✓	
Custody Seal: DATE TIME		✓
COC Relinquished	✓	
COC/Samples Labels Agree	✓	
All Samples in Good Condition	✓	
Samples Received within Holding Time	✓	
Is there enough Volume	✓	
Proper Media/Container Used	✓	
Splitting Samples Required		✓
MS/MSD		✓
Trip Blanks		✓
Lab to Filters		✓
COC Legible	✓	

COC Included: (Check all Included)
Client [✓] Analysis [✓] Sampler Name [✓]
Project [✓] IDs [✓] Collection Date/Time [✓]

All Samples Proper PH N/A [ ] [ ]

Container (Circle when applicable)	UnP	HCl	HNO3	H2SO4	NaOH	Trizma	NaS2O3	Other Preservative
1L Amber Plastic								
500 mL Amber Plastic								
250 mL Amber Plastic								
Other Amber Clear Plastic								
16oz Amber Clear								
8oz (Amber) Clear	4							
4oz Amber Clear								
2oz Amber Clear								
Col/Bacteria								
Flashpoint								
Plastic Bag								
SOC Kit								
Perchlorate								
Encore								
Frozen								

	Proper Headspace	UnP	HCl	MeOH	Bisulfate	DI	Thiosulfate	Sulfuric	Other
Vials	1			2	4				

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Pace New England	Project #: 23B0766
Project Location: Sand Pit Rd, Truro, MA	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

23B0766-01 thru 23B0766-09

Matrices: Soil

CAM Protocol (check all that below)

8260 VOC CAM II A (X)	7470/7471 Hg CAM IIIB (X)	MassDEP VPH (GC/PID/FID) CAM IV A ( )	8082 PCB CAM V A (X)	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )
8270 SVOC CAM II B (X)	7010 Metals CAM III C ( )	MassDEP VPH (GC/MS) CAM IV C ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	MassDEP EPH CAM IV B (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

<u>Data User Note:</u> Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Lisa Worthington Position: Technical Representative

Printed Name: Lisa A. Worthington Date: 02/28/23

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February 22, 2023

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Sand Pit Rd., Truro, MA.
Client Job Number:
Project Number: 22129
Laboratory Work Order Number: 23B1132

Enclosed are results of analyses for samples as received by the laboratory on February 9, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Kaitlyn A. Feliciano
Project Manager

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Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 2/22/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22129

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 23B1132

The results of analyses performed on the following samples submitted to CON-TEST, a Pace Analytical Laboratory, are found in this report.

PROJECT LOCATION: Sand Pit Rd., Truro, MA.

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
TP-5 (6-8)	23B1132-01	Soil		MADEP EPH rev 2.1 SM 2540G SW-846 6010D SW-846 7471B	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SM 2540G

Qualifications:

H-03

Sample received after recommended holding time was exceeded.

Analyte & Samples(s) Qualified:

% Solids
23B1132-01[TP-5 (6-8)]

SW-846 6010D

Qualifications:

L-07

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

Analyte & Samples(s) Qualified:

Arsenic
B331335-BS1

Lead
B331335-BS4

Silver
B331335-BS1

M-10

The reporting limit verification for the AIHA lead program is outside of control limits for this element. Any reported result at or near the detection limit may be biased on the high side.

Analyte & Samples(s) Qualified:

Lead
23B1132-01[TP-5 (6-8)], B331335-SRM1

SW-846 7471B

Qualifications:

MS-22

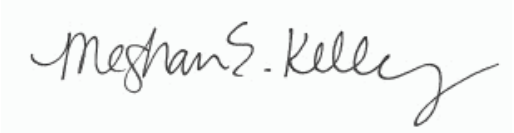
Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.

Analyte & Samples(s) Qualified:

Mercury
B331454-MS1

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The results of analyses reported only relate to samples submitted to Con-Test, a Pace Analytical Laboratory, for testing.
I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Meghan E. Kelley
Reporting Specialist

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Sand Pit Rd., Truro, MA. Sample Description: Work Order: 23B1132

Date Received: 2/9/2023

Field Sample #: TP-5 (6-8) Sampled: 2/2/2023 10:15

Sample ID: 23B1132-01

Sample Matrix: Soil

Petroleum Hydrocarbons Analyses - EPH

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
C9-C18 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
C19-C36 Aliphatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Unadjusted C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
C11-C22 Aromatics	ND	11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Acenaphthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Acenaphthylene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Benzo(a)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Benzo(a)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Benzo(b)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Benzo(g,h,i)perylene	0.17	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Benzo(k)fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Chrysene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Dibenz(a,h)anthracene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Fluoranthene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Fluorene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Indeno(1,2,3-cd)pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
2-Methylnaphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Naphthalene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Phenanthrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB
Pyrene	ND	0.11	mg/Kg dry	1		MADEP EPH rev 2.1	2/10/23	2/15/23 10:49	GJB

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
Chlorooctadecane (COD)	66.9	40-140		2/15/23 10:49
o-Terphenyl (OTP)	73.8	40-140		2/15/23 10:49
2-Bromonaphthalene	74.8	40-140		2/15/23 10:49
2-Fluorobiphenyl	79.2	40-140		2/15/23 10:49

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Project Location: Sand Pit Rd., Truro, MA. Sample Description: Work Order: 23B1132

Date Received: 2/9/2023

Field Sample #: TP-5 (6-8) Sampled: 2/2/2023 10:15

Sample ID: 23B1132-01

Sample Matrix: Soil

Metals Analyses (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Antimony	ND	1.8	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Arsenic	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Barium	9.8	1.8	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Beryllium	0.22	0.18	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Cadmium	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Chromium	6.1	0.72	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Lead	6.4	0.54	mg/Kg dry	1	M-10	SW-846 6010D	2/13/23	2/16/23 18:31	HNN
Mercury	ND	0.027	mg/Kg dry	1		SW-846 7471B	2/14/23	2/15/23 15:19	AAJ
Nickel	2.8	0.72	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Selenium	ND	3.6	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Silver	ND	0.36	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Thallium	ND	1.8	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Vanadium	8.9	0.72	mg/Kg dry	1		SW-846 6010D	2/13/23	2/15/23 16:24	ATP
Zinc	9.7	0.72	mg/Kg dry	1		SW-846 6010D	2/13/23	2/16/23 18:31	HNN

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Project Location: Sand Pit Rd., Truro, MA. Sample Description: Work Order: 23B1132

Date Received: 2/9/2023

Field Sample #: TP-5 (6-8) Sampled: 2/2/2023 10:15

Sample ID: 23B1132-01

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	91.0		% Wt	1	H-03	SM 2540G	2/11/23	2/11/23 7:44	WDC

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Sample Extraction Data

Prep Method: SW-846 3546 **Analytical Method: MADEP EPH rev 2.1**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B1132-01 [TP-5 (6-8)]	B331184	20.0	2.00	02/10/23

Prep Method: % Solids **Analytical Method: SM 2540G**

Lab Number [Field ID]	Batch	Date
23B1132-01 [TP-5 (6-8)]	B331289	02/11/23

Prep Method: SW-846 3050B **Analytical Method: SW-846 6010D**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B1132-01 [TP-5 (6-8)]	B331335	1.52	50.0	02/13/23

Prep Method: SW-846 7470A/7471A **Analytical Method: SW-846 7471B**

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
23B1132-01 [TP-5 (6-8)]	B331454	0.604	50.0	02/14/23

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B331184 - SW-846 3546										
Blank (B331184-BLK1)				Prepared: 02/10/23 Analyzed: 02/14/23						
C9-C18 Aliphatics	ND	10	mg/Kg wet							
C19-C36 Aliphatics	ND	10	mg/Kg wet							
Unadjusted C11-C22 Aromatics	ND	10	mg/Kg wet							
C11-C22 Aromatics	ND	10	mg/Kg wet							
Acenaphthene	ND	0.10	mg/Kg wet							
Acenaphthylene	ND	0.10	mg/Kg wet							
Anthracene	ND	0.10	mg/Kg wet							
Benzo(a)anthracene	ND	0.10	mg/Kg wet							
Benzo(a)pyrene	ND	0.10	mg/Kg wet							
Benzo(b)fluoranthene	ND	0.10	mg/Kg wet							
Benzo(g,h,i)perylene	ND	0.10	mg/Kg wet							
Benzo(k)fluoranthene	ND	0.10	mg/Kg wet							
Chrysene	ND	0.10	mg/Kg wet							
Dibenz(a,h)anthracene	ND	0.10	mg/Kg wet							
Fluoranthene	ND	0.10	mg/Kg wet							
Fluorene	ND	0.10	mg/Kg wet							
Indeno(1,2,3-cd)pyrene	ND	0.10	mg/Kg wet							
2-Methylnaphthalene	ND	0.10	mg/Kg wet							
Naphthalene	ND	0.10	mg/Kg wet							
Phenanthrene	ND	0.10	mg/Kg wet							
Pyrene	ND	0.10	mg/Kg wet							
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet							
Surrogate: Chlorooctadecane (COD)	*3.40*		mg/Kg wet	5.00		68.1	40-140			
Surrogate: o-Terphenyl (OTP)	*4.30*		mg/Kg wet	5.00		86.0	40-140			
Surrogate: 2-Bromonaphthalene	*4.77*		mg/Kg wet	5.00		95.4	40-140			
Surrogate: 2-Fluorobiphenyl	*4.76*		mg/Kg wet	5.00		95.2	40-140			
LCS (B331184-BS1)				Prepared: 02/10/23 Analyzed: 02/14/23						
C9-C18 Aliphatics	20.6	10	mg/Kg wet	30.0		68.7	40-140			
C19-C36 Aliphatics	34.2	10	mg/Kg wet	40.0		85.5	40-140			
Unadjusted C11-C22 Aromatics	88.4	10	mg/Kg wet	85.0		104	40-140			
Acenaphthene	4.28	0.10	mg/Kg wet	5.00		85.6	40-140			
Acenaphthylene	3.86	0.10	mg/Kg wet	5.00		77.3	40-140			
Anthracene	4.68	0.10	mg/Kg wet	5.00		93.6	40-140			
Benzo(a)anthracene	5.42	0.10	mg/Kg wet	5.00		108	40-140			
Benzo(a)pyrene	5.59	0.10	mg/Kg wet	5.00		112	40-140			
Benzo(b)fluoranthene	5.56	0.10	mg/Kg wet	5.00		111	40-140			
Benzo(g,h,i)perylene	5.51	0.10	mg/Kg wet	5.00		110	40-140			
Benzo(k)fluoranthene	4.85	0.10	mg/Kg wet	5.00		97.0	40-140			
Chrysene	5.23	0.10	mg/Kg wet	5.00		105	40-140			
Dibenz(a,h)anthracene	5.51	0.10	mg/Kg wet	5.00		110	40-140			
Fluoranthene	4.99	0.10	mg/Kg wet	5.00		99.8	40-140			
Fluorene	4.53	0.10	mg/Kg wet	5.00		90.7	40-140			
Indeno(1,2,3-cd)pyrene	5.76	0.10	mg/Kg wet	5.00		115	40-140			
2-Methylnaphthalene	3.80	0.10	mg/Kg wet	5.00		76.1	40-140			
Naphthalene	3.13	0.10	mg/Kg wet	5.00		62.5	40-140			
Phenanthrene	4.92	0.10	mg/Kg wet	5.00		98.4	40-140			
Pyrene	5.14	0.10	mg/Kg wet	5.00		103	40-140			
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.29*		mg/Kg wet	5.00		65.8	40-140			

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QUALITY CONTROL

Petroleum Hydrocarbons Analyses - EPH - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B331184 - SW-846 3546										
LCS (B331184-BS1)				Prepared: 02/10/23 Analyzed: 02/14/23						
Surrogate: o-Terphenyl (OTP)	*4.59*		mg/Kg wet	5.00		91.9	40-140			
Surrogate: 2-Bromonaphthalene	*4.79*		mg/Kg wet	5.00		95.7	40-140			
Surrogate: 2-Fluorobiphenyl	*4.78*		mg/Kg wet	5.00		95.6	40-140			
LCS Dup (B331184-BSD1)				Prepared: 02/10/23 Analyzed: 02/14/23						
C9-C18 Aliphatics	21.8	10	mg/Kg wet	30.0		72.5	40-140	5.40	25	
C19-C36 Aliphatics	35.2	10	mg/Kg wet	40.0		87.9	40-140	2.84	25	
Unadjusted C11-C22 Aromatics	75.0	10	mg/Kg wet	85.0		88.3	40-140	16.4	25	
Acenaphthene	3.55	0.10	mg/Kg wet	5.00		70.9	40-140	18.8	25	
Acenaphthylene	3.21	0.10	mg/Kg wet	5.00		64.3	40-140	18.4	25	
Anthracene	3.90	0.10	mg/Kg wet	5.00		78.0	40-140	18.2	25	
Benzo(a)anthracene	4.55	0.10	mg/Kg wet	5.00		91.0	40-140	17.5	25	
Benzo(a)pyrene	4.68	0.10	mg/Kg wet	5.00		93.6	40-140	17.7	25	
Benzo(b)fluoranthene	4.66	0.10	mg/Kg wet	5.00		93.2	40-140	17.6	25	
Benzo(g,h,i)perylene	4.66	0.10	mg/Kg wet	5.00		93.2	40-140	16.8	25	
Benzo(k)fluoranthene	4.07	0.10	mg/Kg wet	5.00		81.3	40-140	17.5	25	
Chrysene	4.40	0.10	mg/Kg wet	5.00		88.0	40-140	17.3	25	
Dibenz(a,h)anthracene	4.63	0.10	mg/Kg wet	5.00		92.6	40-140	17.4	25	
Fluoranthene	4.18	0.10	mg/Kg wet	5.00		83.7	40-140	17.6	25	
Fluorene	3.74	0.10	mg/Kg wet	5.00		74.8	40-140	19.2	25	
Indeno(1,2,3-cd)pyrene	4.83	0.10	mg/Kg wet	5.00		96.6	40-140	17.7	25	
2-Methylnaphthalene	3.33	0.10	mg/Kg wet	5.00		66.6	40-140	13.2	25	
Naphthalene	3.05	0.10	mg/Kg wet	5.00		61.0	40-140	2.44	25	
Phenanthrene	4.08	0.10	mg/Kg wet	5.00		81.6	40-140	18.6	25	
Pyrene	4.29	0.10	mg/Kg wet	5.00		85.9	40-140	17.9	25	
Naphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
2-Methylnaphthalene-aliphatic fraction	ND	0.10	mg/Kg wet	5.00			0-5			
Surrogate: Chlorooctadecane (COD)	*3.33*		mg/Kg wet	5.00		66.5	40-140			
Surrogate: o-Terphenyl (OTP)	*3.75*		mg/Kg wet	5.00		75.0	40-140			
Surrogate: 2-Bromonaphthalene	*4.22*		mg/Kg wet	5.00		84.4	40-140			
Surrogate: 2-Fluorobiphenyl	*4.20*		mg/Kg wet	5.00		84.1	40-140			

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B331335 - SW-846 3050B											
Blank (B331335-BLK1)				Prepared: 02/13/23 Analyzed: 02/15/23							
Antimony	ND	1.6	mg/Kg wet								
Arsenic	ND	3.2	mg/Kg wet								
Barium	ND	1.6	mg/Kg wet								
Beryllium	ND	0.16	mg/Kg wet								
Cadmium	ND	0.32	mg/Kg wet								
Chromium	ND	0.64	mg/Kg wet								
Nickel	ND	0.64	mg/Kg wet								
Selenium	ND	3.2	mg/Kg wet								
Silver	ND	0.32	mg/Kg wet								
Thallium	ND	1.6	mg/Kg wet								
Vanadium	ND	0.64	mg/Kg wet								
Blank (B331335-BLK2)				Prepared: 02/13/23 Analyzed: 02/16/23							
Lead	ND	0.48	mg/Kg wet								
Zinc	ND	0.64	mg/Kg wet								
LCS (B331335-BS1)				Prepared: 02/13/23 Analyzed: 02/15/23							
Antimony	89.4	5.0	mg/Kg wet	111		80.5		0-205.4			
Arsenic	86.7	9.9	mg/Kg wet	112		**77.4**	*	82-118.8			L-07
Barium	140	5.0	mg/Kg wet	154		90.7		81.8-118.2			
Beryllium	124	0.50	mg/Kg wet	121		103		82.2-118.2			
Cadmium	189	0.99	mg/Kg wet	196		96.3		82.1-118.4			
Chromium	92.6	2.0	mg/Kg wet	103		89.9		80.8-118.4			
Nickel	235	2.0	mg/Kg wet	249		94.2		81.9-118.1			
Selenium	188	9.9	mg/Kg wet	215		87.4		78.1-121.9			
Silver	60.8	0.99	mg/Kg wet	78.5		**77.4**	*	78.9-121.1			L-07
Thallium	66.6	5.0	mg/Kg wet	67.7		98.3		80.1-120.1			
Vanadium	156	2.0	mg/Kg wet	177		88.2		78-122			
LCS (B331335-BS2)				Prepared: 02/13/23 Analyzed: 02/16/23							
Zinc	304	2.0	mg/Kg wet	360		84.6		79.7-120.3			
LCS (B331335-BS4)				Prepared: 02/13/23 Analyzed: 02/19/23							
Lead	55.5	1.5	mg/Kg wet	73.2		**75.8**	*	82.8-117.3			L-07
LCS Dup (B331335-BSD1)				Prepared: 02/13/23 Analyzed: 02/15/23							
Antimony	102	5.0	mg/Kg wet	111		92.2		0-205.4	13.5	30	
Arsenic	97.9	9.9	mg/Kg wet	112		87.4		82-118.8	12.2	30	
Barium	156	5.0	mg/Kg wet	154		101		81.8-118.2	10.8	20	
Beryllium	141	0.50	mg/Kg wet	121		117		82.2-118.2	12.8	30	
Cadmium	206	0.99	mg/Kg wet	196		105		82.1-118.4	8.69	20	
Chromium	108	2.0	mg/Kg wet	103		105		80.8-118.4	15.1	30	
Nickel	266	2.0	mg/Kg wet	249		107		81.9-118.1	12.7	30	
Selenium	208	9.9	mg/Kg wet	215		96.7		78.1-121.9	10.1	30	
Silver	71.3	0.99	mg/Kg wet	78.5		90.8		78.9-121.1	15.9	30	
Thallium	72.6	5.0	mg/Kg wet	67.7		107		80.1-120.1	8.67	30	
Vanadium	177	2.0	mg/Kg wet	177		100		78-122	12.8	30	

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QUALITY CONTROL

Metals Analyses (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC		%REC Limits	RPD	RPD Limit	Notes
Batch B331335 - SW-846 3050B											
LCS Dup (B331335-BSD2)				Prepared: 02/13/23 Analyzed: 02/16/23							
Zinc	339	2.0	mg/Kg wet	360		94.3		79.7-120.3	10.8	30	
LCS Dup (B331335-BSD4)				Prepared: 02/13/23 Analyzed: 02/16/23							
Lead	65.6	1.5	mg/Kg wet	73.2		89.7		82.8-117.3	16.7	30	
Reference (B331335-SRM1) MRL CHECK				Prepared: 02/13/23 Analyzed: 02/19/23							
Lead	0.645	0.50	mg/Kg wet	0.497		**130**	*	80-120			M-10
Batch B331454 - SW-846 7470A/7471A											
Blank (B331454-BLK1)				Prepared: 02/14/23 Analyzed: 02/15/23							
Mercury	ND	0.024	mg/Kg wet								
LCS (B331454-BS1)				Prepared: 02/14/23 Analyzed: 02/15/23							
Mercury	24.9	3.7	mg/Kg wet	25.6		97.3		67.2-132.8			
LCS Dup (B331454-BSD1)				Prepared: 02/14/23 Analyzed: 02/15/23							
Mercury	27.3	3.7	mg/Kg wet	25.6		107		67.2-132.8	9.15	20	
Matrix Spike (B331454-MS1)	**Source: 23B1132-01**			Prepared: 02/14/23 Analyzed: 02/15/23							
Mercury	0.274	0.027	mg/Kg dry	0.366	ND	**74.9**	*	80-120			MS-22
Matrix Spike Dup (B331454-MSD1)	**Source: 23B1132-01**			Prepared: 02/14/23 Analyzed: 02/15/23							
Mercury	0.299	0.027	mg/Kg dry	0.363	ND	82.4		80-120	8.72	20	

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QUALITY CONTROL

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total) - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B331289 - % Solids										
Duplicate (B331289-DUP3)	**Source: 23B1132-01**			Prepared & Analyzed: 02/11/23						
% Solids	92.1		% Wt		91.0			1.15	10	

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
H-03	Sample received after recommended holding time was exceeded.
L-07	Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.
M-10	The reporting limit verification for the AIHA lead program is outside of control limits for this element. Any reported result at or near the detection limit may be biased on the high side.
MS-22	Either matrix spike or MS duplicate is outside of control limits, but the other is within limits. RPD between the two MS/MSD results is within method specified criteria.

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
MADEP EPH rev 2.1 in Soil	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
MADEP EPH rev 2.1 in Water	
C9-C18 Aliphatics	CT,NC,ME,NH-P
C19-C36 Aliphatics	CT,NC,ME,NH-P
Unadjusted C11-C22 Aromatics	CT,NC,ME,NH-P
C11-C22 Aromatics	CT,NC,ME,NH-P
Acenaphthene	CT,NC,ME,NH-P
Acenaphthylene	CT,NC,ME,NH-P
Anthracene	CT,NC,ME,NH-P
Benzo(a)anthracene	CT,NC,ME,NH-P
Benzo(a)pyrene	CT,NC,ME,NH-P
Benzo(b)fluoranthene	CT,NC,ME,NH-P
Benzo(g,h,i)perylene	CT,NC,ME,NH-P
Benzo(k)fluoranthene	CT,NC,ME,NH-P
Chrysene	CT,NC,ME,NH-P
Dibenz(a,h)anthracene	CT,NC,ME,NH-P
Fluoranthene	CT,NC,ME,NH-P
Fluorene	CT,NC,ME
Indeno(1,2,3-cd)pyrene	CT,NC,ME,NH-P
2-Methylnaphthalene	CT,NC
Naphthalene	CT,NC,ME,NH-P
Phenanthrene	CT,NC,ME,NH-P
Pyrene	CT,NC,ME,NH-P
SW-846 6010D in Soil	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,NC

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CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SW-846 6010D in Soil	
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,AIHA,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,ME,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 6010D in Water	
Antimony	CT,NH,NY,ME,VA,NC
Arsenic	CT,NH,NY,ME,VA,RI,NC
Barium	CT,NH,NY,ME,VA,NC
Beryllium	CT,NH,NY,ME,VA,NC
Cadmium	CT,NH,NY,ME,VA,NC
Chromium	CT,NH,NY,ME,VA,NC
Lead	CT,NH,NY,ME,VA,NC
Nickel	CT,NH,NY,ME,VA,NC
Selenium	CT,NH,NY,ME,VA,NC
Silver	CT,NH,NY,ME,VA,NC
Thallium	CT,NH,NY,VA,NC
Vanadium	CT,NH,NY,ME,VA,NC
Zinc	CT,NH,NY,ME,VA,NC
SW-846 7471B in Soil	
Mercury	CT,NH,NY,NC,ME,VA

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO 17025:2017	100033	03/1/2024
CT	Connecticut Department of Public Health	PH-0821	12/31/2024
NY	New York State Department of Health	10899 NELAP	04/1/2023
NH	New Hampshire Environmental Lab	2516 NELAP	02/5/2024
RI	Rhode Island Department of Health	LAO00373	12/30/2023
NC	North Carolina Div. of Water Quality	652	12/31/2023
ME	State of Maine	MA00100	06/9/2023
VA	Commonwealth of Virginia	460217	12/14/2023
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2023

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Access COC's and Support Requests

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Page 1 of 1

Company Name:	Horsley Witten Group
Address:	90 Route 6A, Sandwich, MA 02563
Phone:	781-243-1527
Project Name:	Sand Pit Road, Truro
Project Location:	Sand Pit Road, Truro
Project Number:	22129
Project Manager:	Bryan Massa
Pace Quote Name/Number:	
Invoice Recipient:	
Sampled By:	Caroline Armstrong

Requested Turnaround Time
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☐ Due Date:

Rush Approval Required
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

Data Delivery
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsley witten.com
Fax To #:

Dissolved Metals Samples
○ Field Filtered
○ Lab to Filter

Orthophosphate Samples
○ Field Filtered
○ Lab to Filter

PCB ONLY
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

Pace Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE	EPH w/ PAHs	MCP 14 metals
1	TP-6(6-8)	2/2/23	10:15	grab	S			1				X	X

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS 1
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[1] Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

[2] Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

Relinquished by: (signature)	Date/Time: 2/9 1100
Received by: (signature)	Date/Time: 2/9/23 1100
Relinquished by: (signature)	Date/Time: 2/9/23 1255
Received by: (signature)	Date/Time: 2/9/23 1255
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:
Relinquished by: (signature)	Date/Time:
Received by: (signature)	Date/Time:

Client Comments: sample included on chain from same project, picked up 2/6/23 (sample was misplaced during pickup)
MCP methods, RCS-1

Detection Limit Requirements
MA RCS-1
CT
Other

Special Requirements
MA MCP Required ☒
MCP Certification Form Required
CT RCP Required ☐
RCP Certification Form Required
MA State DW Required ☐
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP, LLC

Lab Comments:

Disclaimer: Pace Analytical is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

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Log In Back-Sheet

Login Sample Receipt Checklist – (Rejection Criteria Listing – Using Acceptance Policy) Any False statement will be brought to the attention of the Client – True or False

Pace
PEOPLE ADVANCING SCIENCE

Client: Horsley Witten Group
Project: Sand Pit Road (# 22109)
MCP/RCP Required: MA - MCP
Deliverable Package Req.: RCS-1
Location: Sand Pit Rd, Truro, MA
PWSID# (When Applicable): n/a
Arrival Method:

Courier ☑ Fed Ex ☐ Walk In ☐ Other ☐

Received By / Date / Time: MKM 2/9/23 1255
Back-Sheet By / Date / Time: MKM 2/9/23 1832
Temperature Method: Gun # 3
Temp ☑ < 6° C Actual Temperature: 2.1
Rush Samples: Yes / No Notify: No
Short Hold: Yes / No Notify: No

Notes regarding Samples/COC outside of SOP:

	True	False
Received on Ice	☑	☐
Received in Cooler	☑	☐
Custody Seal: DATE TIME	☐	☑
COC Relinquished	☑	☐
COC/Samples Labels Agree	☑	☐
All Samples in Good Condition	☑	☐
Samples Received within Holding Time	☑	☐
Is there enough Volume	☑	☐
Proper Media/Container Used	☑	☐
Splitting Samples Required	☐	☑
MS/MSD	☐	☑
Trip Blanks	☐	☑
Lab to Filters	☐	☑
COC Legible	☑	☐

COC Included: (Check all included)

Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper pH: (N/A) ☐ ☐

Container (Circle when applicable)	UnP	HCl	HNO3	H2SO4	NaOH	Trizma	NaS2O3	Other Preservative
1L Amber Plastic								
500 mL Amber Plastic								
250 mL Amber Plastic								
Other Amber Clear Plastic								
16oz Amber Clear								
8oz (Amber) Clear	1							
4oz Amber Clear								
2oz Amber Clear								
Col/Bacteria								
Flashpoint								
Plastic Bag								
SOC Kit								
Perchlorate								
Encore								
Frozen								

	Proper Headspace	UnP	HCl	MeOH	Bisulfate	DI	Thiosulfate	Sulfuric	Other
Vials									

MADEP MCP Analytical Method Report Certification Form

Laboratory Name: Pace New England	Project #: 23B1132
Project Location: Sand Pit Rd., Truro, MA.	RTN:

This Form provides certifications for the following data set: [list Laboratory Sample ID Number(s)]

23B1132-01

Matrices: Soil

CAM Protocol (check all that below)

8260 VOC CAM II A ( )	7470/7471 Hg CAM IIIB (X)	MassDEP VPH (GC/PID/FID) CAM IV A ( )	8082 PCB CAM V A ( )	9014 Total Cyanide/PAC CAM VI A ( )	6860 Perchlorate CAM VIII B ( )
8270 SVOC CAM II B ( )	7010 Metals CAM III C ( )	MassDEP VPH (GC/MS) CAM IV C ( )	8081 Pesticides CAM V B ( )	7196 Hex Cr CAM VI B ( )	MassDEP APH CAM IX A ( )
6010 Metals CAM III A (X)	6020 Metals CAM III D ( )	MassDEP EPH CAM IV B (X)	8151 Herbicides CAM V C ( )	8330 Explosives CAM VIII A ( )	TO-15 VOC CAM IX B ( )

Affirmative response to Questions A throughF is required for "Presumptive Certainty" status

A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	☑ Yes	☐ No[1]
B	Were the analytical method(s) and all associated QC requirements specificed in the selected CAM protocol(s) followed?	☑ Yes	☐ No[1]
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	☑ Yes	☐ No[1]
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, Quality Assurance and Quality Control Guidlines for the Acquisition and Reporting of Analytical Data?	☑ Yes	☐ No[1]
E a	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	☑ Yes	☐ No[1]
E b	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	☐ Yes	☐ No[1]
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all No responses to Qestions A through E)?	☑ Yes	☐ No[1]

A response to questions G, H and I below is required for "Presumptive Certainty" status

G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

***Data User Note:* Data that achieve "Presumptive Certainty" status may not necessarily meet the data usability and representativeness requirements described in 310 CMR 40. 1056 (2)(k) and WSC-07-350.**

H	Were all QC perfomance standards specified in the CAM protocol(s) achieved?	☐ Yes	☑ No[1]
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	☑ Yes	☐ No[1]

[1] *All Negative responses must be addressed in an attached Environmental Laboratory case narrative.*

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Meghan E. Kelley Position: Reporting Specialist

Printed Name: Meghan E. Kelley Date: 02/22/23

ANALYTICAL REPORT

Lab Number:	L2308720
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	SAND PIT ROAD, TRURO
Project Number:	22129
Report Date:	02/24/23

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA086), NH NELAP (2064), CT (PH-0574), IL (200077), ME (MA00086), MD (348), NJ (MA935), NY (11148), NC (25700/666), PA (68-03671), RI (LAO00065), TX (T104704476), VT (VT-0935), VA (460195), USDA (Permit #P330-17-00196).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308720
Report Date: 02/24/23

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2308720-01	MW-1	WATER	TRURO, MA	02/15/23 15:00	02/17/23
L2308720-02	MW-2	WATER	TRURO, MA	02/15/23 12:15	02/17/23
L2308720-03	MW-3	WATER	TRURO, MA	02/15/23 13:30	02/17/23

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	YES
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES

A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	NO
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	NO
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES

For any questions answered "No", please refer to the case narrative section on the following page(s).

Please note that sample matrix information is located in the Sample Results section of this report.

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308720
Project Number:	22129	**Report Date:**	02/24/23

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: SAND PIT ROAD, TRURO **Lab Number:** L2308720
Project Number: 22129 **Report Date:** 02/24/23

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Sample Receipt

L2308720-01, -02, and -03: Sample containers for PCB 8082A and SVOC 8270D were received but were not listed on the chain of custody. At the client's request, the analyses were not performed.

Volatile Organics

L2308720-01 through -03: Initial calibration utilized a quadratic fit for: bromomethane

In reference to question H:

L2308720-01 through -03: Initial Calibration did not meet:

Lowest Calibration Standard Minimum Response Factor: 1,4-dioxane (0.0013), 1,1,2-trichloroethane (0.1527), 1,2-dibromoethane (0.1749)

Average Response Factor: 1,4-dioxane, 1,1,2-trichloroethane

Verification: bromomethane (138%)

L2308720-01 through -03: The associated continuing calibration standard is outside the acceptance criteria for several compounds; however, it is within overall method allowances. Associated results are considered to be biased high if the %D is negative and biased low if the %D is positive. A copy of the continuing calibration standard is included as an addendum to this report.

Dissolved Metals

In reference to question G:

L2308720-01 through -03: One or more of the target analytes did not achieve the requested CAM reporting limits.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Kelly O'Neill

Title: Technical Director/Representative Date: 02/24/23

QC OUTLIER SUMMARY REPORT

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308720
Report Date: 02/24/23

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
MCP Volatile Organics - Westborough Lab								
8260D	Batch QC	WG1746852-4	Chloromethane	LCSD	68	70-130	01-03	potential low bias
8260D	Batch QC	WG1746852-4	Acetone	LCSD	140	70-130	01-03	potential high bias

ORGANICS

VOLATILES

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-01
Client ID: MW-1
Sample Location: TRURO, MA

Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 141,8260D
Analytical Date: 02/21/23 12:38
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Methylene chloride	ND		ug/l	2.0	0.68	1
1,1-Dichloroethane	ND		ug/l	1.0	0.21	1
Chloroform	ND		ug/l	1.0	0.22	1
Carbon tetrachloride	ND		ug/l	1.0	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	1.0	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.0	0.14	1
Tetrachloroethene	ND		ug/l	1.0	0.18	1
Chlorobenzene	ND		ug/l	1.0	0.18	1
Trichlorofluoromethane	ND		ug/l	2.0	0.16	1
1,2-Dichloroethane	ND		ug/l	1.0	0.13	1
1,1,1-Trichloroethane	ND		ug/l	1.0	0.16	1
Bromodichloromethane	ND		ug/l	1.0	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.40	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.40	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.40	0.14	1
1,1-Dichloropropene	ND		ug/l	2.0	0.24	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	1.0	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	1.0	0.20	1
Ethylbenzene	ND		ug/l	1.0	0.17	1
Chloromethane	ND		ug/l	2.0	0.20	1
Bromomethane	ND		ug/l	2.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.0	0.13	1
1,1-Dichloroethene	ND		ug/l	1.0	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	1.0	0.16	1

Project Name: SAND PIT ROAD, TRURO **Lab Number:** L2308720

Project Number: 22129 **Report Date:** 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-01 Date Collected: 02/15/23 15:00

Client ID: MW-1 Date Received: 02/17/23

Sample Location: TRURO, MA Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Trichloroethene	ND		ug/l	1.0	0.18	1
1,2-Dichlorobenzene	ND		ug/l	1.0	0.18	1
1,3-Dichlorobenzene	ND		ug/l	1.0	0.19	1
1,4-Dichlorobenzene	ND		ug/l	1.0	0.19	1
Methyl tert butyl ether	ND		ug/l	2.0	0.17	1
p/m-Xylene	ND		ug/l	2.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.39	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	0.19	1
1,2-Dichloroethene, Total	ND		ug/l	1.0	0.16	1
Dibromomethane	ND		ug/l	2.0	0.36	1
1,2,3-Trichloropropane	ND		ug/l	2.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	2.0	0.24	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	2.0	0.30	1
Methyl ethyl ketone	ND		ug/l	5.0	1.9	1
Methyl isobutyl ketone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Bromochloromethane	ND		ug/l	2.0	0.15	1
Tetrahydrofuran	ND		ug/l	2.0	0.52	1
2,2-Dichloropropane	ND		ug/l	2.0	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.0	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	1.0	0.16	1
Bromobenzene	ND		ug/l	2.0	0.15	1
n-Butylbenzene	ND		ug/l	2.0	0.19	1
sec-Butylbenzene	ND		ug/l	2.0	0.18	1
tert-Butylbenzene	ND		ug/l	2.0	0.20	1
o-Chlorotoluene	ND		ug/l	2.0	0.22	1
p-Chlorotoluene	ND		ug/l	2.0	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.0	0.35	1
Hexachlorobutadiene	ND		ug/l	0.60	0.22	1
Isopropylbenzene	ND		ug/l	2.0	0.19	1
p-Isopropyltoluene	ND		ug/l	2.0	0.19	1
Naphthalene	ND		ug/l	2.0	0.22	1
n-Propylbenzene	ND		ug/l	2.0	0.17	1

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-01
Client ID: MW-1
Sample Location: TRURO, MA
Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.0	0.23	1
1,2,4-Trichlorobenzene	ND		ug/l	2.0	0.22	1
1,3,5-Trimethylbenzene	ND		ug/l	2.0	0.22	1
1,2,4-Trimethylbenzene	ND		ug/l	2.0	0.19	1
Diethyl ether	ND		ug/l	2.0	0.16	1
Diisopropyl Ether	ND		ug/l	2.0	0.42	1
Ethyl-Tert-Butyl-Ether	ND		ug/l	2.0	0.18	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	112		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	113		70-130
Dibromofluoromethane	117		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-02
Client ID: MW-2
Sample Location: TRURO, MA

Date Collected: 02/15/23 12:15
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 141,8260D
Analytical Date: 02/21/23 13:01
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Methylene chloride	ND		ug/l	2.0	0.68	1
1,1-Dichloroethane	ND		ug/l	1.0	0.21	1
Chloroform	0.27	J	ug/l	1.0	0.22	1
Carbon tetrachloride	ND		ug/l	1.0	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	1.0	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.0	0.14	1
Tetrachloroethene	ND		ug/l	1.0	0.18	1
Chlorobenzene	ND		ug/l	1.0	0.18	1
Trichlorofluoromethane	ND		ug/l	2.0	0.16	1
1,2-Dichloroethane	ND		ug/l	1.0	0.13	1
1,1,1-Trichloroethane	ND		ug/l	1.0	0.16	1
Bromodichloromethane	ND		ug/l	1.0	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.40	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.40	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.40	0.14	1
1,1-Dichloropropene	ND		ug/l	2.0	0.24	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	1.0	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	1.0	0.20	1
Ethylbenzene	ND		ug/l	1.0	0.17	1
Chloromethane	ND		ug/l	2.0	0.20	1
Bromomethane	ND		ug/l	2.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.0	0.13	1
1,1-Dichloroethene	ND		ug/l	1.0	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	1.0	0.16	1

Project Name: SAND PIT ROAD, TRURO **Lab Number:** L2308720

Project Number: 22129 **Report Date:** 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-02 Date Collected: 02/15/23 12:15

Client ID: MW-2 Date Received: 02/17/23

Sample Location: TRURO, MA Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Trichloroethene	ND		ug/l	1.0	0.18	1
1,2-Dichlorobenzene	ND		ug/l	1.0	0.18	1
1,3-Dichlorobenzene	ND		ug/l	1.0	0.19	1
1,4-Dichlorobenzene	ND		ug/l	1.0	0.19	1
Methyl tert butyl ether	ND		ug/l	2.0	0.17	1
p/m-Xylene	ND		ug/l	2.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.39	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	0.19	1
1,2-Dichloroethene, Total	ND		ug/l	1.0	0.16	1
Dibromomethane	ND		ug/l	2.0	0.36	1
1,2,3-Trichloropropane	ND		ug/l	2.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	2.0	0.24	1
Acetone	ND		ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	2.0	0.30	1
Methyl ethyl ketone	ND		ug/l	5.0	1.9	1
Methyl isobutyl ketone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Bromochloromethane	ND		ug/l	2.0	0.15	1
Tetrahydrofuran	8.6		ug/l	2.0	0.52	1
2,2-Dichloropropane	ND		ug/l	2.0	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.0	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	1.0	0.16	1
Bromobenzene	ND		ug/l	2.0	0.15	1
n-Butylbenzene	ND		ug/l	2.0	0.19	1
sec-Butylbenzene	ND		ug/l	2.0	0.18	1
tert-Butylbenzene	ND		ug/l	2.0	0.20	1
o-Chlorotoluene	ND		ug/l	2.0	0.22	1
p-Chlorotoluene	ND		ug/l	2.0	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.0	0.35	1
Hexachlorobutadiene	ND		ug/l	0.60	0.22	1
Isopropylbenzene	ND		ug/l	2.0	0.19	1
p-Isopropyltoluene	ND		ug/l	2.0	0.19	1
Naphthalene	ND		ug/l	2.0	0.22	1
n-Propylbenzene	ND		ug/l	2.0	0.17	1

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-02
Client ID: MW-2
Sample Location: TRURO, MA
Date Collected: 02/15/23 12:15
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.0	0.23	1
1,2,4-Trichlorobenzene	ND		ug/l	2.0	0.22	1
1,3,5-Trimethylbenzene	ND		ug/l	2.0	0.22	1
1,2,4-Trimethylbenzene	ND		ug/l	2.0	0.19	1
Diethyl ether	ND		ug/l	2.0	0.16	1
Diisopropyl Ether	ND		ug/l	2.0	0.42	1
Ethyl-Tert-Butyl-Ether	ND		ug/l	2.0	0.18	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	101		70-130
4-Bromofluorobenzene	114		70-130
Dibromofluoromethane	115		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-03
Client ID: MW-3
Sample Location: TRURO, MA

Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water
Analytical Method: 141,8260D
Analytical Date: 02/21/23 13:23
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Methylene chloride	ND		ug/l	2.0	0.68	1
1,1-Dichloroethane	ND		ug/l	1.0	0.21	1
Chloroform	ND		ug/l	1.0	0.22	1
Carbon tetrachloride	ND		ug/l	1.0	0.13	1
1,2-Dichloropropane	ND		ug/l	1.0	0.14	1
Dibromochloromethane	ND		ug/l	1.0	0.15	1
1,1,2-Trichloroethane	ND		ug/l	1.0	0.14	1
Tetrachloroethene	ND		ug/l	1.0	0.18	1
Chlorobenzene	ND		ug/l	1.0	0.18	1
Trichlorofluoromethane	ND		ug/l	2.0	0.16	1
1,2-Dichloroethane	ND		ug/l	1.0	0.13	1
1,1,1-Trichloroethane	ND		ug/l	1.0	0.16	1
Bromodichloromethane	ND		ug/l	1.0	0.19	1
trans-1,3-Dichloropropene	ND		ug/l	0.40	0.16	1
cis-1,3-Dichloropropene	ND		ug/l	0.40	0.14	1
1,3-Dichloropropene, Total	ND		ug/l	0.40	0.14	1
1,1-Dichloropropene	ND		ug/l	2.0	0.24	1
Bromoform	ND		ug/l	2.0	0.25	1
1,1,2,2-Tetrachloroethane	ND		ug/l	1.0	0.17	1
Benzene	ND		ug/l	0.50	0.16	1
Toluene	ND		ug/l	1.0	0.20	1
Ethylbenzene	ND		ug/l	1.0	0.17	1
Chloromethane	ND		ug/l	2.0	0.20	1
Bromomethane	ND		ug/l	2.0	0.26	1
Vinyl chloride	ND		ug/l	1.0	0.07	1
Chloroethane	ND		ug/l	2.0	0.13	1
1,1-Dichloroethene	ND		ug/l	1.0	0.17	1
trans-1,2-Dichloroethene	ND		ug/l	1.0	0.16	1

Project Name: SAND PIT ROAD, TRURO **Lab Number:** L2308720

Project Number: 22129 **Report Date:** 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-03 Date Collected: 02/15/23 13:30

Client ID: MW-3 Date Received: 02/17/23

Sample Location: TRURO, MA Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
Trichloroethene	ND		ug/l	1.0	0.18	1
1,2-Dichlorobenzene	ND		ug/l	1.0	0.18	1
1,3-Dichlorobenzene	ND		ug/l	1.0	0.19	1
1,4-Dichlorobenzene	ND		ug/l	1.0	0.19	1
Methyl tert butyl ether	ND		ug/l	2.0	0.17	1
p/m-Xylene	ND		ug/l	2.0	0.33	1
o-Xylene	ND		ug/l	1.0	0.39	1
Xylenes, Total	ND		ug/l	1.0	0.33	1
cis-1,2-Dichloroethene	ND		ug/l	1.0	0.19	1
1,2-Dichloroethene, Total	ND		ug/l	1.0	0.16	1
Dibromomethane	ND		ug/l	2.0	0.36	1
1,2,3-Trichloropropane	ND		ug/l	2.0	0.18	1
Styrene	ND		ug/l	1.0	0.36	1
Dichlorodifluoromethane	ND		ug/l	2.0	0.24	1
Acetone	3.0	J	ug/l	5.0	1.5	1
Carbon disulfide	ND		ug/l	2.0	0.30	1
Methyl ethyl ketone	ND		ug/l	5.0	1.9	1
Methyl isobutyl ketone	ND		ug/l	5.0	0.42	1
2-Hexanone	ND		ug/l	5.0	0.52	1
Bromochloromethane	ND		ug/l	2.0	0.15	1
Tetrahydrofuran	2.5		ug/l	2.0	0.52	1
2,2-Dichloropropane	ND		ug/l	2.0	0.20	1
1,2-Dibromoethane	ND		ug/l	2.0	0.19	1
1,3-Dichloropropane	ND		ug/l	2.0	0.21	1
1,1,1,2-Tetrachloroethane	ND		ug/l	1.0	0.16	1
Bromobenzene	ND		ug/l	2.0	0.15	1
n-Butylbenzene	ND		ug/l	2.0	0.19	1
sec-Butylbenzene	ND		ug/l	2.0	0.18	1
tert-Butylbenzene	ND		ug/l	2.0	0.20	1
o-Chlorotoluene	ND		ug/l	2.0	0.22	1
p-Chlorotoluene	ND		ug/l	2.0	0.18	1
1,2-Dibromo-3-chloropropane	ND		ug/l	2.0	0.35	1
Hexachlorobutadiene	ND		ug/l	0.60	0.22	1
Isopropylbenzene	ND		ug/l	2.0	0.19	1
p-Isopropyltoluene	ND		ug/l	2.0	0.19	1
Naphthalene	ND		ug/l	2.0	0.22	1
n-Propylbenzene	ND		ug/l	2.0	0.17	1

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-03
Client ID: MW-3
Sample Location: TRURO, MA
Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
MCP Volatile Organics - Westborough Lab						
1,2,3-Trichlorobenzene	ND		ug/l	2.0	0.23	1
1,2,4-Trichlorobenzene	ND		ug/l	2.0	0.22	1
1,3,5-Trimethylbenzene	ND		ug/l	2.0	0.22	1
1,2,4-Trimethylbenzene	ND		ug/l	2.0	0.19	1
Diethyl ether	ND		ug/l	2.0	0.16	1
Diisopropyl Ether	ND		ug/l	2.0	0.42	1
Ethyl-Tert-Butyl-Ether	ND		ug/l	2.0	0.18	1
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28	1
1,4-Dioxane	ND		ug/l	250	61.	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	111		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	114		70-130
Dibromofluoromethane	116		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 02/21/23 06:35
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics - Westborough Lab for sample(s): 01-03 Batch: WG1746852-5					
Methylene chloride	ND		ug/l	2.0	0.68
1,1-Dichloroethane	ND		ug/l	1.0	0.21
Chloroform	ND		ug/l	1.0	0.22
Carbon tetrachloride	ND		ug/l	1.0	0.13
1,2-Dichloropropane	ND		ug/l	1.0	0.14
Dibromochloromethane	ND		ug/l	1.0	0.15
1,1,2-Trichloroethane	ND		ug/l	1.0	0.14
Tetrachloroethene	ND		ug/l	1.0	0.18
Chlorobenzene	ND		ug/l	1.0	0.18
Trichlorofluoromethane	ND		ug/l	2.0	0.16
1,2-Dichloroethane	ND		ug/l	1.0	0.13
1,1,1-Trichloroethane	ND		ug/l	1.0	0.16
Bromodichloromethane	ND		ug/l	1.0	0.19
trans-1,3-Dichloropropene	ND		ug/l	0.40	0.16
cis-1,3-Dichloropropene	ND		ug/l	0.40	0.14
1,3-Dichloropropene, Total	ND		ug/l	0.40	0.14
1,1-Dichloropropene	ND		ug/l	2.0	0.24
Bromoform	ND		ug/l	2.0	0.25
1,1,2,2-Tetrachloroethane	ND		ug/l	1.0	0.17
Benzene	ND		ug/l	0.50	0.16
Toluene	ND		ug/l	1.0	0.20
Ethylbenzene	ND		ug/l	1.0	0.17
Chloromethane	ND		ug/l	2.0	0.20
Bromomethane	ND		ug/l	2.0	0.26
Vinyl chloride	ND		ug/l	1.0	0.07
Chloroethane	ND		ug/l	2.0	0.13
1,1-Dichloroethene	ND		ug/l	1.0	0.17
trans-1,2-Dichloroethene	ND		ug/l	1.0	0.16
Trichloroethene	ND		ug/l	1.0	0.18

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 02/21/23 06:35
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics - Westborough Lab for sample(s): 01-03 Batch: WG1746852-5					
1,2-Dichlorobenzene	ND		ug/l	1.0	0.18
1,3-Dichlorobenzene	ND		ug/l	1.0	0.19
1,4-Dichlorobenzene	ND		ug/l	1.0	0.19
Methyl tert butyl ether	ND		ug/l	2.0	0.17
p/m-Xylene	ND		ug/l	2.0	0.33
o-Xylene	ND		ug/l	1.0	0.39
Xylenes, Total	ND		ug/l	1.0	0.33
cis-1,2-Dichloroethene	ND		ug/l	1.0	0.19
1,2-Dichloroethene, Total	ND		ug/l	1.0	0.16
Dibromomethane	ND		ug/l	2.0	0.36
1,2,3-Trichloropropane	ND		ug/l	2.0	0.18
Styrene	ND		ug/l	1.0	0.36
Dichlorodifluoromethane	ND		ug/l	2.0	0.24
Acetone	ND		ug/l	5.0	1.5
Carbon disulfide	ND		ug/l	2.0	0.30
Methyl ethyl ketone	ND		ug/l	5.0	1.9
Methyl isobutyl ketone	ND		ug/l	5.0	0.42
2-Hexanone	ND		ug/l	5.0	0.52
Bromochloromethane	ND		ug/l	2.0	0.15
Tetrahydrofuran	ND		ug/l	2.0	0.52
2,2-Dichloropropane	ND		ug/l	2.0	0.20
1,2-Dibromoethane	ND		ug/l	2.0	0.19
1,3-Dichloropropane	ND		ug/l	2.0	0.21
1,1,1,2-Tetrachloroethane	ND		ug/l	1.0	0.16
Bromobenzene	ND		ug/l	2.0	0.15
n-Butylbenzene	ND		ug/l	2.0	0.19
sec-Butylbenzene	ND		ug/l	2.0	0.18
tert-Butylbenzene	ND		ug/l	2.0	0.20
o-Chlorotoluene	ND		ug/l	2.0	0.22

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 141,8260D
Analytical Date: 02/21/23 06:35
Analyst: MCM

Parameter	Result	Qualifier	Units	RL	MDL
MCP Volatile Organics - Westborough Lab for sample(s): 01-03 Batch: WG1746852-5					
p-Chlorotoluene	ND		ug/l	2.0	0.18
1,2-Dibromo-3-chloropropane	ND		ug/l	2.0	0.35
Hexachlorobutadiene	ND		ug/l	0.60	0.22
Isopropylbenzene	ND		ug/l	2.0	0.19
p-Isopropyltoluene	ND		ug/l	2.0	0.19
Naphthalene	ND		ug/l	2.0	0.22
n-Propylbenzene	ND		ug/l	2.0	0.17
1,2,3-Trichlorobenzene	ND		ug/l	2.0	0.23
1,2,4-Trichlorobenzene	ND		ug/l	2.0	0.22
1,3,5-Trimethylbenzene	ND		ug/l	2.0	0.22
1,2,4-Trimethylbenzene	ND		ug/l	2.0	0.19
Diethyl ether	ND		ug/l	2.0	0.16
Diisopropyl Ether	ND		ug/l	2.0	0.42
Ethyl-Tert-Butyl-Ether	ND		ug/l	2.0	0.18
Tertiary-Amyl Methyl Ether	ND		ug/l	2.0	0.28
1,4-Dioxane	ND		ug/l	250	61.

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	100		70-130
4-Bromofluorobenzene	114		70-130
Dibromofluoromethane	114		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics - Westborough Lab Associated sample(s): 01-03 Batch: WG1746852-3 WG1746852-4								
Methylene chloride	100		100		70-130	0		20
1,1-Dichloroethane	100		100		70-130	0		20
Chloroform	100		100		70-130	0		20
Carbon tetrachloride	100		100		70-130	0		20
1,2-Dichloropropane	100		100		70-130	0		20
Dibromochloromethane	95		95		70-130	0		20
1,1,2-Trichloroethane	99		98		70-130	1		20
Tetrachloroethene	100		98		70-130	2		20
Chlorobenzene	100		100		70-130	0		20
Trichlorofluoromethane	100		100		70-130	0		20
1,2-Dichloroethane	100		100		70-130	0		20
1,1,1-Trichloroethane	110		100		70-130	10		20
Bromodichloromethane	100		100		70-130	0		20
trans-1,3-Dichloropropene	99		96		70-130	3		20
cis-1,3-Dichloropropene	98		99		70-130	1		20
1,1-Dichloropropene	110		100		70-130	10		20
Bromoform	100		99		70-130	1		20
1,1,2,2-Tetrachloroethane	100		100		70-130	0		20
Benzene	100		100		70-130	0		20
Toluene	100		99		70-130	1		20
Ethylbenzene	110		100		70-130	10		20
Chloromethane	72		**68**	Q	70-130	6		20
Bromomethane	97		98		70-130	1		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics - Westborough Lab Associated sample(s): 01-03 Batch: WG1746852-3 WG1746852-4								
Vinyl chloride	97		94		70-130	3		20
Chloroethane	97		94		70-130	3		20
1,1-Dichloroethene	100		99		70-130	1		20
trans-1,2-Dichloroethene	100		100		70-130	0		20
Trichloroethene	100		97		70-130	3		20
1,2-Dichlorobenzene	110		100		70-130	10		20
1,3-Dichlorobenzene	110		100		70-130	10		20
1,4-Dichlorobenzene	110		100		70-130	10		20
Methyl tert butyl ether	96		99		70-130	3		20
p/m-Xylene	105		100		70-130	5		20
o-Xylene	105		100		70-130	5		20
cis-1,2-Dichloroethene	100		100		70-130	0		20
Dibromomethane	98		100		70-130	2		20
1,2,3-Trichloropropane	100		100		70-130	0		20
Styrene	105		105		70-130	0		20
Dichlorodifluoromethane	85		84		70-130	1		20
Acetone	120		**140**	Q	70-130	15		20
Carbon disulfide	100		98		70-130	2		20
Methyl ethyl ketone	91		96		70-130	5		20
Methyl isobutyl ketone	94		95		70-130	1		20
2-Hexanone	110		110		70-130	0		20
Bromochloromethane	100		100		70-130	0		20
Tetrahydrofuran	98		100		70-130	2		20

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics - Westborough Lab Associated sample(s): 01-03 Batch: WG1746852-3 WG1746852-4								
2,2-Dichloropropane	100		100		70-130	0		20
1,2-Dibromoethane	99		97		70-130	2		20
1,3-Dichloropropane	100		99		70-130	1		20
1,1,1,2-Tetrachloroethane	96		93		70-130	3		20
Bromobenzene	110		110		70-130	0		20
n-Butylbenzene	100		100		70-130	0		20
sec-Butylbenzene	110		110		70-130	0		20
tert-Butylbenzene	110		110		70-130	0		20
o-Chlorotoluene	110		110		70-130	0		20
p-Chlorotoluene	110		110		70-130	0		20
1,2-Dibromo-3-chloropropane	97		100		70-130	3		20
Hexachlorobutadiene	100		100		70-130	0		20
Isopropylbenzene	110		110		70-130	0		20
p-Isopropyltoluene	100		100		70-130	0		20
Naphthalene	100		100		70-130	0		20
n-Propylbenzene	110		110		70-130	0		20
1,2,3-Trichlorobenzene	100		100		70-130	0		20
1,2,4-Trichlorobenzene	100		100		70-130	0		20
1,3,5-Trimethylbenzene	99		96		70-130	3		20
1,2,4-Trimethylbenzene	100		97		70-130	3		20
Diethyl ether	100		100		70-130	0		20
Diisopropyl Ether	98		96		70-130	2		20
Ethyl-Tert-Butyl-Ether	95		95		70-130	0		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308720

Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Volatile Organics - Westborough Lab Associated sample(s): 01-03 Batch: WG1746852-3 WG1746852-4								
Tertiary-Amyl Methyl Ether	93		93		70-130	0		20
1,4-Dioxane	96		94		70-130	2		20

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	106		111		70-130
Toluene-d8	102		102		70-130
4-Bromofluorobenzene	111		109		70-130
Dibromofluoromethane	101		104		70-130

PETROLEUM HYDROCARBONS

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-01	Date Collected:	02/15/23 15:00
Client ID:	MW-1	Date Received:	02/17/23
Sample Location:	TRURO, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/24/23 01:31		
Analyst:	BAD		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	100	100.	1
C9-C12 Aliphatics	ND		ug/l	100	100.	1
C9-C10 Aromatics	ND		ug/l	100	100.	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	100	100.	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	100	100.	1
Benzene	ND		ug/l	2.00	2.00	1
Toluene	ND		ug/l	2.00	2.00	1
Ethylbenzene	ND		ug/l	2.00	2.00	1
p/m-Xylene	ND		ug/l	2.00	2.00	1
o-Xylene	ND		ug/l	2.00	2.00	1
Methyl tert butyl ether	ND		ug/l	3.00	3.00	1
Naphthalene	ND		ug/l	4.00	4.00	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	102		70-130
2,5-Dibromotoluene-FID	102		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-01			Date Collected:	02/15/23 15:00
Client ID:	MW-1			Date Received:	02/17/23
Sample Location:	TRURO, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	135,EPH-19-2.1			Extraction Date:	02/19/23 21:25
Analytical Date:	02/23/23 14:35	M.S. Analytical Date:	02/23/23 09:21	Cleanup Method1:	EPH-19-2.1
Analyst:	SC	M.S. Analyst:	AH	Cleanup Date1:	02/22/23

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/Targets via GCMS-SIM - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	100.	1
C19-C36 Aliphatics	ND		ug/l	100	100.	1
C11-C22 Aromatics	ND		ug/l	100	100.	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	100.	1
Naphthalene	ND		ug/l	0.400	0.136	1
2-Methylnaphthalene	ND		ug/l	0.400	0.077	1
Acenaphthylene	ND		ug/l	0.400	0.054	1
Acenaphthene	ND		ug/l	0.400	0.091	1
Fluorene	ND		ug/l	0.400	0.097	1
Phenanthrene	ND		ug/l	0.400	0.084	1
Anthracene	ND		ug/l	0.400	0.079	1
Fluoranthene	ND		ug/l	0.400	0.121	1
Pyrene	ND		ug/l	0.400	0.114	1
Benzo(a)anthracene	ND		ug/l	0.400	0.088	1
Chrysene	ND		ug/l	0.400	0.102	1
Benzo(b)fluoranthene	ND		ug/l	0.400	0.102	1
Benzo(k)fluoranthene	ND		ug/l	0.400	0.126	1
Benzo(a)pyrene	ND		ug/l	0.200	0.072	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	0.095	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	0.091	1
Benzo(ghi)perylene	ND		ug/l	0.400	0.102	1

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-01	Date Collected:	02/15/23 15:00
Client ID:	MW-1	Date Received:	02/17/23
Sample Location:	TRURO, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/Targets via GCMS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	59		40-140
o-Terphenyl	83		40-140
2-Fluorobiphenyl	75		40-140
2-Bromonaphthalene	75		40-140
O-Terphenyl-MS	97		40-140

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-02	Date Collected:	02/15/23 12:15
Client ID:	MW-2	Date Received:	02/17/23
Sample Location:	TRURO, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/24/23 02:01		
Analyst:	BAD		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	100	100.	1
C9-C12 Aliphatics	ND		ug/l	100	100.	1
C9-C10 Aromatics	ND		ug/l	100	100.	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	100	100.	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	100	100.	1
Benzene	ND		ug/l	2.00	2.00	1
Toluene	ND		ug/l	2.00	2.00	1
Ethylbenzene	ND		ug/l	2.00	2.00	1
p/m-Xylene	ND		ug/l	2.00	2.00	1
o-Xylene	ND		ug/l	2.00	2.00	1
Methyl tert butyl ether	ND		ug/l	3.00	3.00	1
Naphthalene	ND		ug/l	4.00	4.00	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	102		70-130
2,5-Dibromotoluene-FID	102		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-02			Date Collected:	02/15/23 12:15
Client ID:	MW-2			Date Received:	02/17/23
Sample Location:	TRURO, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	135,EPH-19-2.1			Extraction Date:	02/19/23 21:25
Analytical Date:	02/23/23 15:00	M.S. Analytical Date:	02/23/23 09:38	Cleanup Method1:	EPH-19-2.1
Analyst:	SC	M.S. Analyst:	AH	Cleanup Date1:	02/22/23

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/Targets via GCMS-SIM - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	100.	1
C19-C36 Aliphatics	ND		ug/l	100	100.	1
C11-C22 Aromatics	ND		ug/l	100	100.	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	100.	1
Naphthalene	ND		ug/l	0.400	0.136	1
2-Methylnaphthalene	ND		ug/l	0.400	0.077	1
Acenaphthylene	ND		ug/l	0.400	0.054	1
Acenaphthene	ND		ug/l	0.400	0.091	1
Fluorene	ND		ug/l	0.400	0.097	1
Phenanthrene	ND		ug/l	0.400	0.084	1
Anthracene	ND		ug/l	0.400	0.079	1
Fluoranthene	ND		ug/l	0.400	0.121	1
Pyrene	ND		ug/l	0.400	0.114	1
Benzo(a)anthracene	ND		ug/l	0.400	0.088	1
Chrysene	ND		ug/l	0.400	0.102	1
Benzo(b)fluoranthene	ND		ug/l	0.400	0.102	1
Benzo(k)fluoranthene	ND		ug/l	0.400	0.126	1
Benzo(a)pyrene	ND		ug/l	0.200	0.072	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	0.095	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	0.091	1
Benzo(ghi)perylene	ND		ug/l	0.400	0.102	1

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-02	Date Collected:	02/15/23 12:15
Client ID:	MW-2	Date Received:	02/17/23
Sample Location:	TRURO, MA	Field Prep:	Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/Targets via GCMS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	64		40-140
o-Terphenyl	74		40-140
2-Fluorobiphenyl	74		40-140
2-Bromonaphthalene	73		40-140
O-Terphenyl-MS	79		40-140

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-03	Date Collected:	02/15/23 13:30
Client ID:	MW-3	Date Received:	02/17/23
Sample Location:	TRURO, MA	Field Prep:	Refer to COC
Sample Depth:			
Matrix:	Water		
Analytical Method:	131,VPH-18-2.1		
Analytical Date:	02/24/23 02:31		
Analyst:	BAD		

Trap:	EST, Carbopack B/Carboxen 1000&1001	Analytical Column:	Restek, RTX-502.2, 105m, 0.53ID, 3um

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Petroleum Hydrocarbons - Westborough Lab						
C5-C8 Aliphatics	ND		ug/l	100	100.	1
C9-C12 Aliphatics	ND		ug/l	100	100.	1
C9-C10 Aromatics	ND		ug/l	100	100.	1
C5-C8 Aliphatics, Adjusted	ND		ug/l	100	100.	1
C9-C12 Aliphatics, Adjusted	ND		ug/l	100	100.	1
Benzene	ND		ug/l	2.00	2.00	1
Toluene	ND		ug/l	2.00	2.00	1
Ethylbenzene	ND		ug/l	2.00	2.00	1
p/m-Xylene	ND		ug/l	2.00	2.00	1
o-Xylene	ND		ug/l	2.00	2.00	1
Methyl tert butyl ether	ND		ug/l	3.00	3.00	1
Naphthalene	ND		ug/l	4.00	4.00	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	104		70-130
2,5-Dibromotoluene-FID	104		70-130

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID:	L2308720-03			Date Collected:	02/15/23 13:30
Client ID:	MW-3			Date Received:	02/17/23
Sample Location:	TRURO, MA			Field Prep:	Refer to COC
Sample Depth:					
Matrix:	Water			Extraction Method:	EPA 3510C
Analytical Method:	135,EPH-19-2.1			Extraction Date:	02/19/23 21:25
Analytical Date:	02/23/23 15:25	M.S. Analytical Date:	02/23/23 09:54	Cleanup Method1:	EPH-19-2.1
Analyst:	SC	M.S. Analyst:	AH	Cleanup Date1:	02/22/23

Quality Control Information

Condition of sample received:	Satisfactory
Aqueous Preservative:	Laboratory Provided Preserved Container
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
EPH w/Targets via GCMS-SIM - Westborough Lab						
C9-C18 Aliphatics	ND		ug/l	100	100.	1
C19-C36 Aliphatics	ND		ug/l	100	100.	1
C11-C22 Aromatics	ND		ug/l	100	100.	1
C11-C22 Aromatics, Adjusted	ND		ug/l	100	100.	1
Naphthalene	ND		ug/l	0.400	0.136	1
2-Methylnaphthalene	ND		ug/l	0.400	0.077	1
Acenaphthylene	ND		ug/l	0.400	0.054	1
Acenaphthene	ND		ug/l	0.400	0.091	1
Fluorene	ND		ug/l	0.400	0.097	1
Phenanthrene	ND		ug/l	0.400	0.084	1
Anthracene	ND		ug/l	0.400	0.079	1
Fluoranthene	ND		ug/l	0.400	0.121	1
Pyrene	ND		ug/l	0.400	0.114	1
Benzo(a)anthracene	ND		ug/l	0.400	0.088	1
Chrysene	ND		ug/l	0.400	0.102	1
Benzo(b)fluoranthene	ND		ug/l	0.400	0.102	1
Benzo(k)fluoranthene	ND		ug/l	0.400	0.126	1
Benzo(a)pyrene	ND		ug/l	0.200	0.072	1
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	0.095	1
Dibenzo(a,h)anthracene	ND		ug/l	0.400	0.091	1
Benzo(ghi)perylene	ND		ug/l	0.400	0.102	1

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-03
Client ID: MW-3
Sample Location: TRURO, MA
Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

EPH w/Targets via GCMS-SIM - Westborough Lab

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	74		40-140
o-Terphenyl	69		40-140
2-Fluorobiphenyl	71		40-140
2-Bromonaphthalene	72		40-140
O-Terphenyl-MS	81		40-140

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 135,EPH-19-2.1
Analytical Date: 02/21/23 11:52
Analyst: ALL
M.S. Analytical Date: 02/21/23 10:58
M.S. Analyst: JJW
Extraction Method: EPA 3510C
Extraction Date: 02/19/23 21:25
Cleanup Method: EPH-19-2.1
Cleanup Date: 02/20/23

Parameter	Result	Qualifier	Units	RL	MDL
EPH w/Targets via GCMS-SIM - Westborough Lab for sample(s): 01-03 Batch: WG1746264-1					
C9-C18 Aliphatics	ND		ug/l	100	100.
C19-C36 Aliphatics	ND		ug/l	100	100.
C11-C22 Aromatics	ND		ug/l	100	100.
C11-C22 Aromatics, Adjusted	ND		ug/l	100	100.
Naphthalene	ND		ug/l	0.400	0.136
2-Methylnaphthalene	ND		ug/l	0.400	0.077
Acenaphthylene	ND		ug/l	0.400	0.054
Acenaphthene	ND		ug/l	0.400	0.091
Fluorene	ND		ug/l	0.400	0.097
Phenanthrene	ND		ug/l	0.400	0.084
Anthracene	ND		ug/l	0.400	0.079
Fluoranthene	ND		ug/l	0.400	0.121
Pyrene	ND		ug/l	0.400	0.114
Benzo(a)anthracene	ND		ug/l	0.400	0.088
Chrysene	ND		ug/l	0.400	0.102
Benzo(b)fluoranthene	ND		ug/l	0.400	0.102
Benzo(k)fluoranthene	ND		ug/l	0.400	0.126
Benzo(a)pyrene	ND		ug/l	0.200	0.072
Indeno(1,2,3-cd)Pyrene	ND		ug/l	0.400	0.095
Dibenzo(a,h)anthracene	ND		ug/l	0.400	0.091
Benzo(ghi)perylene	ND		ug/l	0.400	0.102

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 135,EPH-19-2.1
Analytical Date: 02/21/23 11:52
Analyst: ALL
M.S. Analytical Date: 02/21/23 10:58
M.S. Analyst: JJW
Extraction Method: EPA 3510C
Extraction Date: 02/19/23 21:25
Cleanup Method: EPH-19-2.1
Cleanup Date: 02/20/23

Parameter	Result	Qualifier	Units	RL	MDL
EPH w/Targets via GCMS-SIM - Westborough Lab for sample(s): 01-03 Batch: WG1746264-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	69		40-140
o-Terphenyl	74		40-140
2-Fluorobiphenyl	68		40-140
2-Bromonaphthalene	70		40-140
O-Terphenyl-MS	105		40-140

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 131,VPH-18-2.1
Analytical Date: 02/23/23 20:31
Analyst: BAD

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Petroleum Hydrocarbons - Westborough Lab for sample(s): 01-03 Batch: WG1748214-4					
C5-C8 Aliphatics	ND		ug/l	100	100.
C9-C12 Aliphatics	ND		ug/l	100	100.
C9-C10 Aromatics	ND		ug/l	100	100.
C5-C8 Aliphatics, Adjusted	ND		ug/l	100	100.
C9-C12 Aliphatics, Adjusted	ND		ug/l	100	100.
Benzene	ND		ug/l	2.00	2.00
Toluene	ND		ug/l	2.00	2.00
Ethylbenzene	ND		ug/l	2.00	2.00
p/m-Xylene	ND		ug/l	2.00	2.00
o-Xylene	ND		ug/l	2.00	2.00
Methyl tert butyl ether	ND		ug/l	3.00	3.00
Naphthalene	ND		ug/l	4.00	4.00

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2,5-Dibromotoluene-PID	92		70-130
2,5-Dibromotoluene-FID	92		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
EPH w/Targets via GCMS-SIM - Westborough Lab Associated sample(s): 01-03 Batch: WG1746264-2 WG1746264-3								
C9-C18 Aliphatics	46		48		40-140	4		25
C19-C36 Aliphatics	79		79		40-140	0		25
C11-C22 Aromatics	86		73		40-140	16		25
Naphthalene	94		80		40-140	16		25
2-Methylnaphthalene	106		90		40-140	16		25
Acenaphthylene	105		88		40-140	18		25
Acenaphthene	99		85		40-140	15		25
Fluorene	106		90		40-140	16		25
Phenanthrene	103		87		40-140	17		25
Anthracene	107		91		40-140	16		25
Fluoranthene	116		99		40-140	16		25
Pyrene	118		101		40-140	16		25
Benzo(a)anthracene	104		86		40-140	19		25
Chrysene	108		97		40-140	11		25
Benzo(b)fluoranthene	106		92		40-140	14		25
Benzo(k)fluoranthene	103		85		40-140	19		25
Benzo(a)pyrene	115		96		40-140	18		25
Indeno(1,2,3-cd)Pyrene	116		94		40-140	21		25
Dibenzo(a,h)anthracene	113		94		40-140	18		25
Benzo(ghi)perylene	92		76		40-140	19		25

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308720

Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
EPH w/Targets via GCMS-SIM - Westborough Lab Associated sample(s): 01-03 Batch: WG1746264-2 WG1746264-3								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	68		73		40-140
o-Terphenyl	86		75		40-140
2-Fluorobiphenyl	76		68		40-140
2-Bromonaphthalene	78		71		40-140
O-Terphenyl-MS	131		105		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308720

Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 01-03 Batch: WG1748214-2 WG1748214-3								
C5-C8 Aliphatics	91		97		70-130	6		25
C9-C12 Aliphatics	97		105		70-130	8		25
C9-C10 Aromatics	101		110		70-130	9		25
Benzene	104		111		70-130	7		25
Toluene	102		109		70-130	7		25
Ethylbenzene	105		113		70-130	7		25
p/m-Xylene	105		112		70-130	6		25
o-Xylene	104		113		70-130	8		25
Methyl tert butyl ether	104		113		70-130	8		25
Naphthalene	103		114		70-130	10		25
1,2,4-Trimethylbenzene	101		110		70-130	9		25
Pentane	79		82		70-130	4		25
2-Methylpentane	96		101		70-130	5		25
2,2,4-Trimethylpentane	100		107		70-130	7		25
n-Nonane	97		104		30-130	7		25
n-Decane	97		106		70-130	8		25
n-Butylcyclohexane	99		107		70-130	8		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2,5-Dibromotoluene-PID	98		108		70-130
2,5-Dibromotoluene-FID	95		105		70-130

METALS

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-01
Client ID: MW-1
Sample Location: TRURO, MA
Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.0040	0.0020	1	02/21/23 15:00	02/21/23 22:39	EPA 3005A	97,6020B	NTB
Arsenic, Dissolved	ND		mg/l	0.0050	0.0019	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Barium, Dissolved	0.0445		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Beryllium, Dissolved	ND		mg/l	0.0005	0.0005	1	02/21/23 15:00	02/21/23 22:39	EPA 3005A	97,6020B	NTB
Cadmium, Dissolved	ND		mg/l	0.0040	0.0010	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Chromium, Dissolved	ND		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Lead, Dissolved	ND		mg/l	0.0100	0.0027	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Mercury, Dissolved	ND		mg/l	0.0002	0.0002	1	02/21/23 15:38	02/22/23 00:44	EPA 7470A	97,7470A	DMB
Nickel, Dissolved	0.0037	J	mg/l	0.0250	0.0024	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Selenium, Dissolved	ND		mg/l	0.0100	0.0035	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Silver, Dissolved	ND		mg/l	0.0070	0.0028	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Thallium, Dissolved	ND		mg/l	0.0010	0.0010	1	02/21/23 15:00	02/21/23 22:39	EPA 3005A	97,6020B	NTB
Vanadium, Dissolved	ND		mg/l	0.0100	0.0020	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL
Zinc, Dissolved	0.0198	J	mg/l	0.0500	0.0021	1	02/21/23 15:00	02/21/23 21:37	EPA 3005A	97,6010D	DHL

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-02
Client ID: MW-2
Sample Location: TRURO, MA
Date Collected: 02/15/23 12:15
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.0040	0.0020	1	02/21/23 15:00	02/21/23 22:44	EPA 3005A	97,6020B	NTB
Arsenic, Dissolved	ND		mg/l	0.0050	0.0019	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Barium, Dissolved	0.0130		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Beryllium, Dissolved	ND		mg/l	0.0005	0.0005	1	02/21/23 15:00	02/21/23 22:44	EPA 3005A	97,6020B	NTB
Cadmium, Dissolved	ND		mg/l	0.0040	0.0010	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Chromium, Dissolved	ND		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Lead, Dissolved	ND		mg/l	0.0100	0.0027	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Mercury, Dissolved	ND		mg/l	0.0002	0.0002	1	02/21/23 15:38	02/22/23 00:48	EPA 7470A	97,7470A	DMB
Nickel, Dissolved	ND		mg/l	0.0250	0.0024	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Selenium, Dissolved	ND		mg/l	0.0100	0.0035	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Silver, Dissolved	ND		mg/l	0.0070	0.0028	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Thallium, Dissolved	ND		mg/l	0.0010	0.0010	1	02/21/23 15:00	02/21/23 22:44	EPA 3005A	97,6020B	NTB
Vanadium, Dissolved	ND		mg/l	0.0100	0.0020	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL
Zinc, Dissolved	0.0116	J	mg/l	0.0500	0.0021	1	02/21/23 15:00	02/21/23 21:40	EPA 3005A	97,6010D	DHL

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308720
Project Number: 22129
Report Date: 02/24/23

SAMPLE RESULTS

Lab ID: L2308720-03
Client ID: MW-3
Sample Location: TRURO, MA
Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Refer to COC

Sample Depth:
Matrix: Water

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab											
Antimony, Dissolved	ND		mg/l	0.0040	0.0020	1	02/21/23 15:00	02/21/23 22:50	EPA 3005A	97,6020B	NTB
Arsenic, Dissolved	ND		mg/l	0.0050	0.0019	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Barium, Dissolved	0.0049	J	mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Beryllium, Dissolved	ND		mg/l	0.0005	0.0005	1	02/21/23 15:00	02/21/23 22:50	EPA 3005A	97,6020B	NTB
Cadmium, Dissolved	ND		mg/l	0.0040	0.0010	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Chromium, Dissolved	ND		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Lead, Dissolved	ND		mg/l	0.0100	0.0027	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Mercury, Dissolved	ND		mg/l	0.0002	0.0002	1	02/21/23 15:38	02/22/23 00:51	EPA 7470A	97,7470A	DMB
Nickel, Dissolved	ND		mg/l	0.0250	0.0024	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Selenium, Dissolved	ND		mg/l	0.0100	0.0035	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Silver, Dissolved	ND		mg/l	0.0070	0.0028	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Thallium, Dissolved	ND		mg/l	0.0010	0.0010	1	02/21/23 15:00	02/21/23 22:50	EPA 3005A	97,6020B	NTB
Vanadium, Dissolved	ND		mg/l	0.0100	0.0020	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL
Zinc, Dissolved	0.0104	J	mg/l	0.0500	0.0021	1	02/21/23 15:00	02/21/23 21:43	EPA 3005A	97,6010D	DHL

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308720
Report Date: 02/24/23

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1746855-1										
Arsenic, Dissolved	ND		mg/l	0.0050	0.0019	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Barium, Dissolved	ND		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Cadmium, Dissolved	ND		mg/l	0.0040	0.0010	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Chromium, Dissolved	ND		mg/l	0.0100	0.0021	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Lead, Dissolved	ND		mg/l	0.0100	0.0027	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Nickel, Dissolved	ND		mg/l	0.0250	0.0024	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Selenium, Dissolved	ND		mg/l	0.0100	0.0035	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Silver, Dissolved	ND		mg/l	0.0070	0.0028	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Vanadium, Dissolved	ND		mg/l	0.0100	0.0020	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL
Zinc, Dissolved	ND		mg/l	0.0500	0.0021	1	02/21/23 15:00	02/21/23 21:27	97,6010D	DHL

Prep Information

Digestion Method: EPA 3005A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1746858-1										
Mercury, Dissolved	ND		mg/l	0.0002	0.0002	1	02/21/23 15:38	02/22/23 00:35	97,7470A	DMB

Prep Information

Digestion Method: EPA 7470A

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
MCP Dissolved Metals - Mansfield Lab for sample(s): 01-03 Batch: WG1746859-1										
Antimony, Dissolved	ND		mg/l	0.0040	0.0020	1	02/21/23 15:00	02/21/23 22:00	97,6020B	NTB
Beryllium, Dissolved	ND		mg/l	0.0005	0.0005	1	02/21/23 15:00	02/21/23 22:00	97,6020B	NTB
Thallium, Dissolved	ND		mg/l	0.0010	0.0010	1	02/21/23 15:00	02/21/23 22:00	97,6020B	NTB

Project Name: SAND PIT ROAD, TRURO
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Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 3005A

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308720

Report Date: 02/24/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1746855-2 WG1746855-3								
Arsenic, Dissolved	104		104		80-120	0		20
Barium, Dissolved	100		102		80-120	2		20
Cadmium, Dissolved	105		105		80-120	0		20
Chromium, Dissolved	100		101		80-120	1		20
Lead, Dissolved	100		100		80-120	0		20
Nickel, Dissolved	100		100		80-120	0		20
Selenium, Dissolved	102		104		80-120	2		20
Silver, Dissolved	104		104		80-120	0		20
Vanadium, Dissolved	104		105		80-120	1		20
Zinc, Dissolved	102		103		80-120	1		20
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1746858-2 WG1746858-3								
Mercury, Dissolved	96		102		80-120	6		20
MCP Dissolved Metals - Mansfield Lab Associated sample(s): 01-03 Batch: WG1746859-2 WG1746859-3								
Antimony, Dissolved	92		93		80-120	1		20
Beryllium, Dissolved	104		105		80-120	1		20
Thallium, Dissolved	87		86		80-120	1		20

Project Name: SAND PIT ROAD, TRURO
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Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2308720-01A	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-01B	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-01C	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-01D	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-01E	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-01F	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-01G	Plastic 250ml HNO3 preserved	A	<2	<2	5.9	Y	Absent		MCP-CD-6010S-10(180),MCP-BE-6020S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-SB-6020S-10(180),MCP-ZN-6010S-10(180),MCP-CR-6010S-10(180),MCP-AS-6010S-10(180),MCP-TL-6020S-10(180),MCP-BA-6010S-10(180),MCP-PB-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180),MCP-NI-6010S-10(180)
L2308720-01H	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-01I	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-01J	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-01K	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-01L	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)
L2308720-01M	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)
L2308720-02A	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-02B	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-02C	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-02D	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-02E	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-02F	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2308720-02G	Plastic 250ml HNO3 preserved	A	<2	<2	5.9	Y	Absent		MCP-BE-6020S-10(180),MCP-CD-6010S-10(180),MCP-7470S-10(28),MCP-SB-6020S-10(180),MCP-AG-6010S-10(180),MCP-ZN-6010S-10(180),MCP-TL-6020S-10(180),MCP-CR-6010S-10(180),MCP-AS-6010S-10(180),MCP-BA-6010S-10(180),MCP-PB-6010S-10(180),MCP-SE-6010S-10(180),MCP-V-6010S-10(180),MCP-NI-6010S-10(180)
L2308720-02H	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-02I	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-02J	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-02K	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-02L	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)
L2308720-02M	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)
L2308720-03A	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-03B	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-03C	Vial HCl preserved	A	NA		5.9	Y	Absent		MCP-8260-21(14)
L2308720-03D	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-03E	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-03F	Vial HCl preserved	A	NA		5.9	Y	Absent		VPH-DELUX-18(14)
L2308720-03G	Plastic 250ml HNO3 preserved	A	<2	<2	5.9	Y	Absent		MCP-CD-6010S-10(180),MCP-BE-6020S-10(180),MCP-7470S-10(28),MCP-AG-6010S-10(180),MCP-SB-6020S-10(180),MCP-ZN-6010S-10(180),MCP-AS-6010S-10(180),MCP-CR-6010S-10(180),MCP-TL-6020S-10(180),MCP-BA-6010S-10(180),MCP-PB-6010S-10(180),MCP-V-6010S-10(180),MCP-NI-6010S-10(180),MCP-SE-6010S-10(180)
L2308720-03H	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-03I	Amber 120ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8082(7)
L2308720-03J	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-03K	Amber 250ml unpreserved	A	7	7	5.9	Y	Absent		HOLD-8270(7)
L2308720-03L	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)
L2308720-03M	Amber 1000ml HCl preserved	A	<2	<2	5.9	Y	Absent		EPHD-GC-20(14),EPH-MS-20(14)

*Values in parentheses indicate holding time in days

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GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

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Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively

Report Format: DU Report with 'J' Qualifiers

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Data Qualifiers

Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

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REFERENCES

97 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA, IIB, IIIA, IIIB, IIIC, IIID, VA, VB, VC, VIA, VIB, VIIIA and VIIIB, July 2010.

131 Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), MassDEP, February 2018, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of VPH under the Massachusetts Contingency Plan, WSC-CAM-IVA, June 1, 2018.

135 Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MassDEP, December 2019, Revision 2.1 with QC Requirements & Performance Standards for the Analysis of EPH under the Massachusetts Contingency Plan, WSC-CAM-IVB, March 1, 2020.

141 EPA Test Methods (SW-846) with QC Requirements & Performance Standards for the Analysis of EPA SW-846 Methods under the Massachusetts Contingency Plan, WSC-CAM-IIA and IIB, November 2021.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

Serial_No:02242317:00

CHAIN OF CUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 2/17/23

ALPHA Job #: L2308720 (L2308730)

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: Horsley Witten Group
Address: 90 Route 6A
Sandwich, MA 02563
Phone: 781-243-1527
Email: pmassa@horsleywitten.com

Project Information

Project Name: Sand Pit Road, Truro
Project Location: Truro, MA
Project #: 22129
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☐ Same as Client info PO #: JC

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program _____ Criteria _____

Additional Project Information:
RCGW-1 criteria
MCP presumptive certainty
Analyzed for EPH w/ PAHs, dissolved MCP 14 metals

ANALYSIS: VOC: ☒ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☒ MCP 14 (dissolved) ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☒ Ranges & Targets ☐ Ranges Only (w/ PAHs); VPH: ☒ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint

SAMPLE INFO
Filtration: ☒ Field ☐ Lab to do
Preservation: ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	SVOC	METALS: MCP 13	METALS: MCP 14 (dissolved)	EPH: Ranges & Targets (w/ PAHs)	VPH: Ranges & Targets	PCB	PEST	TPH: Quant Only	Fingerprint	Sample Comments	TOTAL # BOTTLES
JC 08730 01	MW-1	2/15/23	1500	gw	CA	X		X		X	X					dissolved MCP14 EPH w/ PAHs	
08720 02	MW-2	2/15/23	1215	gw	CA	X		X		X	X					dissolved MCP 14 EPH w/ PAHs	
03	MW-3	2/16/23	1330	gw	CA	X		X		X	X					dissolved MCP14 EPH w/ PAHs	

Container Type	V		P		A	V											
Preservative	B		C		B	B											

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
Carolle Amyot	2/17/23 11:28	Eric Woods	2/17/23 1128
Eric Woods	2/17/23 1630	Kylie	2/17 1630

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

Method Blank Summary
Form 4
Volatiles

Client	: Horseley & Witten, Inc.	**Lab Number**	: L2308720
Project Name	: SAND PIT ROAD, TRURO	**Project Number**	: 22129
Lab Sample ID	: WG1746852-5	**Lab File ID**	: VQ230221A05
Instrument ID	: QUIMBY		
Matrix	: WATER	**Analysis Date**	: 02/21/23 06:35

Client Sample No.	Lab Sample ID	Analysis Date
WG1746852-3LCS	WG1746852-3	02/21/23 05:04
WG1746852-4LCSD	WG1746852-4	02/21/23 05:27
MW-1	L2308720-01	02/21/23 12:38
MW-2	L2308720-02	02/21/23 13:01
MW-3	L2308720-03	02/21/23 13:23

Calibration Verification Summary
Form 7
Volatiles

Client	: Horseley & Witten, Inc.	**Lab Number**	: L2308720
Project Name	: SAND PIT ROAD, TRURO	**Project Number**	: 22129
Instrument ID	: QUIMBY	**Calibration Date**	: 02/21/23 05:04
Lab File ID	: VQ230221A01	**Init. Calib. Date(s)**	: 02/09/23 02/09/23
Sample No	: WG1746852-2	**Init. Calib. Times**	: 04:21 07:00
Channel	:		

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
Fluorobenzene	1	1	-	0	20	89	0
Dichlorodifluoromethane	0.25	0.213	-	14.8	20	74	0
Chloromethane	10	7.241	-	27.6*	20	60	0
Vinyl chloride	0.263	0.255	-	3	20	84	0
Bromomethane	10	9.716	-	2.8	20	78	0
Chloroethane	0.158	0.154	-	2.5	20	81	0
Trichlorofluoromethane	0.351	0.361	-	-2.8	20	87	0
Ethyl ether	0.089	0.091	-	-2.2	20	84	0
1,1-Dichloroethene	0.191	0.192	-	-0.5	20	86	0
Carbon disulfide	0.55	0.558	-	-1.5	20	87	0
Freon-113	0.208	0.221	-	-6.3	20	89	0
Acrolein	10	10.799	-	-8	20	99	0
Methylene chloride	10	10.507	-	-5.1	20	86	0
Acetone	10	12.302	-	-23*	20	104	0
trans-1,2-Dichloroethene	0.198	0.206	-	-4	20	88	0
Methyl acetate	0.108	0.11	-	-1.9	20	90	0
Methyl tert-butyl ether	0.418	0.403	-	3.6	20	88	0
tert-Butyl alcohol	0.01	0.011	-	-10	20	94	0
Diisopropyl ether	0.775	0.761	-	1.8	20	89	0
1,1-Dichloroethane	0.471	0.486	-	-3.2	20	88	0
Halothane	0.182	0.192	-	-5.5	20	90	0
Acrylonitrile	0.051	0.053	-	-3.9	20	90	0
Ethyl tert-butyl ether	0.61	0.581	-	4.8	20	88	0
Vinyl acetate	0.456	0.449	-	1.5	20	91	0
cis-1,2-Dichloroethene	0.263	0.271	-	-3	20	90	0
2,2-Dichloropropane	0.425	0.441	-	-3.8	20	88	0
Bromochloromethane	0.116	0.119	-	-2.6	20	88	0
Cyclohexane	0.463	0.488	-	-5.4	20	91	0
Chloroform	0.427	0.446	-	-4.4	20	89	0
Ethyl acetate	0.141	0.136	-	3.5	20	92	0
Carbon tetrachloride	0.341	0.356	-	-4.4	20	87	0
Tetrahydrofuran	0.054	0.053	-	1.9	20	88	0
Dibromofluoromethane	0.28	0.284	-	-1.4	20	88	0
1,1,1-Trichloroethane	0.375	0.399	-	-6.4	20	91	0
2-Butanone	0.068	0.062	-	8.8	20	86	0
1,1-Dichloropropene	0.304	0.325	-	-6.9	20	93	0
Benzene	0.907	0.936	-	-3.2	20	92	0
tert-Amyl methyl ether	0.507	0.47	-	7.3	20	86	0
1,2-Dichloroethane-d4	0.311	0.329	-	-5.8	20	89	0
1,2-Dichloroethane	0.314	0.323	-	-2.9	20	88	0
Methyl cyclohexane	0.414	0.404	-	2.4	20	88	0
Trichloroethene	0.24	0.241	-	-0.4	20	94	0
Dibromomethane	0.128	0.126	-	1.6	20	85	0

* Value outside of QC limits.

Calibration Verification Summary
Form 7
Volatiles

Client	: Horseley & Witten, Inc.		**Lab Number**	: L2308720	
Project Name	: SAND PIT ROAD, TRURO		**Project Number**	: 22129	
Instrument ID	: QUIMBY		**Calibration Date**	: 02/21/23 05:04	
Lab File ID	: VQ230221A01		**Init. Calib. Date(s)**	: 02/09/23	02/09/23
Sample No	: WG1746852-2		**Init. Calib. Times**	: 04:21	07:00
Channel	:				

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
1,2-Dichloropropane	0.24	0.248	-	-3.3	20	91	0
2-Chloroethyl vinyl ether	0.109	0.101	-	7.3	20	83	0
Bromodichloromethane	0.318	0.327	-	-2.8	20	89	0
1,4-Dioxane	0.00128	0.00123*	-	3.9	20	78	0
cis-1,3-Dichloropropene	0.366	0.361	-	1.4	20	88	0
Chlorobenzene-d5	1	1	-	0	20	86	0
Toluene-d8	1.331	1.354	-	-1.7	20	87	0
Toluene	0.742	0.773	-	-4.2	20	89	0
4-Methyl-2-pentanone	0.059	0.056	-	5.1	20	85	0
Tetrachloroethene	0.295	0.307	-	-4.1	20	90	0
trans-1,3-Dichloropropene	0.413	0.408	-	1.2	20	88	0
Ethyl methacrylate	0.245	0.251	-	-2.4	20	85	0
1,1,2-Trichloroethane	0.174	0.172*	-	1.1	20	89	0
Chlorodibromomethane	0.272	0.258	-	5.1	20	84	0
1,3-Dichloropropane	0.378	0.379	-	-0.3	20	88	0
1,2-Dibromoethane	0.202	0.2	-	1	20	87	0
2-Hexanone	0.113	0.124	-	-9.7	20	96	0
Chlorobenzene	0.838	0.874	-	-4.3	20	88	0
Ethylbenzene	1.436	1.535	-	-6.9	20	89	0
1,1,1,2-Tetrachloroethane	0.287	0.275	-	4.2	20	86	0
p/m Xylene	0.571	0.594	-	-4	20	86	0
o Xylene	0.549	0.57	-	-3.8	20	86	0
Styrene	0.913	0.97	-	-6.2	20	86	0
1,4-Dichlorobenzene-d4	1	1	-	0	20	79	0
Bromoform	0.276	0.282	-	-2.2	20	82	0
Isopropylbenzene	2.784	3.161	-	-13.5	20	87	0
4-Bromofluorobenzene	0.937	1.04	-	-11	20	87	0
Bromobenzene	0.638	0.712	-	-11.6	20	86	0
n-Propylbenzene	3.306	3.772	-	-14.1	20	86	0
1,4-Dichlorobutane	0.708	0.746	-	-5.4	20	85	0
1,1,2,2-Tetrachloroethane	0.436	0.453	-	-3.9	20	83	0
4-Ethyltoluene	2.852	3.06	-	-7.3	20	81	0
2-Chlorotoluene	2.318	2.594	-	-11.9	20	86	0
1,3,5-Trimethylbenzene	2.416	2.383	-	1.4	20	76	0
1,2,3-Trichloropropane	0.367	0.383	-	-4.4	20	83	0
trans-1,4-Dichloro-2-buten	0.151	0.152	-	-0.7	20	79	0
4-Chlorotoluene	2.086	2.341	-	-12.2	20	86	0
tert-Butylbenzene	2.092	2.31	-	-10.4	20	84	0
1,2,4-Trimethylbenzene	2.347	2.343	-	0.2	20	77	0
sec-Butylbenzene	3.071	3.426	-	-11.6	20	84	0
p-Isopropyltoluene	2.698	2.813	-	-4.3	20	78	0
1,3-Dichlorobenzene	1.308	1.411	-	-7.9	20	83	0
1,4-Dichlorobenzene	1.311	1.396	-	-6.5	20	82	0

* Value outside of QC limits.

Calibration Verification Summary
Form 7
Volatiles

Client	: Horseley & Witten, Inc.		**Lab Number**	: L2308720	
Project Name	: SAND PIT ROAD, TRURO		**Project Number**	: 22129	
Instrument ID	: QUIMBY		**Calibration Date**	: 02/21/23 05:04	
Lab File ID	: VQ230221A01		**Init. Calib. Date(s)**	: 02/09/23	02/09/23
Sample No	: WG1746852-2		**Init. Calib. Times**	: 04:21	07:00
Channel	:				

Compound	Ave. RRF	RRF	Min RRF	%D	Max %D	Area%	Dev(min)
p-Diethylbenzene	1.626	1.604	-	1.4	20	76	0
n-Butylbenzene	2.309	2.407	-	-4.2	20	78	0
1,2-Dichlorobenzene	1.201	1.291	-	-7.5	20	83	0
1,2,4,5-Tetramethylbenzene	2.349	2.315	-	1.4	20	82	0
1,2-Dibromo-3-chloropropan	0.073	0.071	-	2.7	20	76	0
1,3,5-Trichlorobenzene	0.96	0.951	-	0.9	20	82	.01
Hexachlorobutadiene	0.388	0.389	-	-0.3	20	80	0
1,2,4-Trichlorobenzene	0.844	0.845	-	-0.1	20	80	0
Naphthalene	1.649	1.703	-	-3.3	20	80	0
1,2,3-Trichlorobenzene	0.747	0.751	-	-0.5	20	78	0

*** Value outside of QC limits.**

ANALYTICAL REPORT

Lab Number:	L2308730
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	SAND PIT ROAD, TRURO
Project Number:	22129
Report Date:	03/06/23

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308730
Report Date: 03/06/23

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2308730-01	MW-1	WATER	TRUR, MA	02/15/23 15:00	02/17/23
L2308730-02	MW-2	WATER	TRUR, MA	02/15/23 12:15	02/17/23
L2308730-03	MW-3	WATER	TRUR, MA	02/15/23 13:30	02/17/23

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

Perfluorinated Alkyl Acids by Isotope Dilution

L2308730-01: The sample was centrifuged and decanted prior to extraction due to sample matrix.

L2308730-01: The MeOH fraction of the extraction is reported for perfluorooctanesulfonamide (fosa) due to better extraction efficiency of the perfluoro[13c8]octanesulfonamide (m8fosa) Extracted Internal Standard.

L2308730-02: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:  Alycia Mogayzel

Title: Technical Director/Representative Date: 03/06/23

ORGANICS

SEMIVOLATILES

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-01
Client ID: MW-1
Sample Location: TRUR, MA

Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 13:53
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	5.90		ng/l	1.95	0.398	1
Perfluoropentanoic Acid (PFPeA)	5.46		ng/l	1.95	0.386	1
Perfluorobutanesulfonic Acid (PFBS)	10.9		ng/l	1.95	0.232	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.95	0.441	1
Perfluorohexanoic Acid (PFHxA)	15.8		ng/l	1.95	0.320	1
Perfluoropentanesulfonic Acid (PFPeS)	10.6		ng/l	1.95	0.239	1
Perfluoroheptanoic Acid (PFHpA)	32.6		ng/l	1.95	0.220	1
Perfluorohexanesulfonic Acid (PFHxS)	48.8		ng/l	1.95	0.367	1
Perfluorooctanoic Acid (PFOA)	9.18		ng/l	1.95	0.230	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.95	1.30	1
Perfluoroheptanesulfonic Acid (PFHpS)	5.11		ng/l	1.95	0.671	1
Perfluorononanoic Acid (PFNA)	0.620	J	ng/l	1.95	0.304	1
Perfluorooctanesulfonic Acid (PFOS)	248		ng/l	1.95	0.491	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.95	0.296	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.95	1.18	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.95	1.09	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.95	0.632	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.95	0.254	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.95	0.956	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.95	0.784	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.95	0.363	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.95	0.319	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.95	0.242	1

Project Name: SAND PIT ROAD, TRURO
Lab Number: L2308730
Project Number: 22129
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-01
Client ID: MW-1
Sample Location: TRUR, MA

Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	76		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	90		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	100		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	93		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	69		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	75		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	102		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	81		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	73		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	87		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	79		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	84		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	82		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	84		55-137
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	89		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	79		22-136

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-01
Client ID: MW-1
Sample Location: TRUR, MA

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 20:18
Analyst: JW

Date Collected: 02/15/23 15:00
Date Received: 02/17/23
Field Prep: Not Specified

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.95	0.566	1

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	58		5-112

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-02
Client ID: MW-2
Sample Location: TRUR, MA

Date Collected: 02/15/23 12:15
Date Received: 02/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 14:09
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	2.34		ng/l	1.83	0.373	1
Perfluoropentanoic Acid (PFPeA)	1.05	J	ng/l	1.83	0.362	1
Perfluorobutanesulfonic Acid (PFBS)	0.336	J	ng/l	1.83	0.217	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.83	0.413	1
Perfluorohexanoic Acid (PFHxA)	1.28	J	ng/l	1.83	0.300	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	1.83	0.224	1
Perfluoroheptanoic Acid (PFHpA)	1.13	J	ng/l	1.83	0.206	1
Perfluorohexanesulfonic Acid (PFHxS)	0.800	J	ng/l	1.83	0.344	1
Perfluorooctanoic Acid (PFOA)	1.51	J	ng/l	1.83	0.216	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.83	1.22	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.83	0.628	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.83	0.285	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.83	0.460	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.83	0.278	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.83	1.11	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.83	1.02	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.83	0.592	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.83	0.238	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.83	0.895	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.83	0.530	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.83	0.734	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.83	0.340	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.83	0.299	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.83	0.226	1

Project Name: SAND PIT ROAD, TRURO **Lab Number:** L2308730

Project Number: 22129 **Report Date:** 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-02 Date Collected: 02/15/23 12:15

Client ID: MW-2 Date Received: 02/17/23

Sample Location: TRUR, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	**52**	Q	58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	**57**	Q	62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	73		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	**42**	Q	57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	**41**	Q	60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	100		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	**42**	Q	62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	78		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	**37**	Q	59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	94		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	**41**	Q	62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	75		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	50		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	**51**	Q	55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	6		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	50		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	57		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	76		22-136

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-03
Client ID: MW-3
Sample Location: TRUR, MA

Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 14:26
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	5.76		ng/l	1.88	0.383	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	1.88	0.372	1
Perfluorobutanesulfonic Acid (PFBS)	1.12	J	ng/l	1.88	0.224	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.88	0.424	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	1.88	0.308	1
Perfluoropentanesulfonic Acid (PFPeS)	0.237	J	ng/l	1.88	0.230	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	1.88	0.212	1
Perfluorohexanesulfonic Acid (PFHxS)	1.29	J	ng/l	1.88	0.353	1
Perfluorooctanoic Acid (PFOA)	0.639	J	ng/l	1.88	0.222	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.88	1.25	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.88	0.646	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.88	0.293	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.88	0.473	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.88	0.286	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.88	1.14	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.88	1.05	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.88	0.608	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.88	0.244	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.88	0.920	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.88	0.545	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.88	0.755	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.88	0.349	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.88	0.307	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.88	0.233	1

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

SAMPLE RESULTS

Lab ID: L2308730-03
Client ID: MW-3
Sample Location: TRUR, MA
Date Collected: 02/15/23 13:30
Date Received: 02/17/23
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	64		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	75		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	88		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	61		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	63		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	107		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	66		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	87		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	60		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	94		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	62		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	75		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	65		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	75		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	15		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	71		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	82		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	88		22-136

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 08:38
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-03 Batch: WG1746338-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	2.00	0.452
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	2.00	0.245
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	2.00	1.12
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 08:38
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-03 Batch: WG1746338-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	99		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	107		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	108		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	96		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	110		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	100		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	97		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	94		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	101		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	93		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	106		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	75		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	99		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	18		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	73		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	106		22-136

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 02/21/23 20:05
Analyst: JW

Extraction Method: ALPHA 23528
Extraction Date: 02/20/23 10:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-03 Batch: WG1746338-1					
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	59		5-112

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 Batch: WG1746338-2								
Perfluorobutanoic Acid (PFBA)	94		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	93		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	94		-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	105		-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	96		-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	104		-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	95		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	116		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	96		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	113		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	106		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	102		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	114		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	93		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	101		-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	109		-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	105		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	91		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	106		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	92		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	108		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	87		-		67-153	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308730

Report Date: 03/06/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 Batch: WG1746338-2								
Perfluorotridecanoic Acid (PFTrDA)	113		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	104		-		59-182	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	100				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	110				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	107				70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	100				12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	96				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	110				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	106				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	97				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	100				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	110				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	81				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	97				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	21				5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	77				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	95				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	109				22-136

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308730

Report Date: 03/06/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01-03		Batch: WG1746338-2					
Perfluorooctanesulfonamide (FOSA)	90		-		46-170	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	64				5-112

Matrix Spike Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308730

Report Date: 03/06/23

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1746338-3 QC Sample: L2308443-02 Client ID: MS Sample												
Perfluorobutanoic Acid (PFBA)	3.60	38.1	39.4	94		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	2.88	38.1	38.4	93		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	33.8	32.4	96		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	35.7	39.1	110		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	1.08J	38.1	36.3	92		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	35.8	36.9	103		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	38.1	36.4	96		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	34.8	41.4	119		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	ND	38.1	35.1	92		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	36.2	40.6	112		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	36.3	38.7	107		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	ND	38.1	40.6	107		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	35.3	37.6	106		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	ND	38.1	36.8	97		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	36.5	38.0	104		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	36.6	37.3	102		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	38.1	38.3	101		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	38.1	36.8	97		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	36.8	40.4	110		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	38.1	34.5F	91		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	38.1	38.7F	102		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	38.1	34.2	90		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: SAND PIT ROAD, TRURO

Project Number: 22129

Lab Number: L2308730

Report Date: 03/06/23

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1746338-3 QC Sample: L2308443-02 Client ID: MS Sample												
Perfluorotridecanoic Acid (PFTrDA)	ND	38.1	44.5	117		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	38.1	41.1	108		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	92				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	142				12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	110				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	70				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	84				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	81				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	87				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	80				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	84				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	112				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	88				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	99				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	88				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	103				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	18				5-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	98				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	89				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	80				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	103				70-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308730
Report Date: 03/06/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1746338-4 QC Sample: L2308443-03 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	3.54	3.59	ng/l	1		30
Perfluoropentanoic Acid (PFPeA)	2.51	2.58	ng/l	3		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/l	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	1.06J	0.540J	ng/l	NC		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	ND	ND	ng/l	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/l	NC		30
Perfluorooctanoic Acid (PFOA)	ND	ND	ng/l	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/l	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308730
Report Date: 03/06/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1746338-4 QC Sample: L2308443-03 Client ID: DUP Sample						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	87		85		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	102		100		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		103		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	132		125		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	78		77		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	84		81		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	109		108		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	87		86		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	93		91		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	80		75		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	96		94		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	82		82		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	82		80		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	80		89		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	85		88		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	21		12		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	85		84		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	86		89		48-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308730
Report Date: 03/06/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-03 QC Batch ID: WG1746338-4 QC Sample: L2308443-03 Client ID: DUP Sample

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	95		96		22-136

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129

Lab Number: L2308730
Report Date: 03/06/23

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2308730-01A	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)
L2308730-01B	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)
L2308730-02A	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)
L2308730-02B	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)
L2308730-03A	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)
L2308730-03B	Plastic 250ml unpreserved	A	NA		5.9	Y	Absent		A2-537-ISOTOPE(28)

*Values in parentheses indicate holding time in days

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA/PFTeDA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS/PFDoS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
Perfluoropropanesulfonic Acid	PFPrS	423-41-6
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA/PFOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name: SAND PIT ROAD, TRURO
Project Number: 22129
Lab Number: L2308730
Report Date: 03/06/23

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
FLUOROTELOMER CARBOXYLIC ACIDS (FTCAs)		
3-Perfluoroheptyl Propanoic Acid	7:3FTCA	812-70-4
2H,2H,3H,3H-Perfluorooctanoic Acid	5:3FTCA	914637-49-3
3-Perfluoropropyl Propanoic Acid	3:3FTCA	356-02-5

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

Data Qualifiers

Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT ROAD, TRURO	**Lab Number:**	L2308730
Project Number:	22129	**Report Date:**	03/06/23

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 2/17/23

ALPHA Job #: L2308730

ALPHA ANALYTICAL
8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220
320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Client Information

Client: Horsley Witten Group
Address: 90 Route 6A
Sandwich, MA 02563
Phone: 781-243-1527
Email: bmassa@horsleywitten.com

Project Information

Project Name: Sand Pit Road, Truro
Project Location: Truro, MA
Project #: 22129
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due:

Report Information - Data Deliverables

☒ ADEx ☒ EMAIL

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods ☐ Yes ☐ No CT RCP Analytical Methods
☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☐ No NPDES RGP
☐ Other State /Fed Program ____ Criteria ____

Additional Project Information:
RCGW-1 criteria
MCP presumptive certainty

ANALYSIS

VOC: ☐ 8260 ☐ 624 ☐ 524.2
SVOC: ☐ ABN ☐ PAH
METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15
METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13
EPH: ☐ Ranges & Targets ☐ Ranges Only
VPH: ☐ Ranges & Targets ☐ Ranges Only
☐ PCB ☐ PEST
TPH: ☐ Quant Only ☐ Fingerprint
PFAS isotope dilution

SAMPLE INFO

Filtration
☐ Field
☐ Lab to do
Preservation
☐ Lab to do

Sample Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	PFAS isotope dilution	TOTAL # BOTTLES
08730-01	MW-1	2/15/23	1500	gw	CA	X	
-02	MW-2	2/15/23	1215	gw	CA	X	
-03	MW-3	2/15/23	1330	gw	CA	X	

Container Type																		P	
Preservative																		A	

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H = $Na_2S_2O_3$
I= Ascorbic Acid
J = NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
Carole Anson	2/17/23 11:28	Eric Weis	2/17/23 1128
Eric Weis	2/17/23 1630	K. Manley	2/17 1630
K. Manley	2/17/23 1930		2/17/23 1930

All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 12-Mar-2012)

K. Manley 2/17/23 2003

ANALYTICAL REPORT

Lab Number:	L2314332
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	SAND PIT TRURO
Project Number:	22129
Report Date:	04/07/23

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name: SAND PIT TRURO
Project Number: 22129

Lab Number: L2314332
Report Date: 04/07/23

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2314332-01	MW-1	WATER	SAND PIT RD, TRURO	03/15/23 17:00	03/20/23

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Darian Dailey

Title: Technical Director/Representative Date: 04/07/23

ORGANICS

SEMIVOLATILES

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

SAMPLE RESULTS

Lab ID: L2314332-01
Client ID: MW-1
Sample Location: SAND PIT RD, TRURO

Date Collected: 03/15/23 17:00
Date Received: 03/20/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 04/07/23 00:25
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 04/04/23 11:55

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	5.48		ng/l	1.76	0.360	1
Perfluoropentanoic Acid (PFPeA)	6.34		ng/l	1.76	0.349	1
Perfluorobutanesulfonic Acid (PFBS)	9.62		ng/l	1.76	0.210	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.76	0.399	1
Perfluorohexanoic Acid (PFHxA)	20.3		ng/l	1.76	0.289	1
Perfluoropentanesulfonic Acid (PFPeS)	13.0		ng/l	1.76	0.216	1
Perfluoroheptanoic Acid (PFHpA)	43.8		ng/l	1.76	0.199	1
Perfluorohexanesulfonic Acid (PFHxS)	33.2		ng/l	1.76	0.332	1
Perfluorooctanoic Acid (PFOA)	9.36		ng/l	1.76	0.208	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.76	1.18	1
Perfluoroheptanesulfonic Acid (PFHpS)	3.62		ng/l	1.76	0.607	1
Perfluorononanoic Acid (PFNA)	0.791	J	ng/l	1.76	0.275	1
Perfluorooctanesulfonic Acid (PFOS)	238		ng/l	1.76	0.445	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.76	0.268	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.76	1.07	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.76	0.988	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.76	0.572	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.76	0.229	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.76	0.865	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.76	0.512	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.76	0.709	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.76	0.328	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.76	0.289	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.76	0.219	1

Project Name: SAND PIT TRURO **Lab Number:** L2314332

Project Number: 22129 **Report Date:** 04/07/23

SAMPLE RESULTS

Lab ID: L2314332-01 Date Collected: 03/15/23 17:00

Client ID: MW-1 Date Received: 03/20/23

Sample Location: SAND PIT RD, TRURO Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	78		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	87		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	92		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	121		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	72		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	74		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	98		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	79		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	103		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	72		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	85		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	78		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	94		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	69		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	85		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	6		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	75		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	76		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	62		22-136

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 04/06/23 23:35
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 04/04/23 11:55

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1762567-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	2.00	0.452
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	0.328
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	2.00	0.245
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	2.00	1.12
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 04/06/23 23:35
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 04/04/23 11:55

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1762567-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	91		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	100		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	92		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	89		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	91		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	92		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	93		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	90		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	89		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	87		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	91		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	84		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	89		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	36		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	84		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	75		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	61		22-136

Lab Control Sample Analysis
Batch Quality Control

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1762567-2								
Perfluorobutanoic Acid (PFBA)	105		-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	102		-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	104		-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	109		-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	103		-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	107		-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	104		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	104		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	103		-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	103		-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	115		-		61-179	-		30
Perfluorononanoic Acid (PFNA)	103		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	110		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	108		-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	116		-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	115		-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	94		-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	105		-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	116		-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	107		-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	108		-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	109		-		67-153	-		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: SAND PIT TRURO

Project Number: 22129

Lab Number: L2314332

Report Date: 04/07/23

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1762567-2								
Perfluorotridecanoic Acid (PFTrDA)	113		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	107		-		59-182	-		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	94				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	102				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	99				70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	103				12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	94				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	92				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	103				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	95				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	111				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	93				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	90				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	108				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	86				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	93				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	23				5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	87				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	87				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75				22-136

Matrix Spike Analysis

Batch Quality Control

Project Name: SAND PIT TRURO

Project Number: 22129

Lab Number: L2314332

Report Date: 04/07/23

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01	QC Batch ID: WG1762567-3	QC Sample: L2314332-01	Client ID: MW-1								
Perfluorobutanoic Acid (PFBA)	5.48	37.4	45.0	106		-	-		67-148	-		30
Perfluoropentanoic Acid (PFPeA)	6.34	37.4	45.2	104		-	-		63-161	-		30
Perfluorobutanesulfonic Acid (PFBS)	9.62	33.2	45.6	108		-	-		65-157	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	35.1	39.4	112		-	-		37-219	-		30
Perfluorohexanoic Acid (PFHxA)	20.3	37.4	57.6	100		-	-		69-168	-		30
Perfluoropentanesulfonic Acid (PFPeS)	13.0	35.2	49.6	104		-	-		52-156	-		30
Perfluoroheptanoic Acid (PFHpA)	43.8	37.4	80.0	97		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	33.2	34.2	70.0	108		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	9.36	37.4	49.2	107		-	-		63-159	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	35.6	38.8	109		-	-		49-187	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	3.62	35.6	44.4	114		-	-		61-179	-		30
Perfluorononanoic Acid (PFNA)	0.791J	37.4	43.4	114		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	238	34.7	275	107		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	ND	37.4	42.3	113		-	-		63-171	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	35.9	39.9	111		-	-		56-173	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	36	38.3	107		-	-		48-150	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	37.4	42.2	113		-	-		60-166	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	37.4	39.7	106		-	-		60-153	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	36.1	40.5	112		-	-		38-156	-		30
Perfluorooctanesulfonamide (FOSA)	ND	37.4	37.3F	100		-	-		46-170	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	37.4	39.3	105		-	-		45-170	-		30
Perfluorododecanoic Acid (PFDoA)	ND	37.4	41.8	112		-	-		67-153	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab	Associated sample(s): 01	QC Batch ID: WG1762567-3	QC Sample: L2314332-01	Client ID: MW-1								
Perfluorotridecanoic Acid (PFTrDA)	ND	37.4	40.7	109		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	37.4	38.1	102		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	101				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	122				12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	108				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	77				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	66				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	83				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	72				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	73				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	72				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	70				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	70				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	79				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	29				5-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	93				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	75				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	72				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	98				70-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT TRURO
Project Number: 22129

Lab Number: L2314332
Report Date: 04/07/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1762567-4 QC Sample: L2314333-01 Client ID: DUP Sample						
Perfluorobutanoic Acid (PFBA)	4.97	5.08	ng/l	2		30
Perfluoropentanoic Acid (PFPeA)	4.88	5.08	ng/l	4		30
Perfluorobutanesulfonic Acid (PFBS)	1.07J	1.05J	ng/l	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	4.98	4.82	ng/l	3		30
Perfluoropentanesulfonic Acid (PFPeS)	0.230J	0.254J	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	3.40	3.70	ng/l	8		30
Perfluorohexanesulfonic Acid (PFHxS)	3.98F	3.80	ng/l	5		30
Perfluorooctanoic Acid (PFOA)	16.2	16.1	ng/l	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	1.92	1.67J	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	12.9	13.0	ng/l	1		30
Perfluorooctanesulfonic Acid (PFOS)	35.5	35.8	ng/l	1		30
Perfluorodecanoic Acid (PFDA)	1.77J	1.36J	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT TRURO
Project Number: 22129

Lab Number: L2314332
Report Date: 04/07/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1762567-4 QC Sample: L2314333-01 Client ID: DUP Sample						
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	80		77		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	88		82		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	89		91		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	99		100		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	79		74		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	82		72		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	94		94		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	83		77		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	85		90		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	75		72		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	85		84		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	72		69		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	87		86		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	63		55		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	76		73		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	27		15		5-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	65		56		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	60		61		48-131

Lab Duplicate Analysis
Batch Quality Control

Project Name: SAND PIT TRURO
Project Number: 22129

Lab Number: L2314332
Report Date: 04/07/23

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1762567-4 QC Sample: L2314333-01 Client ID: DUP Sample						

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	52		66		22-136

Project Name: SAND PIT TRURO
Project Number: 22129

Lab Number: L2314332
Report Date: 04/07/23

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2314332-01A	Plastic 250ml unpreserved	A	NA		2.8	Y	Absent		A2-537-ISOTOPE(28)
L2314332-01B	Plastic 250ml unpreserved	A	NA		2.8	Y	Absent		A2-537-ISOTOPE(28)

*Values in parentheses indicate holding time in days

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA/PFTeDA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS/PFDoS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
Perfluoropropanesulfonic Acid	PFPrS	423-41-6
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA/PFOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name: SAND PIT TRURO
Project Number: 22129
Lab Number: L2314332
Report Date: 04/07/23

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
FLUOROTELOMER CARBOXYLIC ACIDS (FTCAs)		
3-Perfluoroheptyl Propanoic Acid	7:3FTCA	812-70-4
2H,2H,3H,3H-Perfluorooctanoic Acid	5:3FTCA	914637-49-3
3-Perfluoropropyl Propanoic Acid	3:3FTCA	356-02-5

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

NR - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Chlordane: The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

Data Qualifiers

Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Report Format: DU Report with 'J' Qualifiers

Project Name:	SAND PIT TRURO	**Lab Number:**	L2314332
Project Number:	22129	**Report Date:**	04/07/23

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N, **SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 3/20/23

ALPHA Job #: L2314332

ALPHA ANALYTICAL
WESTBORO, MA TEL: 508-898-9220 FAX: 508-898-9193
MANSFIELD, MA TEL: 508-822-9300 FAX: 508-822-3288

Client Information

Client: Horsley Witten
Address: 90 Route 6A Sandwich, MA
Phone: 781-243-1527
Fax:
Email: bmassa@horsleywitten.com

☐ These samples have been previously analyzed by Alpha

Project Information

Project Name: Sand Pit Truro
Project Location: Sand Pit Rd, Truro
Project #: 22129
Project Manager: Bryan Massa
ALPHA Quote #:

Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)
Date Due: Time:

Report Information - Data Deliverables

☒ FAX ☒ EMAIL
☒ ADEx ☐ Add'l Deliverables

Billing Information

☐ Same as Client info PO #:

Regulatory Requirements/Report Limits

State /Fed Program	Criteria

Other Project Specific Requirements/Comments/Detection Limits:
MCP required
MADEP GW-1 standards

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	ANALYSIS: PFAS (List type of Isotopes)	SAMPLE HANDLING	TOTAL # BOTTLES
19332-01	MW-1	3/15/23	1700	GW	CA	X		

SAMPLE HANDLING
Filtration
☐ Done
☐ Not needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)
Sample Specific Comments

Container Type	
Preservative	

Relinquished By:	Date/Time	Received By:	Date/Time
Carolina Massa	3/16 1700		3/16 1700
Tricia K. Rood	3/17/23 13:23	HWFRIDGE	3/17/23 17:23
	3/20/23 9:17AM		3/20/23 9:17
	3/20/23 10:55		3/20/23 10:55

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Terms and Conditions. See reverse side.

FORM NO: 01-01 (rev. 14-OCT-07)

Appendix C

Draft Beach Point Memorandum

Technical Memorandum

July 2, 2024

To	Emily Beebe, Town of Truro MA	**Contact No.**	774-470-1637
Copy to		Email	anastasia.rudenko@ghd.com
From	Anastasia Rudenko, PE Peter Lusardi, PE	**Project No.**	12603461
Subject	Beach Point Wastewater Treatment Alternatives – DRAFT rev0		

1. Introduction

The Town of Truro is currently developing a Comprehensive Wastewater Management Plan (CWMP) to quantify wastewater management and nitrogen management needs in Truro and to develop a Recommended Plan to address the identified needs for a 20-year planning period. This memorandum reviews alternatives for wastewater treatment for the Beach Point area to provide an environmentally and economically sound nitrogen reduction for this Study Area.

Beach Point is an area in Truro along Shore Road, bordering Provincetown to the North. For the purposes of this evaluation the Beach Point area is defined as 388 water meter connections between 168 Shore Drive and 706 Shore Drive (referred to in this memo as the Beach Point Study Area). This area extends from the intersection of Shore and Knowles Heights Roads to the Truro-Provincetown boundary line. The Town has indicated that this area is anticipated to see minimal growth over the 20-year planning period, from 2027 through 2047. While there are 388 water meter connections, there are only 128 parcels in the Study Area; the Beach Point Study Area has a number of condominiums, motels, and other commercial facilities with multiple structures on a parcel.

2. Beach Point Areas with Inadequate Title 5 On-site Systems

The following is an inventory provided by the Town for on-lot systems in Beach Point (Study Area A).

Table 1 Beach Point (Study Area A) On-Lot Systems

Beach Point	Number of Systems
Study Area Total	**128**
Outside a Coastal Watershed	**37**
Cesspool	4
Title 5	33
Within Provincetown Harbor Watershed	**91**
Both Cesspool and Title 5	2

This Technical Memorandum is provided as an interim output under our agreement with Town of Truro, MA. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

Beach Point	Number of Systems
Cesspool	5
IA	5
Title 5	79

As presented in the above table, the Beach Point Study Area has 9 cesspools, 5 IA systems, 112 Title 5 systems, and 2 parcels with Title 5 and cesspool systems. Based on Truro's Board of Health Regulations, cesspools are classified as failed systems and require updates to meet Title 5 regulations. The Town of Truro also provided a list of documented failed septic systems; of the seven parcels on the list, one of these systems is within the Beach Point Study Area.

A portion of the Beach Point Study Area is located within the East Harbor Lagoon Subwatershed of Provincetown Harbor. Beach Point is an area of concern because East Harbor Lagoon is tidally restricted with fair to poor water quality at all monitoring stations. Previous evaluations, including the Phase I and Phase II Integrated Water Resources Management Plan by Weston and Sampson, have concluded that management of nutrient loads in East Harbor Lagoon would likely have significant positive effect on the habitat quality.

3. Beach Point Study Area Wastewater Flow Characterization

Various methods to characterize the Beach Point Study Area wastewater flows were evaluated. The characterization methods vary depending on the recommended treatment alternative.

To be consistent with Provincetown's flow estimation and methodology, Title 5 septic system flows were used to establish maximum day flows. The Town of Truro provided GHD with available Title 5 septic system design flows for the Beach Point Study Area. Based on the Title 5 data provided by the Town, the estimated maximum day wastewater flow for the Study Area is 143,300 gpd. Using the maximum day Title 5 flow of 143,300 gpd and applying a 60% conversion factor (maximum day to average day conversion based on flows at the Provincetown Wastewater Treatment Facility), this equates to an average wastewater flow of 86,000 gpd. At a TN concentration of 26.25 mg/l for Title 5 septic systems, the estimated TN load from septic systems in the study area is 8.6 kg/d. This methodology is further summarized in the Draft Beach Point Wastewater Flow Characterization Memorandum.

For nutrient analysis and flow characterization for treatment alternatives that do not include connecting to the Provincetown collection system, water meter records were used to establish average annual flows. The average annual water flow for Beach Point, based on data from water meter records provided by the Provincetown Water Department from 2017 – 2022, is 39,823 gallons per day (gpd). The difference in Title 5 flows and water meter readings is due to seasonality. This value was multiplied by a water to wastewater conversion factor of 0.9 (consistent with the MEP project), to calculate an average annual wastewater flow of 35,800 gpd. At an average wastewater flow of 35,800 gpd (based on water meter readings) and an average effluent total nitrogen (TN) concentration from a conventional Title 5 system of 26.25 mg/L the estimated amount of nitrogen from Beach Point wastewater is 3.56 kg/day.

Using the 35,800 gpd average daily wastewater flow from water meter records and a maximum daily flow of 143,300 gpd from Title 5 data, the peak-to-average ratio at the Provincetown WWTF is 4:1. Maintaining the 150,000 gpd Title 5 flow allowance that Provincetown planning currently incorporates would allow for a 4.5% future flow allowance for the 20-year planning period.

3.1 Nitrogen Reduction Goals

The Cape Cod Commission (CCC) 208 Plan establishes a methodology to estimate preliminary nitrogen reduction allowances for coastal estuaries that require nitrogen management to restore water quality but have not completed the scientific evaluations to establish a nitrogen Total Maximum Daily Load (TMDL) for

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the system. For these watersheds the CCC 208 Plan assumes a 25% reduction allowance in existing nitrogen as an interim target reduction goal. There are no reduction goals or thresholds for areas outside of coastal watersheds. Based on the CCC methodology and Truro's contribution to the Provincetown Harbor watershed (7% according to the 2017 CCC Watershed Report), the reduction goal using the CC planning allowance is 0.79 kg-N/day. The remaining nitrogen load in the Provincetown Harbor watershed is contributed by Provincetown.

4. Conceptual Cost Estimate Development

Preliminary level capital costs were developed for the alternatives outlined in this memo. The costs presented are planning level total estimated project costs with allowances for construction costs including:

- 30 percent construction contingency
- 10 percent engineering design
- 2 percent fiscal/legal/permitting/administrative costs
- 15 percent construction administration and Resident Project Representative (RPR) costs
- 8 percent police detail costs for linear work

Because of the conceptual nature of this evaluation, a 30 percent construction contingency is carried as no detailed design has been performed and no survey has been performed. During final design a reduced contingency will be carried for variability in the bidding climate, project changes before bidding, easements, residential property restoration, and change orders due to unforeseen conditions. Project costs are presented in 2024 dollars. Once a construction timeframe is known, project costs should be adjusted to the mid-point of construction.

The following assumptions were used to develop the conceptual project cost estimates:

- Construction costs were estimated based on unit costs from recent Cape Cod construction bids.
- Anticipated costs to acquire any privately owned land for pump stations were not included in the conceptual cost estimates.
- The construction cost estimate includes estimated costs for linear infrastructure only within the road right-of-way, not on private property. No allowance was carried for sewer lateral installations from the property line to the house for each anticipated connection. Lateral installation costs are typically incurred by a property owner (not the Town).
- Installation of grinder pumps required for a low-pressure system are not included in the cost estimate (the cost estimates include procurement of the pumps only – it is assumed that private homeowners are responsible for installation costs).
- Estimated costs assume that no hazardous materials or other materials that require special handling were encountered.
- Due to the shallow groundwater in this area, dewatering costs were estimated for the entire collection system installation for each centralized collection alternative.
- Full width mill and overlay road restoration was estimated for road restoration.

Engineer's opinions of probable project costs for infrastructure recommended as part of a multi-year planning project are typically initially developed as part of the planning process. As the project progresses, it is critical that these initial estimates are updated and refined at each stage of the planning and design process to accurately reflect items that may affect the cost estimates. Items that may affect cost estimates may include, but are not limited to:

- Changes in bidding climate and tariffs.

This Technical Memorandum is provided as an interim output under our agreement with Town of Truro, MA. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

- Design changes resulting from future law, regulation, or code changes.
- Design changes resulting from industry or manufacturer advances, updates, or changes.
- Unknown conditions discovered during field investigations during design (borings, survey, etc.).
- Design decisions regarding proprietary equipment/sole sourcing of equipment.
- Recommendations from Value Engineer.

It is recommended that the engineer's opinion of probable project costs presented in this memorandum continue to be refined and updated at each major stage of the design process and prior to construction financing.

5. No Action Alternative

Under the "No Action Alternative" no all-inclusive improvements would be made to modify the on-site wastewater infrastructure in the Beach Point area. However, improvements to on-lot treatment would continue to be made on a case-by-case basis where substandard systems are identified. Existing regulations would still be enforced. This would include the conversion of existing cesspools to Title 5 or I/A systems, in accordance with the Truro Board of Health regulations. Water quality monitoring in the Provincetown Harbor watershed shows evidence of water quality impacts due to excess nitrogen. Without addressing the watershed's needs, Truro could be at risk of losing its natural and economic resources, including declines in fin-fishing and shell-fishing habitats, declines in property values, algal blooms in coastal embayments, potential beach and shell-fishing closures and potential declines in tourism as the aesthetic impacts of excessive nitrogen loading continue to impair the Town's water resources. With the anticipated rise in sea-level, conventional septic systems are at a greater risk of being submerged and not functioning properly. Property owners will be responsible for infrastructure on their property, and the Town will be responsible for road infrastructure.

6. Centralized Collection and Treatment Alternatives

The stretch of land comprising Beach Point is approximately 2.5 miles long with relatively flat terrain, with elevations ranging from 7 ft to 15 ft. The area also has a shallow ground water table. This makes for some unique considerations for collection system design and construction. The following discussion assumes all wastewater from Beach Point will be conveyed to a pump station in Provincetown which is approximately 700 feet from the boundary between Beach Point and Provincetown.

Three types of sewer systems were considered for Beach Point:

- Gravity Sewers
- Low Pressure Sewers with Grinder Pumps
- Vacuum Sewers

To be consistent with Provincetown's methodology, the Title 5 flow of 143,300 gpd, or an average day wastewater flow of 86,000 gpd will be assumed as described in section 3.

6.1 Collection System Alternatives

The collection system alternative considers centralized treatment at the Provincetown Wastewater Treatment Plant with effluent discharge in Provincetown.

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6.2 Gravity Sewers

The most prevalent type of collection system in general use is a gravity sewer. This type of system involves the installation of sewers at a constant downhill gradient. The sewer line is designed at a slope sufficient to maintain a velocity within the sewer line that ensures that solids stay suspended within the waste stream. The minimum size of a typical sanitary sewer main is 8-inches. The pipe size increases proportionally with the expected wastewater flow. The sewer is installed at a constant slope until its depth becomes so great that a sewage pump station is needed to "lift" the flow to a wastewater treatment plant or to another gravity sewer. In flat terrain, several pump stations may be required before the flow is pumped to a treatment facility.

In most situations, homes along a gravity sewer connect into the system with gravity service connections from the building to the collector sewer. Houses that are below the street elevation may require the use of small pumps and a small diameter force main (1 to 2 inches) for discharging to the collector sewer.

The installation cost and ease of construction of a gravity sewer depends upon the topography within a particular area and on specific soil types. In areas where topography is consistently increasing or decreasing, the sewers can be installed close to minimum depth (which is typically 4 feet in New England so that the pipe is located below anticipated frost depth). In very hilly areas, deep sewers and/or pump stations may be required. This can significantly increase construction costs when compared with other alternatives. The table below summarizes the advantages and disadvantages or gravity sewers.

Table 2 Advantages and Disadvantages of Gravity Sewers

Advantages	Disadvantages
- A properly designed and installed gravity sewer requires little maintenance. - A gravity system can be easily expanded to serve additional areas. Additional capacity can be provided to accept future flow without affecting performance. - The potential for odors in a properly designed gravity sewer is low. - A gravity system is reliable since it is not dependent upon electrical power for operation. When pump stations are used on collector sewers, electrical generators are provided to supply power during a power outage. - Less space is required on the customers' lots as the gravity sewer does not require a grinder pump station or vacuum valve vault (as required for the other two types of collection systems).	- Gravity sewers are installed at a constant slope, and thus can require deep excavations as the topography changes. Construction with trenchless technologies is generally difficult as constant grades are required. Construction is generally disruptive to traffic patterns and surface infrastructure, as they are often located within the paved roadway to avoid conflicts with water and gas utilities that are typically located closer to the shoulder(s) of the road. - Pump stations are required to transport the sewage out of low points in topography. - Feasibility may be limited by availability of appropriate/available pump station locations. - Capital and operation and maintenance costs increase with each pump station required. - Pump stations tend to increase the potential for odor emissions. - Improper installation techniques could result in infiltration (clean water entering the collection system) and exfiltration (raw wastewater leaving the collection system).

Sewer diameter is dictated by Massachusetts requirements that minimum gravity sewer diameter in public road rights-of-way be 8-inches.

Based on TR-16 requirements, the following guidelines were used to develop a conceptual layout for a gravity collection system at Beach Point:

- Pipe slope minimum: 0.4%, or 0.004 ft/ft assuming 8-inch sewers
- Manholes at every junction and every 400 ft
- Minimum drop of 0.10 ft between manhole inlet and outlet
- Minimum cover: 5 ft
- Maximum cover: 10 ft

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Based on the above design parameters, a preliminary calculation was performed to determine the feasibility of gravity sewers along Shore Road via gravity pipe. Based on the relatively flat topography, a maximum stretch of 2,500 LF of gravity pipe would be able to run along Shore Road between pump stations. This would require approximately 6 pump stations along the 2.5-mile (13,200 ft) road.

Additionally, due to the low ground elevation, if gravity pipe were installed, it would go below the groundwater table and require dewatering during installation which would add significant cost to the project.

6.3 Low-Pressure Sewers

A low-pressure sewer system requires the installation of a grinder pump to serve each building. Wastewater flows from each property by gravity into a pump chamber, where the sewage is shredded and pumped into a pressure sewer, eventually discharging to a gravity main or directly to a pump station or treatment facility. This type of technology has become more widely used over the past 20 years and is particularly suited to areas where there is a need to minimize excavation depths.

The typical pressure in this type of system is 5 to 40 pounds per square inch (psi). Typically, systems can be expanded to serve additional homes; however, there are design limitations, and the overall expansion capability tends to be less than that of a gravity sewer.

When connecting pressure sewer lines to a gravity line or directly to a pump station, odor control for larger systems may be required at the discharge point to mitigate odors created in the pressure sewer pipe. Also, manholes at the discharge point should be protected from corrosion resulting from high hydrogen sulfide concentrations.

For Beach Point, the low-pressure force main would be 1 ½ inches at the southeast end increasing to 4-inches closer to the Provincetown boundary. The pipe typically would be HDPE tubing.

Table 3 Advantages and Disadvantages of Low-Pressure Sewers

Advantages	Disadvantages
– The collection main is installed at a relatively shallow depth and is independent of grade changes. This allows shallower excavation, lower piping installation costs, and less overall disruption to the area due to a shorter construction period. – A pressure sewer can serve areas of hilly terrain or marginal slope. – The pressure sewer piping (beyond the pumping chamber) is not susceptible to infiltration, unlike gravity sewers. – The shredding action of the pump eliminates the need for a larger size collection system. Pressure sewers tend to be much smaller diameter than a typical sanitary sewer, ranging from 1-1/4 inch to 6 inches, depending upon the expected design flow. – The pressure sewer mains (at shallower depths than gravity) are easier to locate in road shoulders to minimize construction in roads where space is available. – Some portion of pressure sewers could be installed with trenchless technologies, thus reducing general disruptions experienced during construction. – Homes with generators can maintain operation of their pumps as long as their home electrical system is set up to accommodate the load (this is becoming more common with the larger number of power outages in recent years).	– Each building in the system would have to be equipped with a pump unit, which increases operation and maintenance requirements. Towns that operate their own systems typically have to maintain an inventory of pumps/parts for these units to minimize disruption of services; otherwise, it becomes the homeowner's responsibility to have their system maintained. – Each pump unit is dependent upon electrical power for proper operation; since the pumps are located at individual homes, municipal backup electrical power is typically not provided. Storage capacity is typically built into each pump chamber (capacity depends on manufacturer). However, in a prolonged power outage, it would be possible for the wastewater flow to exceed this capacity and backup into the structures. This can be mitigated by providing electrical connections on each pump unit to allow a service crew to connect a portable generator and pump out each unit during times of prolonged power outage. Another option is to install a larger capacity unit or a dual tank system, thus providing more storage. – This system is more sensitive to seasonal flow conditions than a gravity sewer. In areas with extreme seasonal fluctuations, minimum flow conditions must be carefully quantified to be sure the sewage flow can properly travel through the system. If inadequate flow exists, solids can harden within the sewer and cause blockages. This concern can be mitigated through proper design.

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Advantages	Disadvantages
	– Some customers may need to upgrade their electrical system, which might not have the capacity for the additional load. – Training would be required to familiarize operating staff with maintenance of the pumps and pressure sewers. – Ownership considerations need to be clearly defined early in the selection and design process. Costs for systems will depend on who owns, operates, and maintains the grinder pump. Easements may also be required to address maintenance and emergency power issues. – Odors can be released at the point of discharge into a gravity sewer or pump station, especially during low flow periods. – Grinder pumps take up space on the customer's property and in the case of Beach Point, many of the properties are relatively small.

A major decision with grinder pumps is who purchases and owns the grinders pumps - the customer or municipal sewer system. A hybrid approach can also be used where the municipality purchases the initial pump and then the customer takes ownership including any repairs or replacements.

For the purpose of estimating the number of grinder pumps required, we assumed that most of the parcels have a low enough number of dwellings that they could be handled by one grinder pump. For instance, one E1 grinder station can handle up to nine homes and up to 24 with factory approval. The vast majority of parcels in Beach Point contain less than 9 residences. Thus, we have assumed that for 128 parcels there would be 150 grinder pump stations required to allow for a few parcels that have too many residences for one grinder station.

6.4 Vacuum Sewers

A typical vacuum sewer system consists of a central vacuum station (CVS), valve pits and the sewer piping and one or more standard wastewater pump stations which are typically constructed in the same building as the CVS. Each customer would have a vacuum valve pit, which consists of the storage sump, the vacuum valve, and associated piping. The valves are operated on pressure differentials and do not require a power source.

Typically, a vacuum sewer system is designed with a maximum static loss of 13 feet and a maximum friction loss of 5 feet in any single flow path to a vacuum pump station.

Most problems affecting vacuum sewers are related to failures in the opening/closing mechanism of the valve. When the valve fails to open this may result in the accumulation of wastewater in the collection chamber and potentially backup into the building.

Each customer's valve pit needs an air intake pipe that typically extends 2-feet above ground level.

A vacuum system would be more efficient for a collection system in a grid rather than homes all on one long straight line as is the case for Beach Point. This is because of the need to run the vacuum pipe at a minimum 0.2% slope and then to raise the elevation of the pipe at intervals to provide necessary upward sloping pipe while keeping the upward elevation gain below the maximum static head of 13 feet.

While the layout and sizing of a vacuum system is best done by the equipment supplier, for the purposes of this evaluation we are assuming the CVS/sewage pump station will be located near the halfway point of the 13,200 feet of Shore Road to be sewered in Beach Point. The CVS would draw wastewater from both directions and then a pump station would pump wastewater back in the northwest direction through a 6 or 8-inch force main to the Provincetown pump station, a distance of approximately 7,300 feet. For most of this distance, there would be two pipes running in parallel, the vacuum pipe and the force main.

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One advantage of the system is the lower cost of facilities constructed on each customer's property. For the low-pressure sewer, the estimated cost is $10,000 for each grinder pump station and for the vacuum sewer the cost is $5,000 for each vacuum valve pit in 2024 dollars.

Each vacuum valve vault can handle up to four homes. For the purpose of estimating the number of vacuum valve vaults required we assumed that most of the parcels have a low enough number of dwellings that they could be handled by one vacuum vault. Thus, we have assumed that for 128 parcels there would be 150 vacuum valve vaults stations to allow for a few parcels that have too many residences for one vacuum valve vault.

6.5 Pumping Beach Point Wastewater to Provincetown WWTF

The Towns of Truro and Provincetown have initiated preliminary discussions on a potential regional wastewater solution for the Beach Point Study Area. The Town of Provincetown has included a preliminary allocation for Truro to connect to Provincetown's collection system (through the future Phase 6B expansion of Provincetown's collection system). The allocation for Truro flow that has been used in Provincetown's planning efforts is 150,000 gpd, based on Title 5 flow estimates (maximum day flows). Provincetown has also indicated that average annual flows at the existing Provincetown Wastewater Treatment Facility (WWTF) are typically approximately 60% of Title 5 flows.

There is an existing Provincetown pump station near the border of Truro that could be used to pump Beach Point wastewater to the Provincetown WWTF. The distance between the Provincetown/Truro border and the pump station is approximately 700 feet.

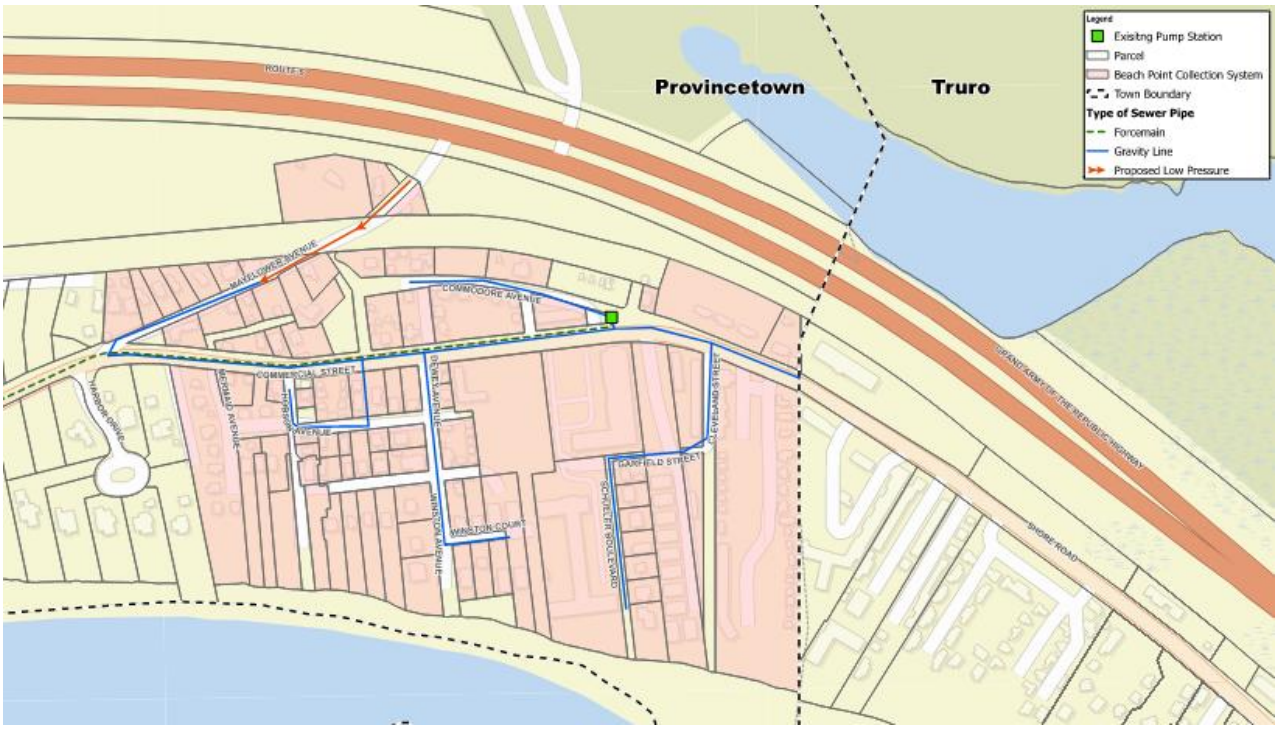


Figure 1 Provincetown Existing Pump Station Location

In addition to costs for sewage collection within Beach Point, there will be capital cost payments to Provincetown for sewage capacity, WWTF upgrades and pump station and force main upgrades.

As of February 8, 2024, the following is our understanding of the capital contributions from Truro to Provincetown:

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Table 4 Estimated Project Costs and Truro Responsibility

Component	Estimated Project Costs (2024$)	Truro Responsibility
Wastewater Treatment Facility	$24 M	Based on flow (25%)
Recharge Facilities	$1 M	Based on Flow (25%)
Collection System Infrastructure and Pumping Station Upgrades	$5 M	100%
Subtotal	$30 M	$11.3 M

Notes:

1. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

In addition to these costs, Provincetown has indicated they would assess a "Treatment Cost." This "Treatment Cost", that would represent Truro's share of the cost of using a portion of the existing Provincetown facilities. The treatment costs would be assessed by Provincetown and provided to Truro. At this time, a placeholder of $2 million was recommended through discussions with Provincetown.

In addition to these costs, Truro would be responsible for their own collection system costs. If Provincetown and Truro were to create a wastewater district, the towns could then explore if Provincetown's design/build legislation would apply to Truro and to verify whether a design/build/operate venture would be applicable for this project.

The conceptual total project costs are shown in the following table:

Table 4 Conceptual Project Costs for Collection System Including Provincetown Capital Contribution (2024 Dollars)

Collection System Alternative	Truro Collection System Project Costs[2.3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[6]	Truro Contribution to Provincetown Capacity Costs[6]	Total Project Costs
Gravity	$26.1 M	N/A[1]	$11.3 M	$2 M	$39.4 M
Low Pressure	$8.8 M	$1.5 M	$11.3 M	$2 M	$23.6 M
Vacuum	$13.5 M	$0.8 M	$11.3 M	$2 M	$27.6 M

Notes:

1. Houses that are adjacent to a gravity sewer but are located at a lower elevation than the sewer will require a small pump and small diameter force main to connect to the system.
2. Total Project Costs include allowances for construction costs including: a 30% construction contingency, 10% engineering design allowance, 2% fiscal/legal/permitting and administrative costs allowance, 15% construction administration and Resident Project Representative (RPR) costs allowance and 8% police detail allowance.
3. Conceptual cost estimates were developed based on a conceptual layout of the system alternatives. No surveys have been conducted as part of this project.
4. Cost estimates do not include the cost of final restoration of private property or the cost of attaining easements.
5. Full width mill and overlay road restoration costs were estimated for road restoration.
6. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

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7. On-Site Wastewater Treatment Alternatives

This section describes an on-site wastewater treatment alternative to replace the existing on-lot septic systems with a system that will provide a higher level of nitrogen treatment. The on-site alternative evaluated for the Beach Point area is the development of an Innovative Alternative (I/A) treatment system Program.

7.1 Innovative On-Lot Treatment Systems

Implementation of an on-lot Innovative Alternative (I/A) treatment system program could potentially eliminate the need to provide sewers in Beach Point. There are multiple types of I/A systems already constructed in the Town of Truro as listed in the following table:

Table 7 I/A Systems in Truro

I/A Type	No. in Truro	MassDEP Approval
MicroFast	16	Remedial Use
FAST	2	General Use
Advantex	22	General Use (AX20)
BioClere	2	General Use
NitROE	2	Provisional use
Septitech	1	General Use
Other	20	

I/A systems can be utilized as an on-site wastewater management strategy, particularly in low-density areas where centralized wastewater treatment through sewer collection is not cost-effective. As of March 2022, the lowest approved total nitrogen effluent concentration for a MassDEP General Use I/A system is 19 mg/L. The Massachusetts Estuaries Project assumes an average effluent total nitrogen concentration from a conventional Title 5 system of 26.25 mg/L.

A summary table of I/A technologies approved for use in Massachusetts can be found at the following link:

https://www.mass.gov/doc/summary-table-of-innovativealternative-technologies-approved-for-use-in-massachusetts/download

Not all I/A systems are designed to reduce appreciable levels of nitrogen. However, several nitrogen-reducing I/A systems are currently in the Provisional Use stage, including the Nitrex system (which has a provisional effluent total nitrogen goal of 10 mg/L) and NitROE system (which has a provisional effluent total nitrogen goal of 11 mg/L). A provisional use system must have at least 50 installations operating for three years prior to applying for a General Use approval. Performance data collected during the 3-year period is evaluated by MassDEP as part of the General Use application.

As there are two “provisional use” technologies that can produce a total nitrogen of 11 mg/L, this alternative assumes Truro would adopt a nitrogen standard of 11 mg/l for either all of Beach Point or for those systems that require improvements. This report evaluates NitROE and Nitrex systems.

NitROE System: This system is installed in series between a Title 5 system septic tank and a soil absorption system constructed to and operating in accordance with state regulations to accommodate design flows of less than 2,000 gpd. The system is comprised of two-unit processes which are sequentially performed in two different chambers. The first chamber is aerated, via an external air pump and airline header/hose arrangement, to achieve both organic carbon reduction along with the biological conversion of ammonia-N to nitrate-N. From the aeration chamber, the wastewater then flows by gravity into a denitrification chamber where, in the presence of natural organics from wood chips, bacteria mediate the conversion of nitrate-N to inert N gas that exits to the atmosphere via the Title 5 system vent piping. Depending on design flow and availability of local tank structures, the sequential aeration and denitrification process steps can be performed in the same single tank, which is NitROE® 2KS WWTS, or each process

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could be performed in its own separate tank with the overall NitROE® WWTS comprised of multiple tank combinations, which is NitROE® 2KM WWTS.

Gravity moves wastewater through the tanks so that the only piece of mechanical equipment is an air pump, which operates from beneath a faux rock.

Scott Horsley recently (11/09/2023) received detailed cost quotes for the installation of a NitROE system in Truro from John Smith of KleanTu/NitROE. Competitive bids for the system ranged from $42,300 to $82,175. This cost is for a full system replacement including septic tank, NitROE treatment system, and soil absorption system/leaching field. The costs of a system upgrade will be considerably less where the existing septic tank and/or soil absorption system can be maintained. If the septic tank and leach field meet Title 5 requirements, and only the NitROE equipment is needed, the estimated cost is $18,000 for the NitROE system installed.

NITREX System: This system uses a patented nitrate-reactive media that converts nitrate to inert nitrogen gas (denitrification). The NITREX reactive media is contained in a buried concrete tank. Raw wastewater is gravitationally fed through the treatment module. For septic tank applications, an oxidative pre-treatment step is required to convert ammonium to nitrate before the NITREX™ filter can perform the reductive denitrification step. This pre-treatment is similar to that for the NitROE system which uses an aeration chamber. The low nitrate effluent from the NITREX filter is then discharged to the leach field or adsorption bed.

For a typical residential septic system installation (3–4-bedroom home) the NITREX filter will cost approximately $4,200 - $5,000 (plus shipping and local installation costs). The pretreatment system materials costs are typically $8,000 - $12,000. With installation usually $4,000 - $6,000, a complete NITREX system cost would be $16,000 - $22,000. Using a cost from the middle of the range of $18,000, the NITREX system cost would be similar to that for the NitROE system. It is assumed that a full system replacement (septic tank, NITREX and leach field) would cost approximately the same as that for the NitROE system which is $42,000.

Reference for cost data: http://lombardoassociates.com/nitrex.php

Per the above discussions, we have assumed that the cost for an on-lot NitROE system is similar to that for a NITREX system which is $18,000 for equipment and installation of the nitrogen removal system and $42,000 for a full on-lot system construction. Because the costs of the two systems are very similar, an allowance of $42,000 for a full system and $18,000 for just the IA system equipment was used for the installation of either system.

Assuming that all 128 parcels have entire replacement including septic tank, NitROE or NITREX system and leach field, with a cost of $42,000 each, the total cost would be $5.4 million. If the septic tank and leach field meet Title 5 requirements, and only the NitROE equipment is needed, the estimated cost is $18,000 per lot for a total cost of $2.3 million.

Determining the scope of work (full system replacement vs. NitROE or NITREX system only) would require a detailed inspection of each property. Accounting for the high density of homes along Shore Road and the number of cesspools in Beach Point, there could be many full system replacements required. A likely outcome is that some parcels will require full replacement of on-lot facilities while others would require installation of the NitROE system only, meaning that the cost will be somewhere between the $2.3 million and $5.4 million discussed above.

Given the nitrogen reduction goal of 0.79 kg-N/day, approximately 81% of the existing systems cesspools or Title 5 systems in the portion of Beach Point within the Provincetown Harbor Watershed would need to convert to a provisional I/A system. This is equivalent to approximately 58% of systems within the Beach Point Study Area. The cost associated with replacing approximately 58% of Beach Point's systems with IA systems is between $1.3 million and $3.1 million (2024 dollars), depending on the individual site improvements required. This estimate needs to be refined by inventorying individual property improvements required, space availability, flow per system and budgetary costs from the I/A system suppliers. For instance, there could be economies of scale by targeting commercial customers as the fixed cost per system would be less than that for a single family residence.

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Because I/A systems have to be regularly maintained to keep them working properly, both state regulations and local boards of health require that each system be inspected periodically. At the very least, an inspection must be done at least once per year; however, MassDEP or the local board of health can require that inspections occur more frequently. When an I/A system is newly installed, the owners are usually required to have the system inspected and sampled much more frequently. Inspection and testing requirements are outlined in the approvals for each type of technology.

System owners must have a maintenance contract with a Certified Wastewater Operator specifically licensed in Massachusetts in place for the life of the system. The manufacturer or distributor of an I/A system should be able to provide customers with names of Certified Operators trained to maintain their systems.

Plans for operation and maintenance, monitoring, and testing must be submitted to the local Board of Health (and in some cases to MassDEP) for approval prior to start-up of the system. Inspection and sampling must be performed in accordance with the technology or system approval issued by the local Board of Health or DEP.

Certified Operators must use the MassDEP-approved Inspection and O&M Form and technology-specific checklist to record inspection results. System owners are responsible for the form being submitted to their local Board of Health and in some cases to MassDEP.

Table 8 Significant Annual Costs (2024 Dollars)

Significant Annual Cost	Cost
Operation and Maintenance contract[1]	$1,200.00
Electricity costs	$350.00
Total Annual Cost to Operate	**$1,550.00**

Notes:

1. Operation and maintenance costs include effluent sampling costs (which are $400)

Source: https://www.chatham-ma.gov/DocumentCenter/View/349/Innovative-Alternative-Onsite-Septic-Systems-for-the-Removal-of-Nitrogen-in-Barnstable-County-PDF?bidId=

7.1.1 Beach Point I/A Program Alternative Analysis

Advantages and potential challenges of implementing an I/A program at Beach Point are summarized in Table 9.

Table 9 Beach Point I/A Program Advantages and Potential Challenges

Advantages	Potential Challenges
An I/A Program would provide a Truro controlled solution which would not require coordination and negotiation with neighboring communities.	I/A systems may be difficult to site on small lots. Based on a site plan prepared by J.M. O'Reilly and Associates dated 2023 and prepared for a NitROE system in Truro, the land requirement for a septic tank, NitROE tank and leaching chamber was 450 ft^2. The space for a NitROE tank only was about 70 ft^2, not including space needed for excavation. The Beach Point Study Area has multiple lots less than 0.25 acres.
An I/A Program could be phased based on triggers outlined in Board of Health regulations revisions, which would spread out the anticipated project costs for the infrastructure.	Title 5 requires a minimum of 4-feet of separation between the top of maximum high groundwater elevation and the bottom of the soil absorption system. Portions of the Beach Point Study Area are anticipated to have depths to water less than 4-feet and would require raised systems.
	The entire Beach Point Study Area is within the FEMA Base Flood (1 percent annual chance or 100 year flood zone). A portion of the Beach Point Study Area is in a VE Zone, which is defined as a Special Flood Hazard Area subject to high velocity wave action. Title 5 does not allow for new septic tanks or absorption systems to be installed in Velocity Zones

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Advantages	Potential Challenges
	(only replacements of existing systems are allowable with restrictions – for example increases in design flows are not allowable). Title 5 requires on-site systems in Velocity Zones to be elevated above the velocity zone, where feasible.
	Vulnerabilities associated with required minimum depths to groundwater and flood zones.Both are anticipated to increase with climate change.

7.2 Cost Estimates for Project Alternatives

The following table shows cost estimates for the alternatives outlined in this report. The operation and maintenance cost estimates include individual lot electrical costs for grinder pumps, vacuum valves and I/A systems, which typically are paid for by private homeowners. As described above, the cost for I/A systems is conceptual and will need to be refined based individual on-lot conditions. The I/A cost estimate assumes treatment for all of Beach Point; however, as discussed above, it may be possible to install I/A systems in only the portion of Beach Point that is tributary to the Provincetown Harbor Watershed, if the primary purpose of the program is nitrogen management in Provincetown Harbor.

The cost estimates do not include sewage rates from Provincetown for monthly or quarterly customer sewage generation or potential costs associated with a Responsible Management Entity (RME) for operation of the I/A program. Cost estimates are presented as total project costs and do not include any anticipated grant or principal forgiveness opportunities available to the different alternatives.

Table 10 Conceptual Project Costs for Collection System Including Provincetown Capital Contribution (2024 Dollars)[7]

Collection System Alternative	Truro Collection System Project Costs[2,3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[8]	Truro Contribution to Provincetown Capacity Costs[8]	Total Project Costs	Total Annual O&M	20 Year Net Present Worth[6]
Centralized Gravity System	$26.1 M	N/A[1]	$11.3 M	$2 M	$39.4 M	$1.1 M	$53.1 M
Centralized Low Pressure System	$8.8 M	$1.5 M	$11.3 M	$2 M	$23.6 M	$0.4 M	$27.4 M
Centralized Vacuum System	$13.5 M	$0.8 M	$11.3 M	$2 M	$27.6 M	$0.5 M	$33.7 M
I/A Program (Full Replacement of Systems	$5.4 M	N/A	N/A	N/A	$5.4 M	$0.6 M	$12.7 M

Notes:

1. Houses that are adjacent to a gravity sewer but are located at a low elevation than the sewer will require a small pump and small diameter force main to connect to the system.
2. Total Project Costs are high level planning costs and include allowances for construction costs including: a 30% construction contingency, 10% engineering design allowance, 2% fiscal/legal/permitting and administrative costs allowance, 15% construction administration and Resident Project Representative (RPR) costs allowance and 8% police detail allowance.
3. Conceptual cost estimates were developed based on a conceptual layout of the system alternatives. No surveys have been conducted as part of this project.
4. Cost estimates do not include the cost of final restoration of private property or the cost of attaining easements.
5. Full width mill and overlay road restoration costs were estimated for road restoration.

This Technical Memorandum is provided as an interim output under our agreement with Town of Truro, MA. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

Collection System Alternative	Truro Collection System Project Costs[2,3,4,5]	Grinder or Vacuum Vault Allowance	Truro Contribution to Provincetown Infrastructure Costs[8]	Truro Contribution to Provincetown Capacity Costs[8]	Total Project Costs	Total Annual O&M	20 Year Net Present Worth[6]

6. Net present worth analysis assumes a 5% annual factor for inflation and a 20 year lifespan for equipment.
7. Cost estimates are presented in May 2024 dollars (ENR = 13532.44). Once a project schedule has been established cost estimates should be adjusted to the anticipated midpoint of construction.
8. Preliminary allowances outlined in this table were provided by the Town of Provincetown through a series of discussions between the Towns of Provincetown and Truro on June 28, 2023, December 6, 2023, February 8 2024 and April 25, 2024.

This Technical Memorandum is provided as an interim output under our agreement with Town of Truro, MA. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

Appendix D

RMAT Analysis

Climate Resilience Design Standards Tool Project Report

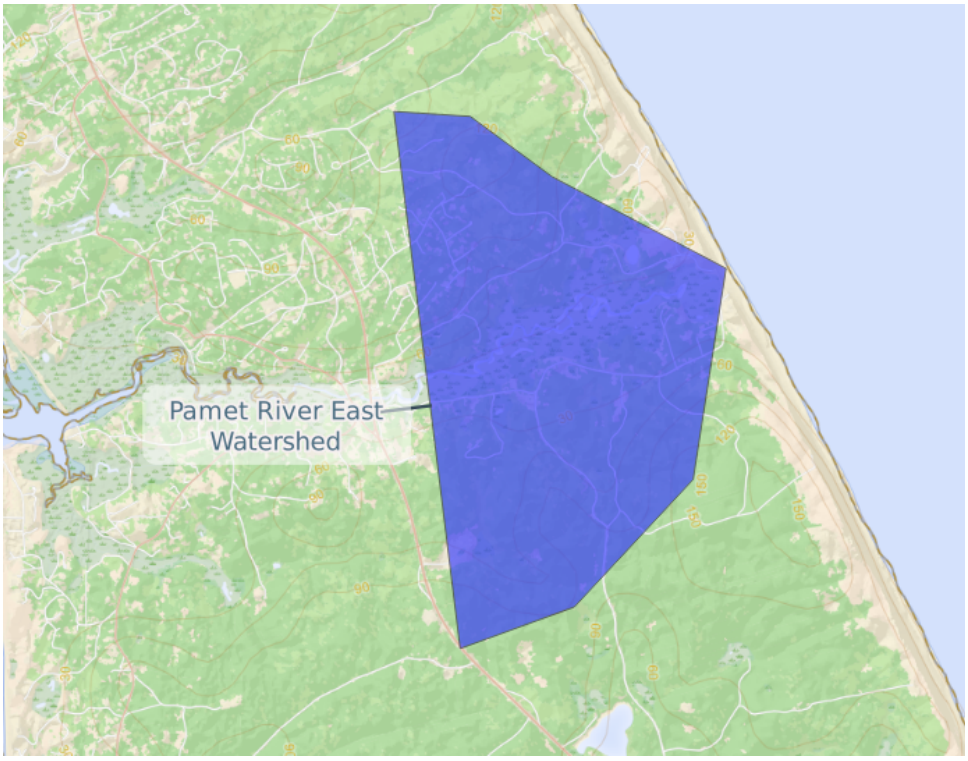
Pamet River East Watershed
Date Created: 9/22/2025 5:33:46 PM
Date Report Generated: 10/2/2025 1:21:12 PM
Created By: hannah.framson
Tool Version: Version 1.4
Project Contact Information: Julia Khrakovsky (julia.khrakovsky@ghd.com)

Project Summary

Link to Project

Estimated Capital Cost: $1800000.00
End of Useful Life Year: 2060
Project within mapped Environmental Justice neighborhood: No

Ecosystem Service Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Stormwater Flooding	Moderate Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	Moderate Exposure



Asset Preliminary Climate Risk Rating Summary

Number of Assets: 4

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Stormwater Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Provisional Use Nitrogen Reducing Systems	High Risk	Moderate Risk	High Risk	Moderate Risk
Permeable Reactive Barrier	High Risk	Moderate Risk	High Risk	Moderate Risk
Stormwater BMP	High Risk	Moderate Risk	High Risk	Moderate Risk
Cluster System	High Risk	Moderate Risk	High Risk	Moderate Risk

Climate Resilience Design Standards Summary

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Provisional Use Nitrogen Reducing Systems	2070	2050		50-yr (2%)	
Permeable Reactive Barrier	2050				
Stormwater BMP	2050				
Cluster System	2070	2050		50-yr (2%)	
Extreme Precipitation					
Provisional Use Nitrogen Reducing Systems	2070			10-yr (10%)	Tier 2
Permeable Reactive Barrier	2050				Tier 2

Stormwater BMP	2050		5-yr (20%)	Tier 2
Cluster System	2070		10-yr (10%)	Tier 2
Extreme Heat				
Provisional Use Nitrogen Reducing Systems	2070	50th		Tier 2
Permeable Reactive Barrier	2050	50th		Tier 2
Stormwater BMP	2050	50th		Tier 2
Cluster System	2070	50th		Tier 2

Scoring Rationale - Project Exposure Score

The purpose of the Exposure Score output is to provide a preliminary assessment of whether the overall project site and subsequent assets are exposed to impacts of natural hazard events and/or future impacts of climate change. For each climate parameter, the Tool will calculate one of the following exposure ratings: Not Exposed, Low Exposure, Moderate Exposure, or High Exposure. The rationale behind the exposure rating is provided below.

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Located within the 0.1% annual coastal flood event within the project's useful life

Extreme Precipitation - Stormwater Flooding

This project received a "Moderate Exposure" because of the following:

- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- No increase to impervious area
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 200ft of a waterbody and less than 30ft above the waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "Moderate Exposure" because of the following:

- Existing impervious area of the project site is less than 10%
- 10 to 30 day increase in days over 90 deg. F within project's useful life
- Located within 100 ft of existing water body
- No increase to the impervious area of the project site
- No tree removal

Scoring Rationale - Asset Preliminary Climate Risk Rating

A Preliminary Climate Risk Rating is determined for each infrastructure and building asset by considering the overall project Exposure Score and responses to Step 4 questions provided by the user in the Tool. Natural Resource assets do not receive a risk rating. The following factors are what influenced the risk ratings for each asset.

Asset - Provisional Use Nitrogen Reducing Systems
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality

- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses
- Cost to replace is less than $10 million
- Spills and/or releases of hazardous materials would be moderately difficult to clean up

Asset - Permeable Reactive Barrier
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than $10 million
- Impact on natural resources will require remediation/rehabilitation with the inoperability of the asset

Asset - Stormwater BMP
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than $10 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Asset - Cluster System
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses
- Cost to replace is less than $10 million
- Spills and/or releases of hazardous materials would be moderately difficult to clean up

Project Climate Resilience Design Standards Output

Climate Resilience Design Standards and Guidance are recommended for each asset and climate parameter. The Design Standards for each climate parameter include the following: recommended planning horizon (target and/or intermediate), recommended return period (Sea Level Rise/Storm Surge and Precipitation) or percentile (Heat), and a list of applicable design criteria that are likely to be affected by climate change. Some design criteria have numerical values associated with the recommended return period and planning horizon, while others have tiered methodologies with step-by-step instructions on how to estimate design values given the other recommended design standards.

Asset: Provisional Use Nitrogen Reducing Systems — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.1	6.7	2.6	-1.4	-1.7
2070	9.0	8.6	4.4	0.3	0.0

Projected Water Surface Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	13.8	11.7	11.7
	2070		15.0	13.9	13.9

Projected Wave Action Water Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	17.9	11.7	13.7
	2070		20.6	13.9	16.2

Projected Wave Heights: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	10.0	0.0	2.7
	2070		10.5	0.0	3.0

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2070
Return Period: 10-yr (10%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Provisional Use Nitrogen Reducing Systems	2070	10-Year (10%)	6.1	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Moderate Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Provisional Use Nitrogen Reducing Systems	2070	50th	57.95	76.67	40.91

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	3	17	55

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Asset: Permeable Reactive Barrier — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: Not exposed to coastal flooding by 2070

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

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Applicable Design Criteria

Projected Tidal Datums: NOT APPLICABLE

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2050
Return Period: No Return Period

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

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Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Permeable Reactive Barrier	2050	No Return Period	N/A	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: NOT APPLICABLE

Extreme Heat Moderate Risk

Target Planning Horizon: 2050
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Asset: Stormwater BMP — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: Not exposed to coastal flooding by 2070

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

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Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.1	6.7	2.6	-1.4	-1.7

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2050
Return Period: 5-yr (20%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Stormwater BMP	2050	5-Year (20%)	4.9	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Moderate Risk

Target Planning Horizon: 2050
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do

their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Stormwater BMP	2050	50th	56.15	73.97	38.21

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Stormwater BMP	2050	50th	2	10	65

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Stormwater BMP	2050	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Asset: Cluster System — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the

Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.1	6.7	2.6	-1.4	-1.7
2070	9.0	8.6	4.4	0.3	0.0

Projected Water Surface Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Cluster System	2050	2% (50-Year)	13.8	11.7	11.7
	2070		15.0	13.9	13.9

Projected Wave Action Water Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Cluster System	2050	2% (50-Year)	17.9	11.7	13.7
	2070		20.6	13.9	16.2

Projected Wave Heights: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Cluster System	2050	2% (50-Year)	10.0	0.0	2.7
	2070		10.5	0.0	3.0

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2070
Return Period: 10-yr (10%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Cluster System	2070	10-Year (10%)	6.1	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Moderate Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Cluster System	2070	50th	57.95	76.67	40.91

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Cluster System	2070	50th	3	17	55

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Cluster System	2070	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

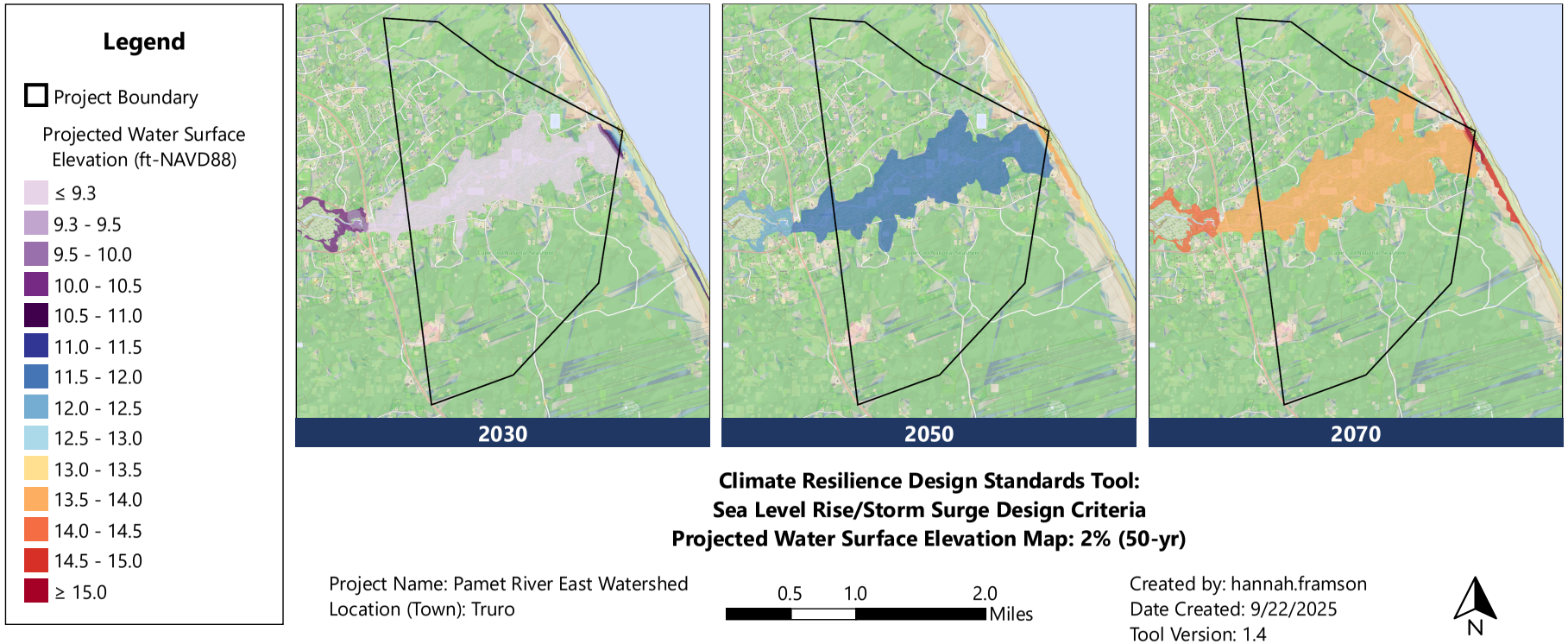
Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Sea Level Rise/Storm Surge Project Maps

The following three maps illustrate the Projected Water Surface Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Water Surface Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, maps, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2% (50-yr)

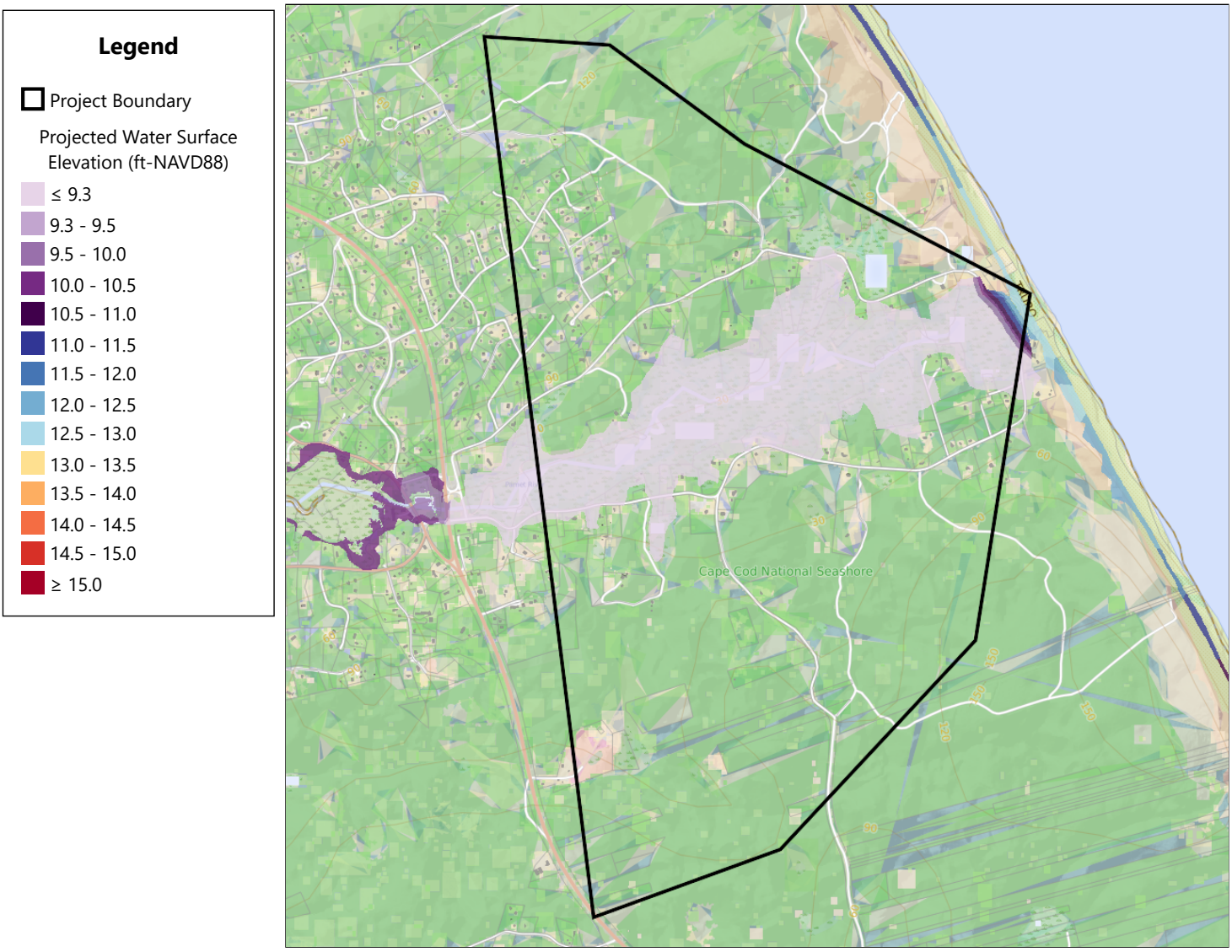
Project Name: Pamet River East Watershed
Location (Town): Truro

0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2030	2% (50-yr)	12.6	9.3	9.3
	2050	2% (50-yr)	13.8	11.7	11.7
	2070	2% (50-yr)	15.0	13.9	13.9



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2030, 2% (50-yr)

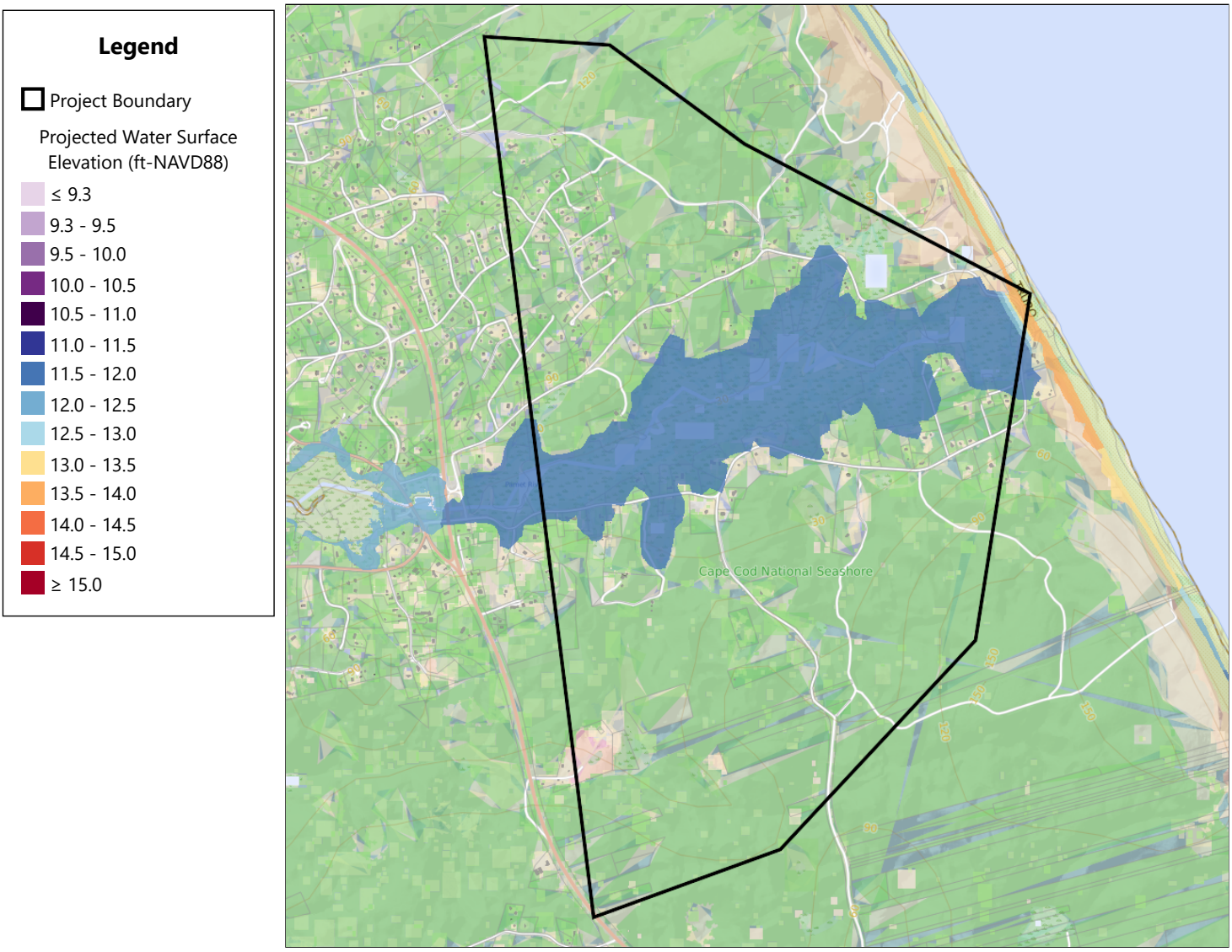
Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2030	2% (50-yr)	12.6	9.3	9.3



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2050, 2% (50-yr)

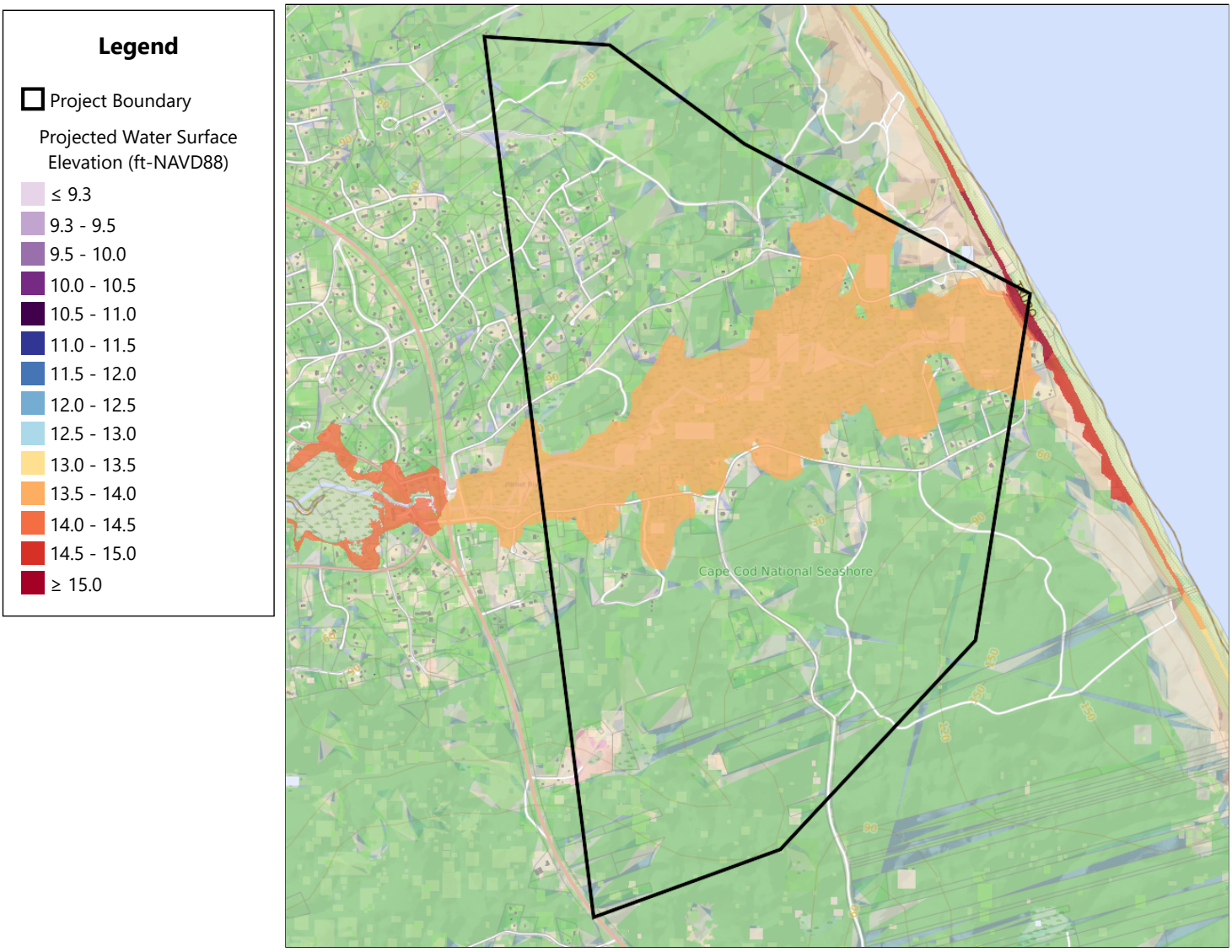
Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2050	2% (50-yr)	13.8	11.7	11.7



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2070, 2% (50-yr)

Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

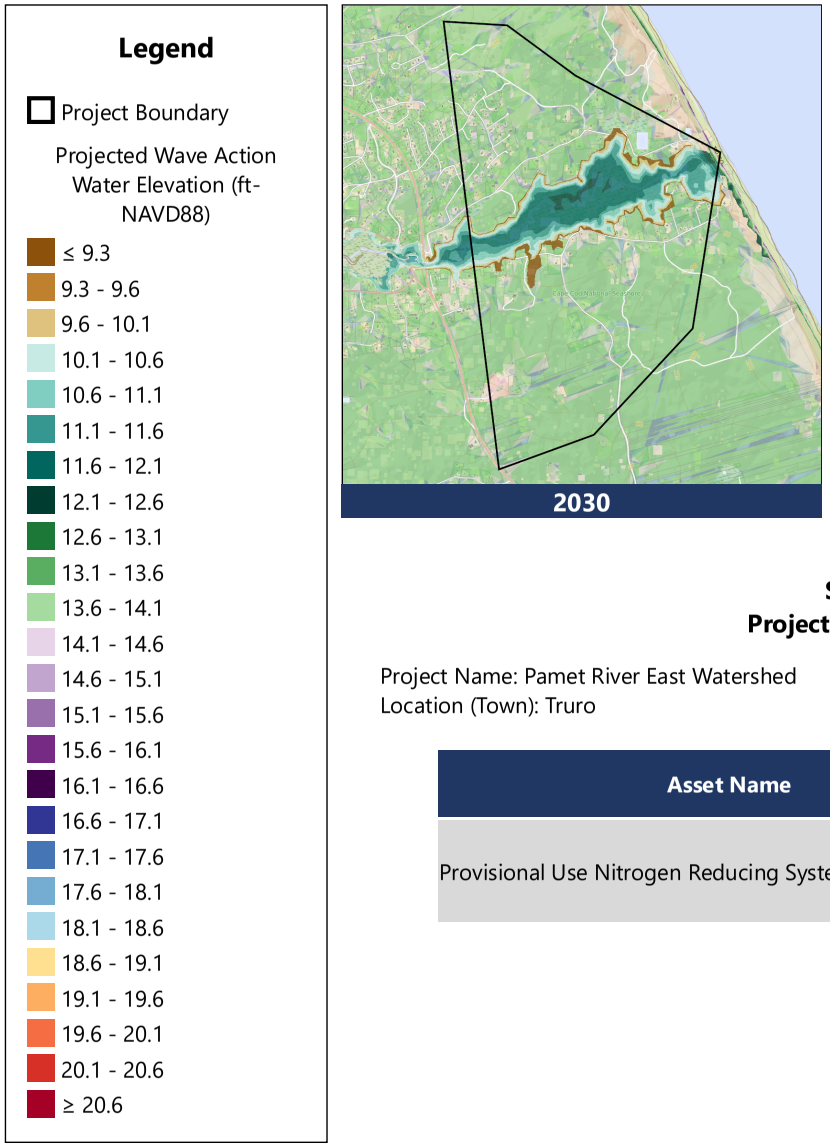
Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2070	2% (50-yr)	15.0	13.9	13.9

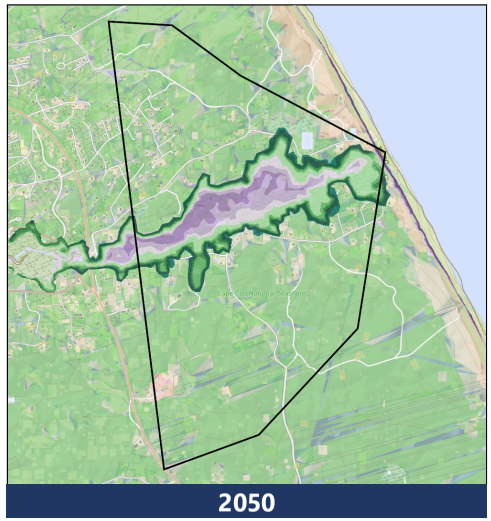
Sea Level Rise/Storm Surge Project Maps

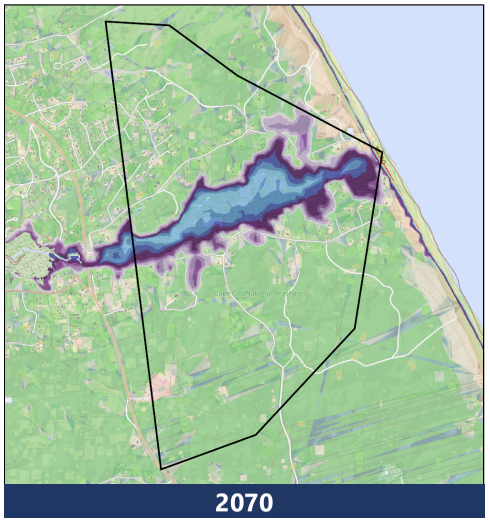
The following three maps illustrate the Projected Wave Action Water Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Wave Action Water Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

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Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2% (50-yr)

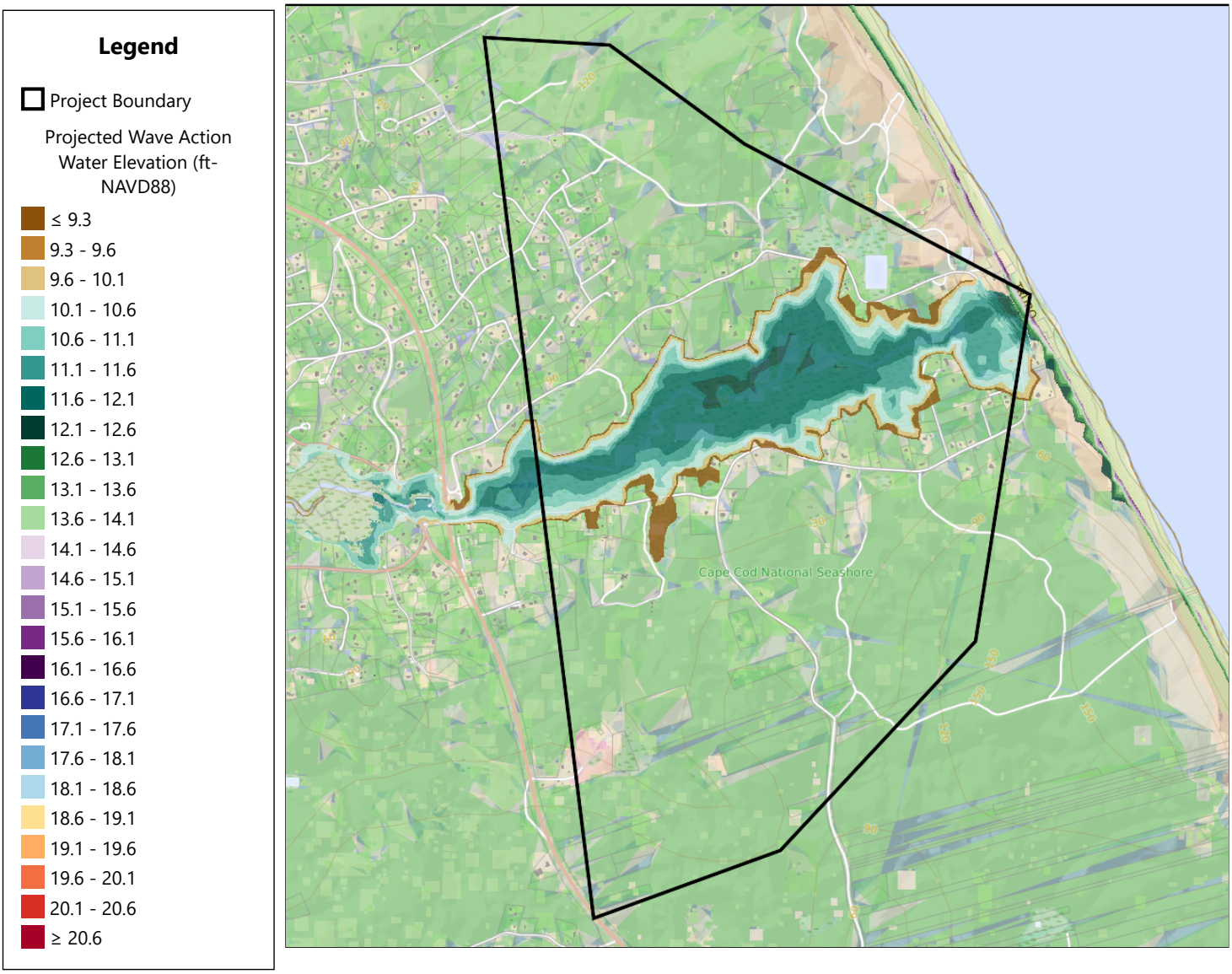
Project Name: Pamet River East Watershed
Location (Town): Truro

0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2030	2% (50-yr)	15.2	9.3	10.9
	2050	2% (50-yr)	17.9	11.7	13.7
	2070	2% (50-yr)	20.6	13.9	16.2



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2030, 2% (50-yr)

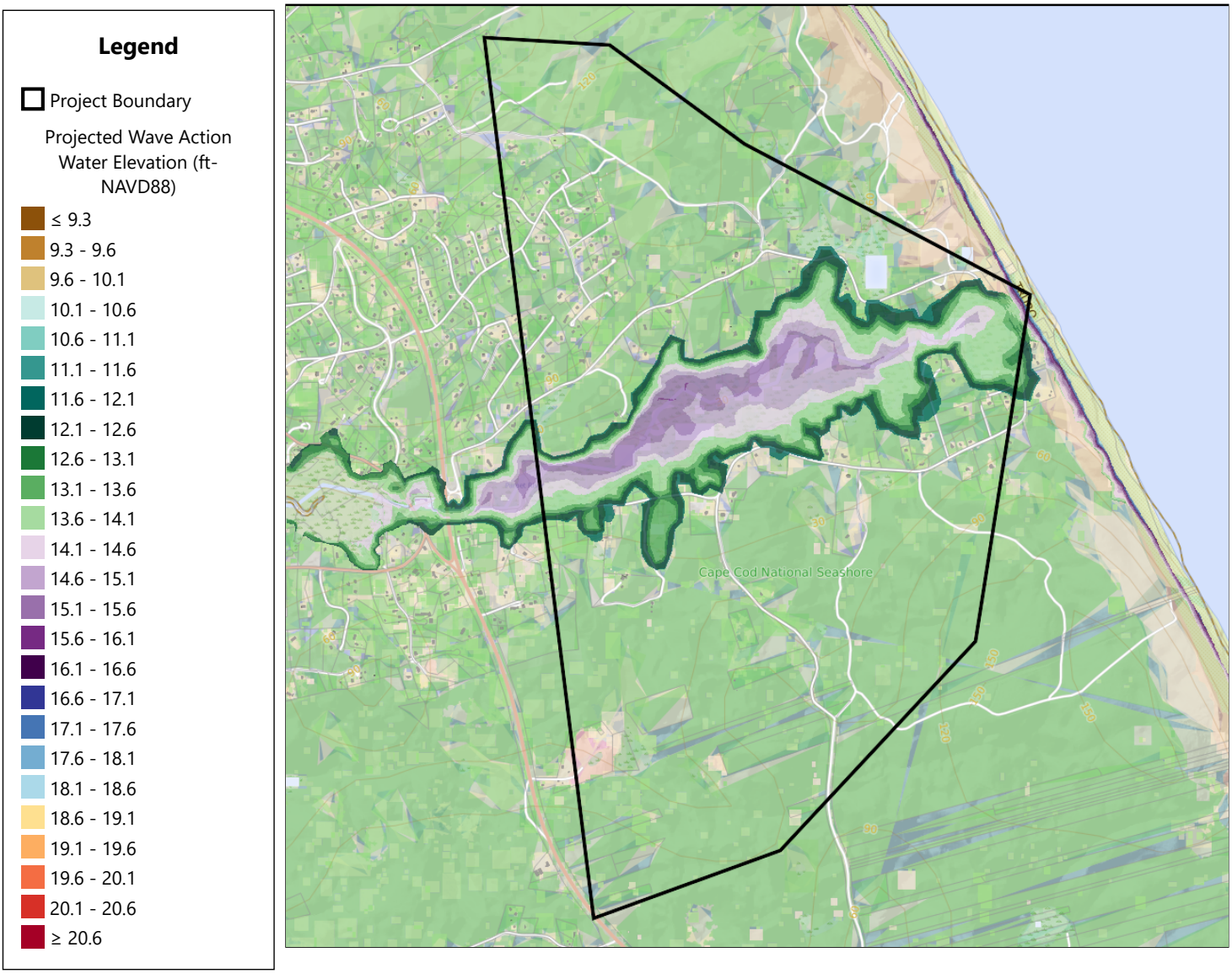
Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average
			(ft-NAVD88)		
Provisional Use Nitrogen Reducing Systems, Cluster System	2030	2% (50-yr)	15.2	9.3	10.9



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2050, 2% (50-yr)

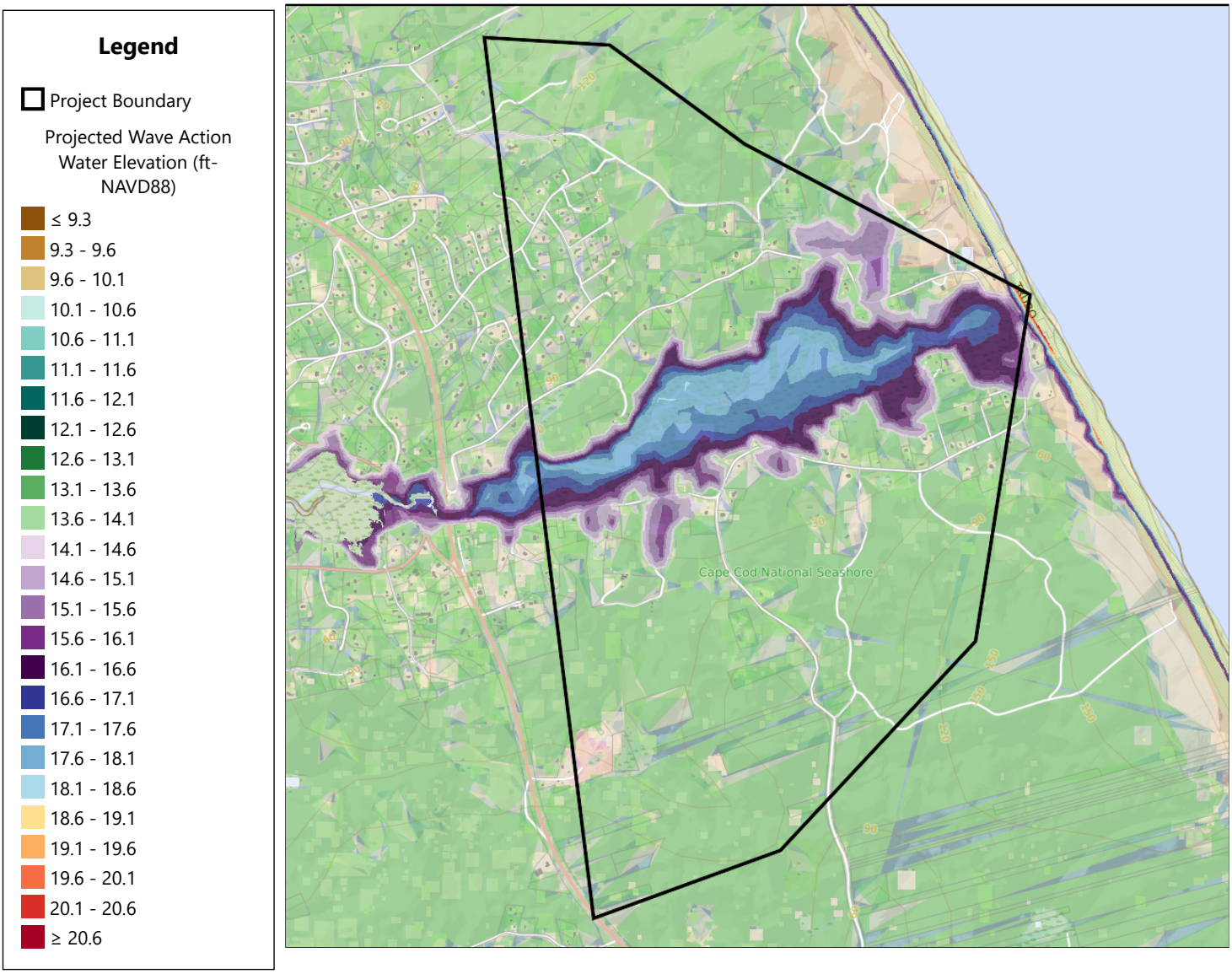
Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2050	2% (50-yr)	17.9	11.7	13.7



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2070, 2% (50-yr)

Project Name: Pamet River East Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems, Cluster System	2070	2% (50-yr)	20.6	13.9	16.2

Project Inputs

Core Project Information

Name:	Pamet River East Watershed
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2060
Location of Project:	Truro
Estimated Capital Cost:	$1,800,000
Who is the Submitting Entity?	City/Town Truro Julia Khrakovsky (julia.khrakovsky@ghd.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	No
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Planning
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	Yes
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The regulatory review process this project is being submitted as part of is MEPA. The purpose of this project is to implement nitrogen management strategies in the Town of Truro to address TMDLs. This analysis includes the eastern portion of Pamet River. The recommended improvements in this area include provisional use nitrogen reducing systems, stormwater BMP's, fertilizer bylaws, and a PRB. A Comprehensive Watershed Nitrogen Management Plan is currently being developed and will be submitted to MassDEP at a later date.

Project Ecosystem Service Benefits

Factors Influencing Output

- ✓ Project protects public water supply
- ✓ Project recharges groundwater
- ✓ Project improves water quality
- ✓ Project protects fisheries, wildlife, and plant habitat
- ✓ Project protects land containing shellfish
- ✓ Project remediates existing sources of pollution
- ✓ Project prevents pollution

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may provide flood protection
- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Incorporate strategies that reduce carbon emissions
- ✓ Incorporate green infrastructure to filter stormwater
- ✓ Incorporate nature-based solutions that sequester carbon carbon
- ✓ Incorporate vegetation that provides pollinator habitat
- ✓ Provide opportunities for passive and/or active recreation through open space
- ✓ Increase plants, trees, and/or other vegetation to provide oxygen production
- ✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
- ✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No
Recharges groundwater	Yes
Protects public water supply	Yes
Filters stormwater using green infrastructure	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	Yes
Remediates existing sources of pollution	Yes

Protects fisheries, wildlife, and plant habitat	Yes
Protects land containing shellfish	Yes
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Hazard Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	No
Are existing trees being removed as part of the proposed project?	No

Project Assets

Asset: Provisional Use Nitrogen Reducing Systems
Asset Type: Utility Infrastructure
Asset Sub-Type: Wastewater
Construction Type: Major Repair/Retrofit
Construction Year: 2030
Useful Life: 30
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
No
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials are expected with moderately difficult cleanup
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources will require remediation/rehabilitation
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support
Asset: Permeable Reactive Barrier
Asset Type: Other
Asset Sub-Type: Other
Construction Type: New Construction
Construction Year: 2030
Useful Life: 20
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts limited to location of infrastructure only
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate

vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
No
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials are expected with relatively easy cleanup
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources will require remediation/rehabilitation
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support
Asset: Stormwater BMP
Asset Type: Green Infrastructure
Asset Sub-Type: Bioswale
Construction Type: New Construction
Construction Year: 2030
Useful Life: 20
Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.
Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts limited to location of infrastructure only
Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people
Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
Yes
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources can be mitigated naturally
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support
Asset: Cluster System
Asset Type: Utility Infrastructure
Asset Sub-Type: Wastewater
Construction Type: New Construction

Construction Year: 2030
Useful Life: 30

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?
No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials are expected with moderately difficult cleanup

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources will require remediation/rehabilitation

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Report Comments

N/A

Climate Resilience Design Standards Tool Project Report

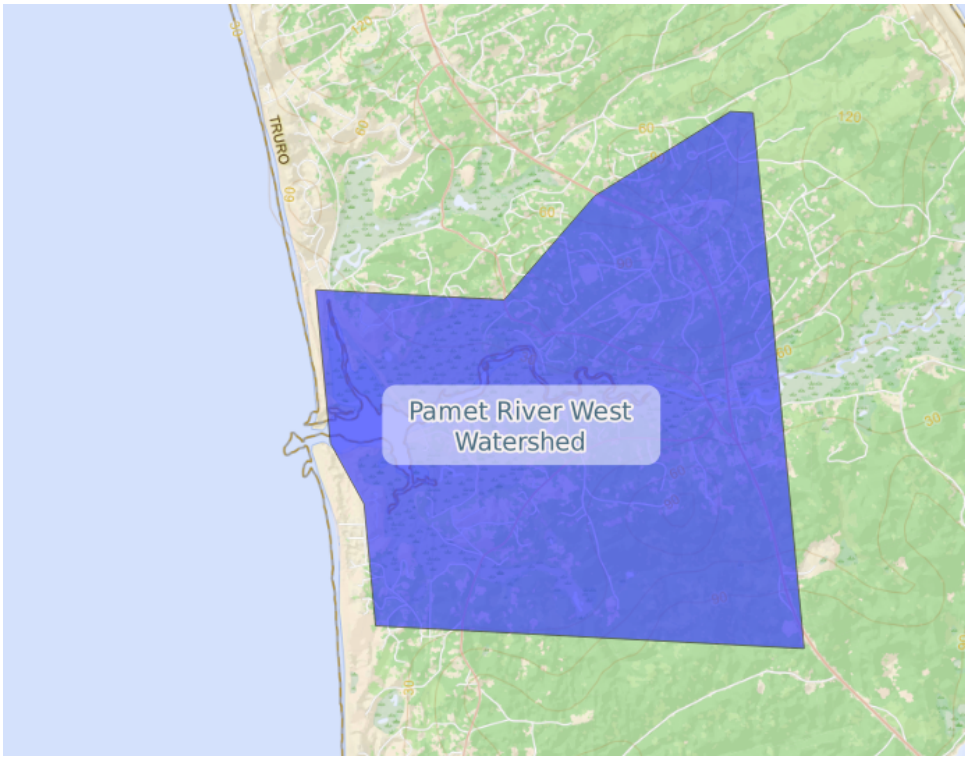
Pamet River West Watershed
Date Created: 9/22/2025 5:11:11 PM
Created By: hannah.framson
Date Report Generated: 9/30/2025 12:47:30 PM
Tool Version: Version 1.4
Project Contact Information: Julia Khrakovsky (julia.khrakovsky@ghd.com)

Project Summary

Link to Project

Estimated Capital Cost: $1800000.00
End of Useful Life Year: 2060
Project within mapped Environmental Justice neighborhood: Yes

Ecosystem Service Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Stormwater Flooding	Moderate Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	Moderate Exposure



Asset Preliminary Climate Risk Rating Summary

Number of Assets: 2

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Stormwater Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Provisional Use Nitrogen Reducing Systems	High Risk	Moderate Risk	High Risk	Moderate Risk
Stormwater BMP	High Risk	Moderate Risk	High Risk	Moderate Risk

Climate Resilience Design Standards Summary

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Provisional Use Nitrogen Reducing Systems	2070	2050		50-yr (2%)	
Stormwater BMP	2050				
Extreme Precipitation					
Provisional Use Nitrogen Reducing Systems	2070			10-yr (10%)	Tier 2
Stormwater BMP	2050			5-yr (20%)	Tier 2
Extreme Heat					
Provisional Use Nitrogen Reducing Systems	2070		50th		Tier 2
Stormwater BMP	2050		50th		Tier 2

Scoring Rationale - Project Exposure Score

The purpose of the Exposure Score output is to provide a preliminary assessment of whether the overall project site and subsequent assets are exposed to impacts of natural hazard events and/or future impacts of climate change. For each climate parameter, the Tool will calculate one of the following exposure ratings: Not Exposed, Low Exposure, Moderate Exposure, or High Exposure. The rationale behind the exposure rating is provided below.

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Located within the 0.1% annual coastal flood event within the project's useful life

Extreme Precipitation - Stormwater Flooding

This project received a "Moderate Exposure" because of the following:

- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- No increase to impervious area
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 200ft of a waterbody and less than 30ft above the waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "Moderate Exposure" because of the following:

- Existing impervious area of the project site is less than 10%
- 10 to 30 day increase in days over 90 deg. F within project's useful life
- Located within 100 ft of existing water body
- No increase to the impervious area of the project site
- No tree removal

Scoring Rationale - Asset Preliminary Climate Risk Rating

A Preliminary Climate Risk Rating is determined for each infrastructure and building asset by considering the overall project Exposure Score and responses to Step 4 questions provided by the user in the Tool. Natural Resource assets do not receive a risk rating. The following factors are what influenced the risk ratings for each asset.

Asset - Provisional Use Nitrogen Reducing Systems
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would be expected to result in minor impacts to people’s health, including minor injuries or minor impacts to chronic illnesses
- Cost to replace is less than $10 million
- Spills and/or releases of hazardous materials would be moderately difficult to clean up

Asset - Stormwater BMP
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than $10 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Project Climate Resilience Design Standards Output

Climate Resilience Design Standards and Guidance are recommended for each asset and climate parameter. The Design Standards for each climate parameter include the following: recommended planning horizon (target and/or intermediate), recommended return period (Sea Level Rise/Storm Surge and Precipitation) or percentile (Heat), and a list of applicable design criteria that are likely to be affected by climate change. Some design criteria have numerical values associated with the recommended return period and planning horizon, while others have tiered methodologies with step-by-step instructions on how to estimate design values given the other recommended design standards.

Asset: Provisional Use Nitrogen Reducing Systems — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.7	7.3	2.5	-2.3	-2.6
2070	9.6	9.2	4.3	-0.6	-0.9

This project is located in an area with uncertainty for future tidal datums. These uncertain zones are either dynamic in terms of geomorphology or are restricted by manmade features (i.e., culverts, tide gates, etc.) that should be evaluated in more detail at the site-scale.

Projected Water Surface Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	12.3	10.7	12.0
	2070		14.1	11.2	14.0

Projected Wave Action Water Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	15.4	10.7	13.1
	2070		18.0	11.2	15.3

Projected Wave Heights: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	7.5	0.0	2.7
	2070		9.0	0.0	3.1

Projected Duration of Flooding: APPLICABLE

Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2070
Return Period: 10-yr (10%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Provisional Use Nitrogen Reducing Systems	2070	10-Year (10%)	6.1	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Moderate Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Provisional Use Nitrogen Reducing Systems	2070	50th	57.95	76.67	40.91

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	3	17	55

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Asset: Stormwater BMP — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: Not exposed to coastal flooding by 2070

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based

on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.7	7.3	2.5	-2.3	-2.6

This project is located in an area with uncertainty for future tidal datums. These uncertain zones are either dynamic in terms of geomorphology or are restricted by manmade features (i.e., culverts, tide gates, etc.) that should be evaluated in more detail at the site-scale.

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2050
Return Period: 5-yr (20%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Stormwater BMP	2050	5-Year (20%)	4.9	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Moderate Risk

Target Planning Horizon: 2050
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Stormwater BMP	2050	50th	56.15	73.97	38.21

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Stormwater BMP	2050	50th	2	10	65

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Stormwater BMP	2050	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

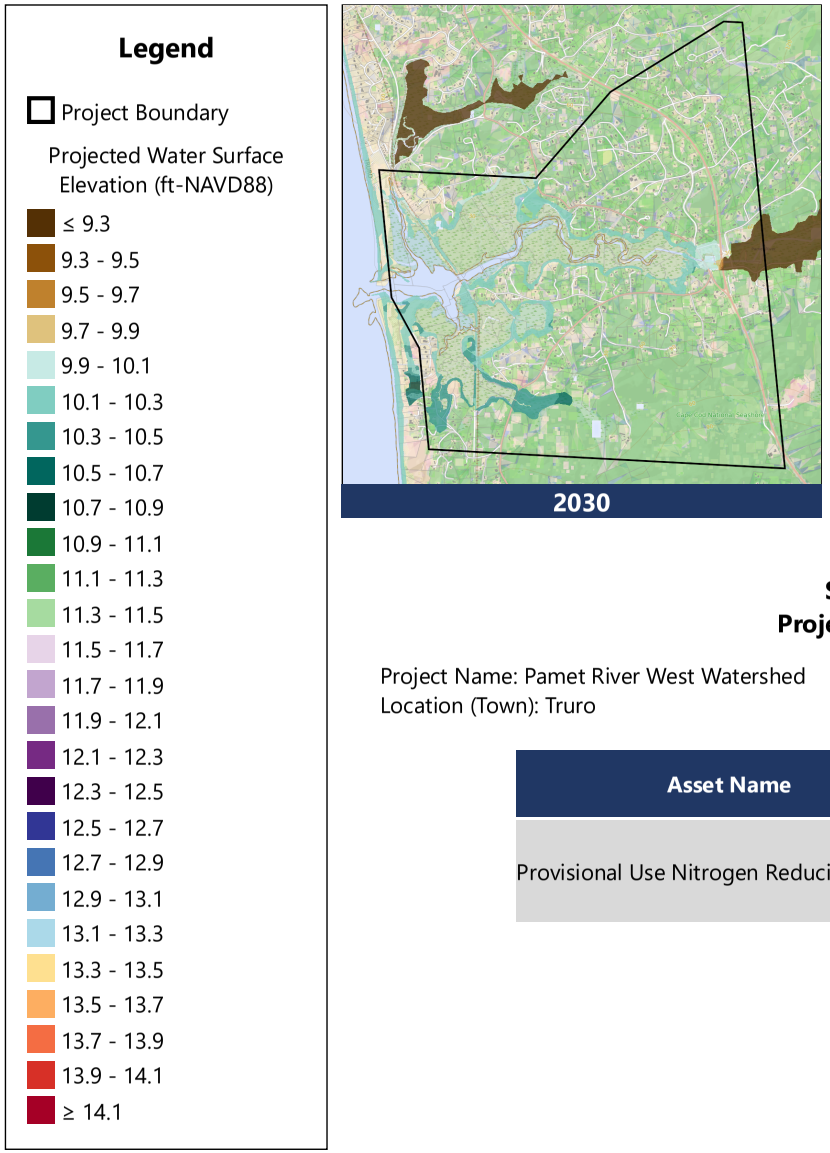
Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

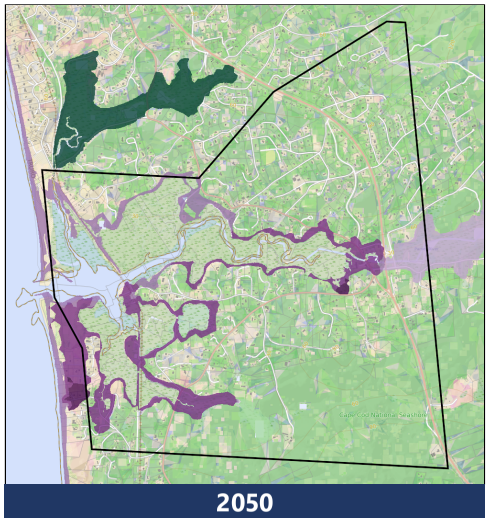
Sea Level Rise/Storm Surge Project Maps

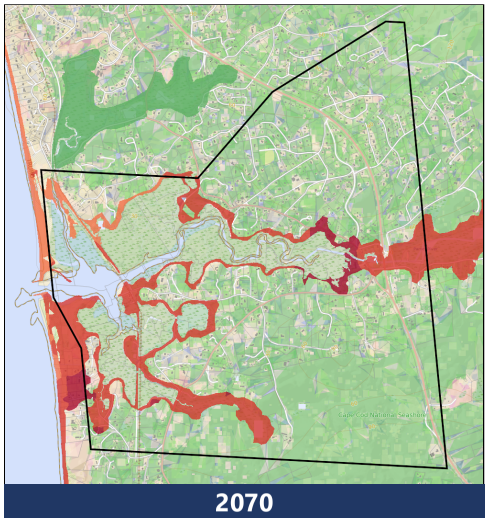
The following three maps illustrate the Projected Water Surface Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Water Surface Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, maps, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.







Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2% (50-yr)

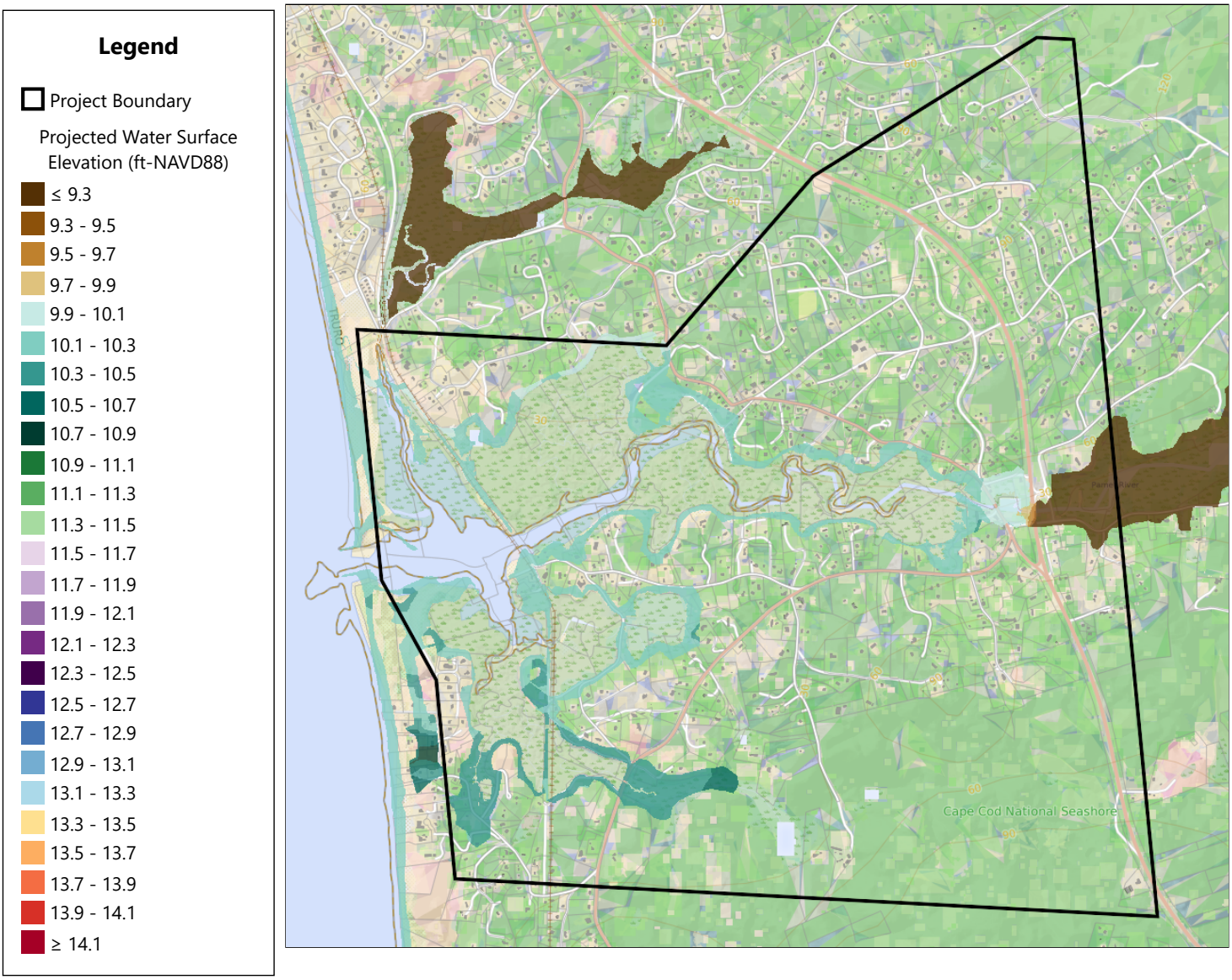
Project Name: Pamet River West Watershed
Location (Town): Truro

0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	10.5	9.3	10.1
	2050	2% (50-yr)	12.3	10.7	12.0
	2070	2% (50-yr)	14.1	11.2	14.0



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2030, 2% (50-yr)

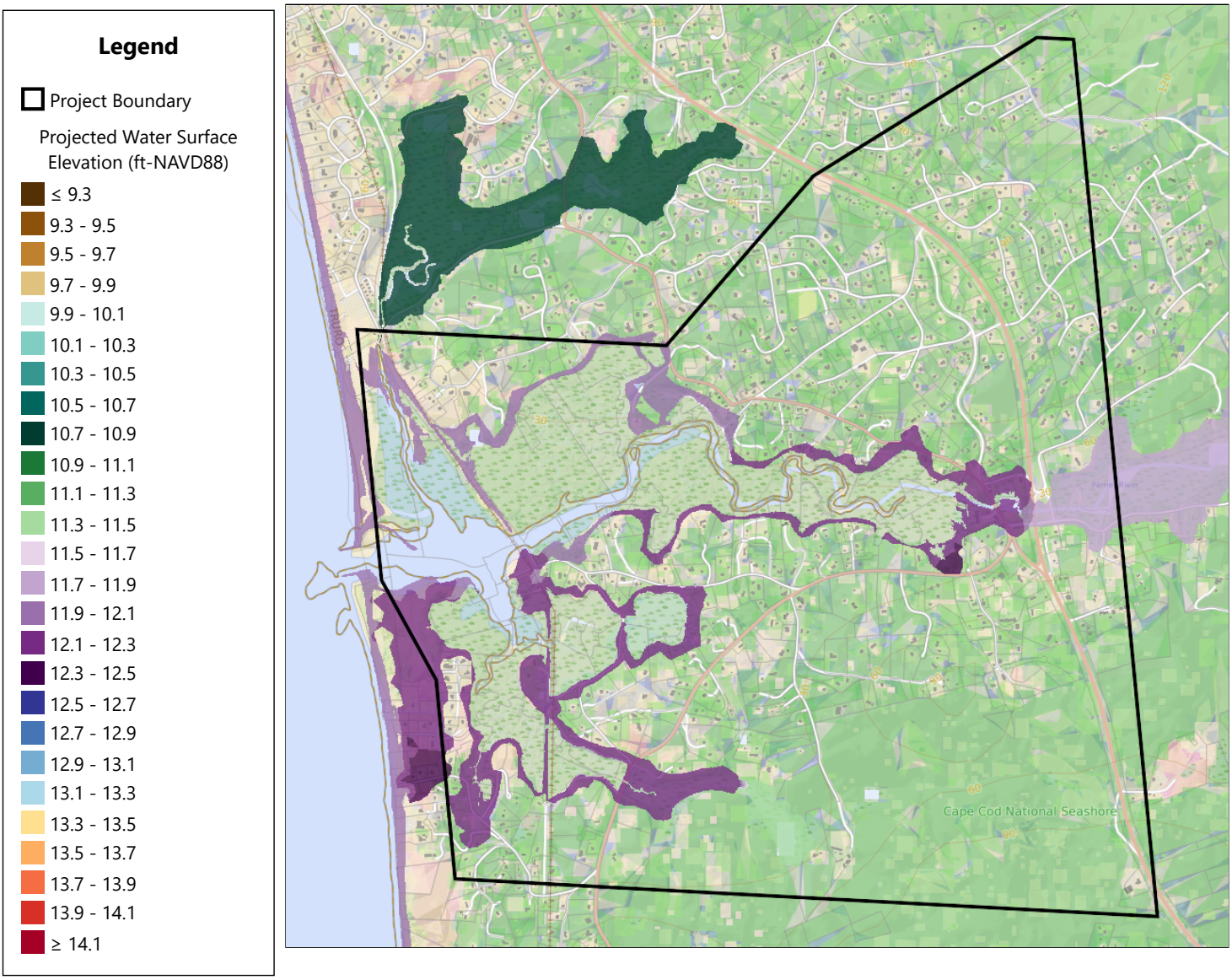
Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	10.5	9.3	10.1



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2050, 2% (50-yr)

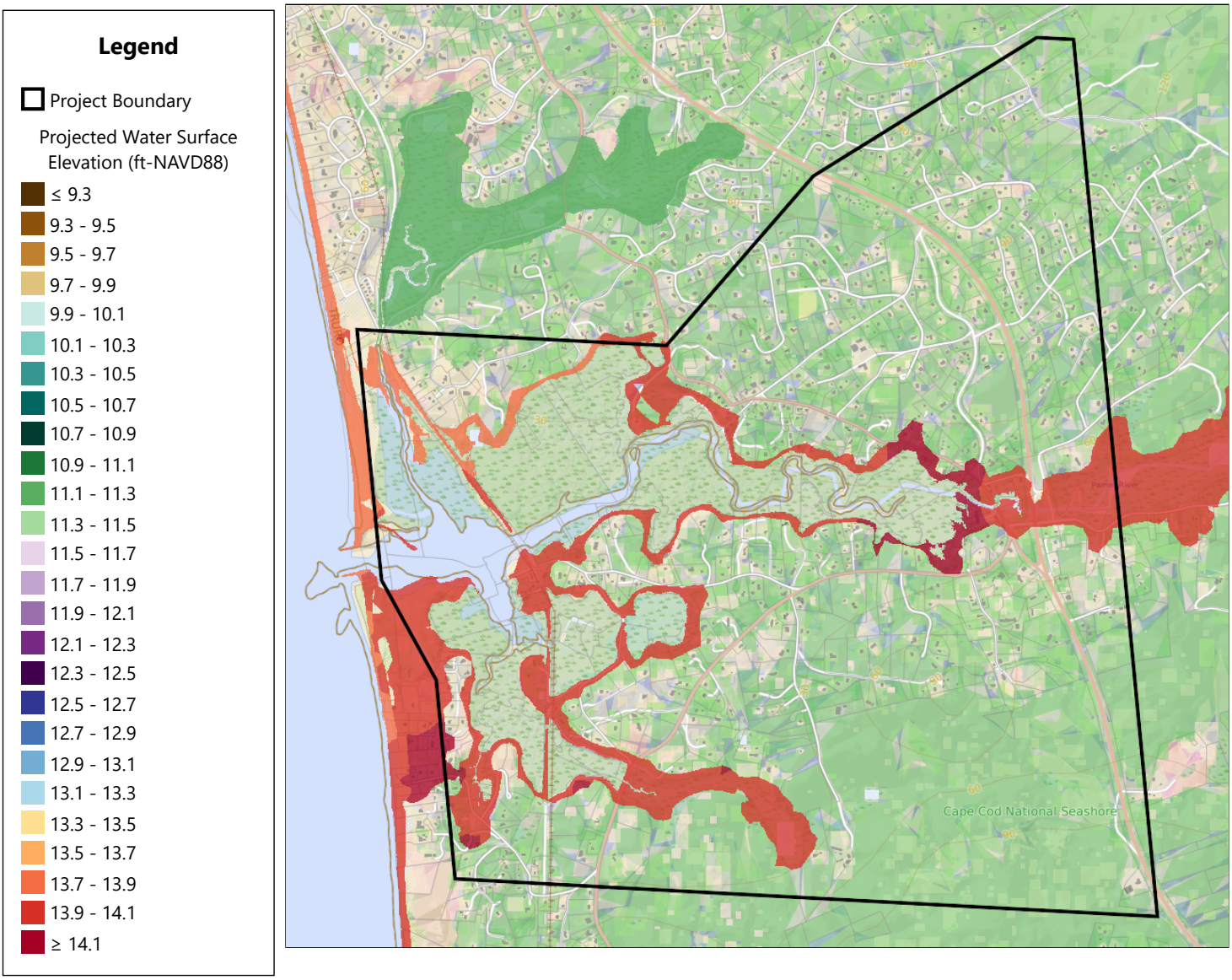
Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2050	2% (50-yr)	12.3	10.7	12.0



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2070, 2% (50-yr)

Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

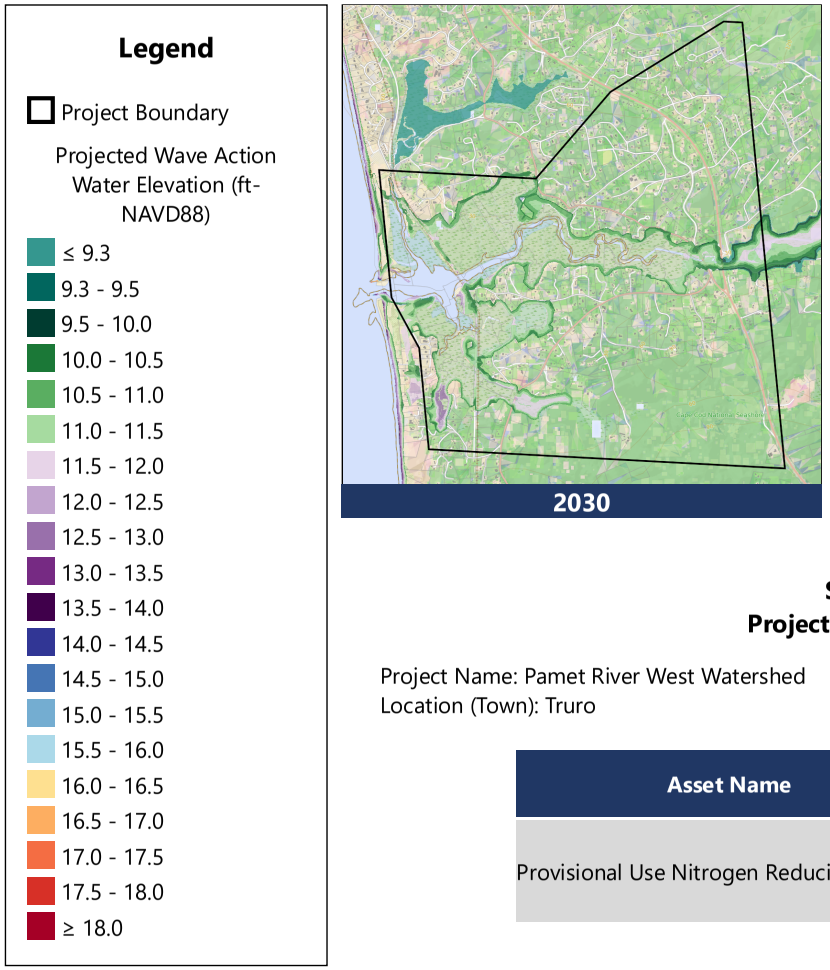
Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2070	2% (50-yr)	14.1	11.2	14.0

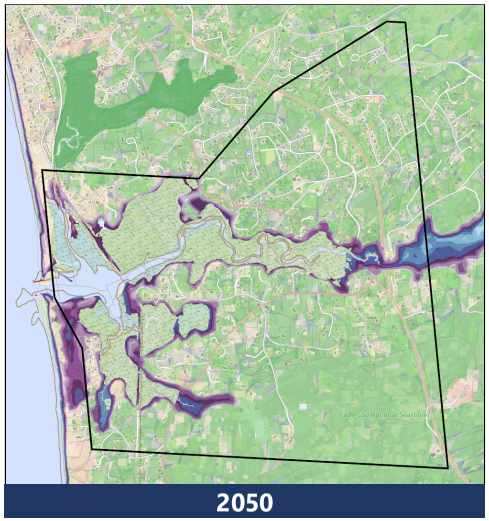
Sea Level Rise/Storm Surge Project Maps

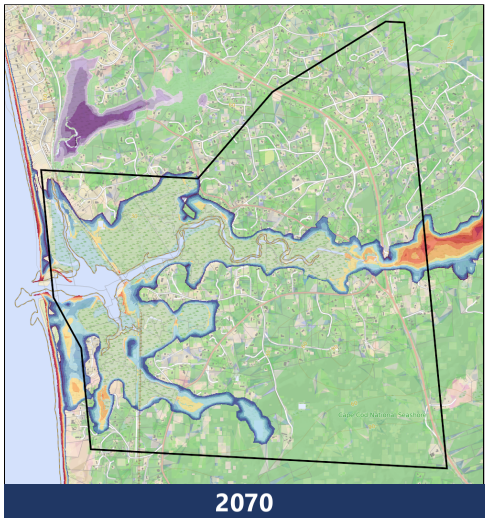
The following three maps illustrate the Projected Wave Action Water Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Wave Action Water Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, maps, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.







Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2% (50-yr)

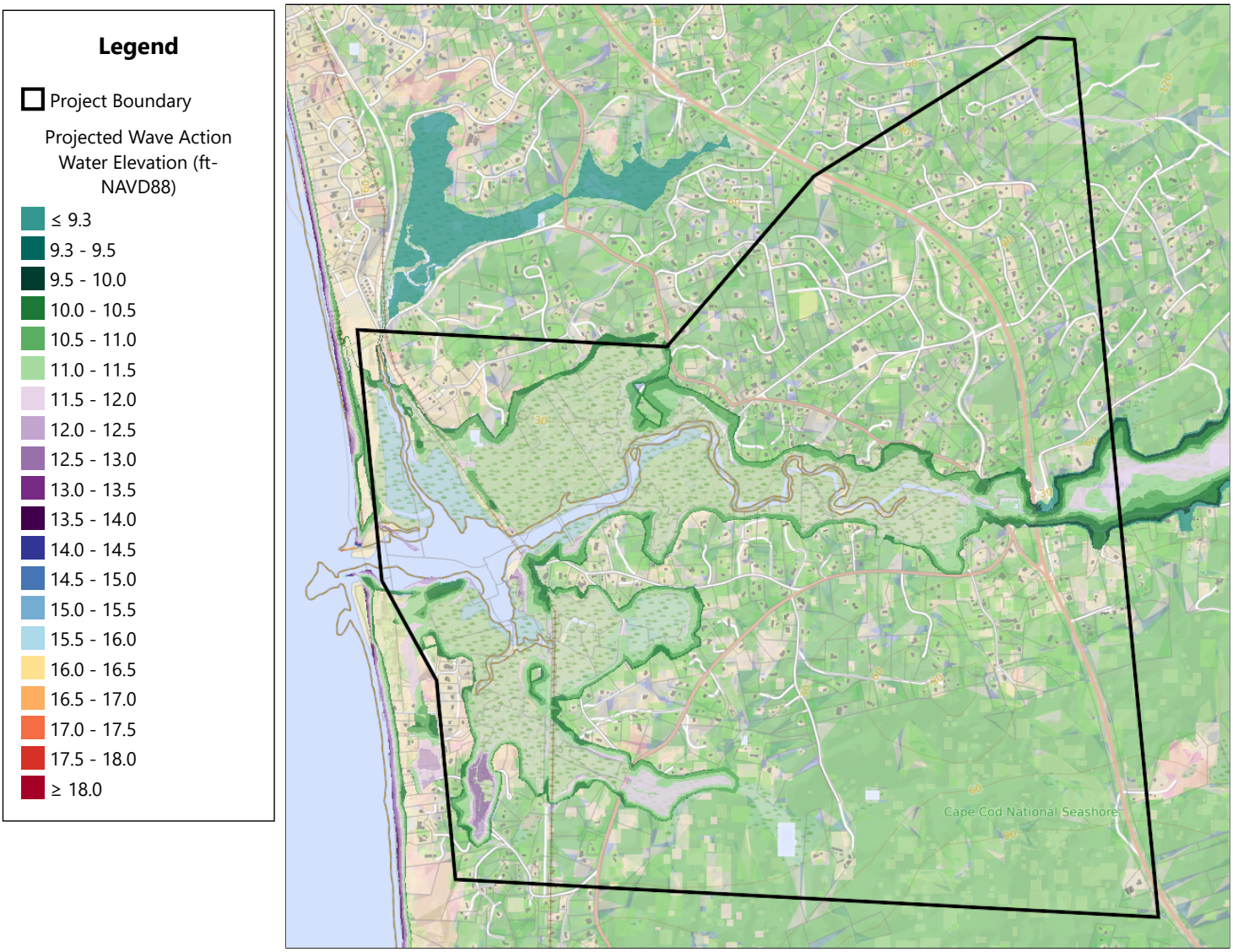
Project Name: Pamet River West Watershed
Location (Town): Truro

0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	13.1	9.3	10.9
	2050	2% (50-yr)	15.4	10.7	13.1
	2070	2% (50-yr)	18.0	11.2	15.3



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2030, 2% (50-yr)

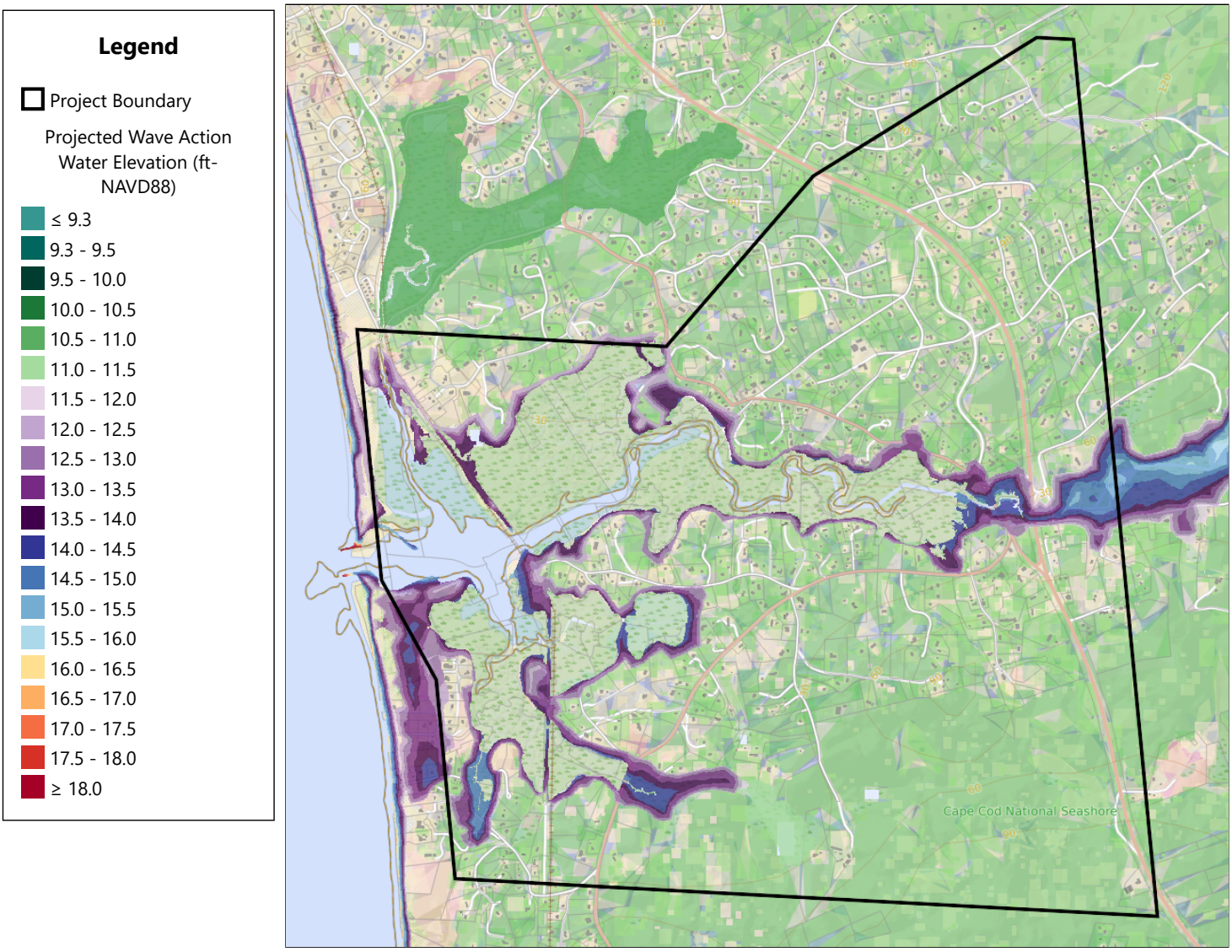
Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	13.1	9.3	10.9



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2050, 2% (50-yr)

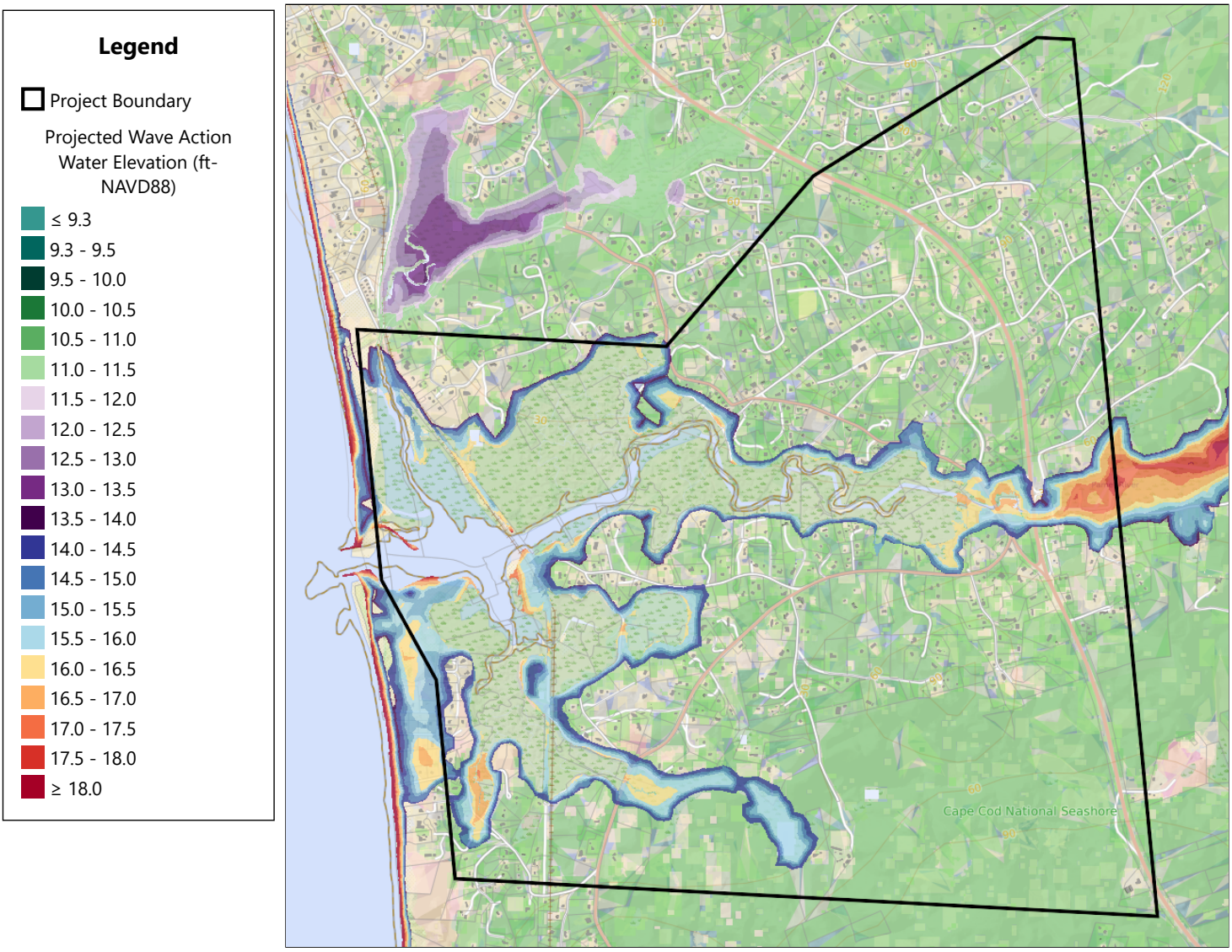
Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2050	2% (50-yr)	15.4	10.7	13.1



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2070, 2% (50-yr)

Project Name: Pamet River West Watershed
Location (Town): Truro

0.1 0.25 0.5 Miles

Created by: hannah.framson
Date Created: 9/22/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2070	2% (50-yr)	18.0	11.2	15.3

Project Inputs

Core Project Information

Name:	Pamet River West Watershed
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2060
Location of Project:	Truro
Estimated Capital Cost:	$1,800,000
Who is the Submitting Entity?	City/Town Truro Julia Khrakovsky (julia.khrakovsky@ghd.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	No
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Planning
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	Yes
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The regulatory review process this project is being submitted as part of is MEPA. The purpose of this project is to implement nitrogen management strategies in the Town of Truro to address TMDLs. This analysis includes the western portion of Pamet River. The recommended improvements in this area include provisional use nitrogen reducing systems, stormwater BMP's, and fertilizer bylaws. A Comprehensive Watershed Nitrogen Management Plan is currently being developed and will be submitted to MassDEP at a later date.

Project Ecosystem Service Benefits

Factors Influencing Output

- ✓ Project protects public water supply
- ✓ Project recharges groundwater
- ✓ Project improves water quality
- ✓ Project protects fisheries, wildlife, and plant habitat
- ✓ Project protects land containing shellfish
- ✓ Project remediates existing sources of pollution
- ✓ Project prevents pollution

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may provide flood protection
- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Incorporate strategies that reduce carbon emissions
- ✓ Incorporate green infrastructure to filter stormwater
- ✓ Incorporate nature-based solutions that sequester carbon carbon
- ✓ Incorporate vegetation that provides pollinator habitat
- ✓ Provide opportunities for passive and/or active recreation through open space
- ✓ Increase plants, trees, and/or other vegetation to provide oxygen production
- ✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
- ✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No
Recharges groundwater	Yes
Protects public water supply	Yes
Filters stormwater using green infrastructure	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	Yes
Remediates existing sources of pollution	Yes

Protects fisheries, wildlife, and plant habitat	Yes
Protects land containing shellfish	Yes
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Hazard Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	No
Are existing trees being removed as part of the proposed project?	No

Project Assets

Asset: Provisional Use Nitrogen Reducing Systems
Asset Type: Utility Infrastructure
Asset Sub-Type: Wastewater
Construction Type: Major Repair/Retrofit
Construction Year: 2030
Useful Life: 30

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?
No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials are expected with moderately difficult cleanup

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources will require remediation/rehabilitation

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Asset: Stormwater BMP
Asset Type: Green Infrastructure
Asset Sub-Type: Bioswale
Construction Type: New Construction
Construction Year: 2030
Useful Life: 20

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate

vulnerable populations.
The infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
Yes
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources can be mitigated naturally
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Report Comments

N/A

Climate Resilience Design Standards Tool Project Report

Provincetown Harbor Watershed
Date Created: 9/15/2025 8:14:34 PM
Date Report Generated: 9/30/2025 12:49:03 PM
Project Contact Information: Julia Khrakovsky (julia.khrakovsky@ghd.com)

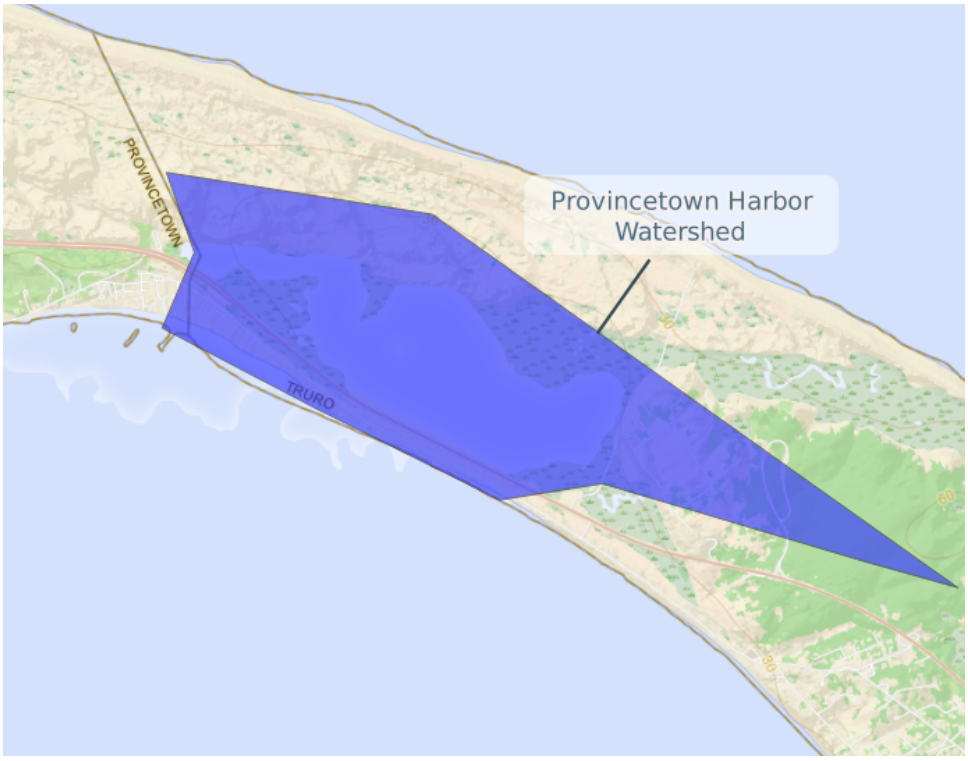
Created By: hannah.framson
Tool Version: Version 1.4

Project Summary

Link to Project

Estimated Capital Cost: $1800000.00
End of Useful Life Year: 2060
Project within mapped Environmental Justice neighborhood: No

Ecosystem Service Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	High Exposure
Extreme Precipitation - Stormwater Flooding	Moderate Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	High Exposure



Asset Preliminary Climate Risk Rating Summary

Number of Assets: 2

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Stormwater Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Provisional Use Nitrogen Reducing Systems	High Risk	Moderate Risk	High Risk	High Risk
Stormwater BMP	High Risk	Moderate Risk	High Risk	High Risk

Climate Resilience Design Standards Summary

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Provisional Use Nitrogen Reducing Systems	2070	2050		50-yr (2%)	
Stormwater BMP	2050				
Extreme Precipitation					
Provisional Use Nitrogen Reducing Systems	2070			10-yr (10%)	Tier 2
Stormwater BMP	2050			5-yr (20%)	Tier 2
Extreme Heat					
Provisional Use Nitrogen Reducing Systems	2070		50th		Tier 2
Stormwater BMP	2050		50th		Tier 2

Scoring Rationale - Project Exposure Score

The purpose of the Exposure Score output is to provide a preliminary assessment of whether the overall project site and subsequent assets are exposed to impacts of natural hazard events and/or future impacts of climate change. For each climate parameter, the Tool will calculate one of the following exposure ratings: Not Exposed, Low Exposure, Moderate Exposure, or High Exposure. The rationale behind the exposure rating is provided below.

Sea Level Rise/Storm Surge

This project received a "High Exposure" because of the following:

- Located within the predicted mean high water shoreline by 2030
- Exposed to the 1% annual coastal flood event as early as 2030
- Located within the 0.1% annual coastal flood event within the project's useful life

Extreme Precipitation - Stormwater Flooding

This project received a "Moderate Exposure" because of the following:

- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- No increase to impervious area
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 500ft of a waterbody and less than 20ft above the waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "High Exposure" because of the following:

- Less than 10% of the existing project site has canopy cover
- 10 to 30 day increase in days over 90 deg. F within project's useful life
- Located within 100 ft of existing water body
- No increase to the impervious area of the project site
- No tree removal

Scoring Rationale - Asset Preliminary Climate Risk Rating

A Preliminary Climate Risk Rating is determined for each infrastructure and building asset by considering the overall project Exposure Score and responses to Step 4 questions provided by the user in the Tool. Natural Resource assets do not receive a risk rating. The following factors are what influenced the risk ratings for each asset.

Asset - Provisional Use Nitrogen Reducing Systems
Primary asset criticality factors influencing risk ratings for this asset:

- Asset may inaccessible/inoperable for more than a day but less than a week after natural hazard event
- Loss/inoperability of the asset would have impacts limited to local area and/or municipality
- Inoperability of the asset would be expected to result in minor impacts to people’s health, including minor injuries or minor impacts to chronic illnesses
- Cost to replace is less than $10 million
- Spills and/or releases of hazardous materials would be moderately difficult to clean up

Asset - Stormwater BMP
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only

- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than $10 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Project Climate Resilience Design Standards Output

Climate Resilience Design Standards and Guidance are recommended for each asset and climate parameter. The Design Standards for each climate parameter include the following: recommended planning horizon (target and/or intermediate), recommended return period (Sea Level Rise/Storm Surge and Precipitation) or percentile (Heat), and a list of applicable design criteria that are likely to be affected by climate change. Some design criteria have numerical values associated with the recommended return period and planning horizon, while others have tiered methodologies with step-by-step instructions on how to estimate design values given the other recommended design standards.

Asset: Provisional Use Nitrogen Reducing Systems — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2070
Intermediate Planning Horizon: 2050
Return Period: 50-yr (2%)

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.7	7.3	2.5	-2.3	-2.6
2070	9.6	9.2	4.3	-0.6	-0.9

Projected Water Surface Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	14.0	10.7	11.0
	2070		15.6	13.2	13.5

Projected Wave Action Water Elevation: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(ft - NAVD88)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	20.3	10.7	14.7
	2070		22.7	13.2	17.9

Projected Wave Heights: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period	Max	Min	Area Weighted Average
			(Feet)		
Provisional Use Nitrogen Reducing Systems	2050	2% (50-Year)	10.5	0.0	5.0
	2070		12.0	0.0	5.8

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.

Projected Duration of Flooding: APPLICABLE

Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2070
Return Period: 10-yr (10%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Provisional Use Nitrogen Reducing Systems	2070	10-Year (10%)	6.0	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat High Risk

Target Planning Horizon: 2070
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Provisional Use Nitrogen Reducing Systems	2070	50th	57.95	76.67	40.91

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	3	17	55

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Provisional Use Nitrogen Reducing Systems	2070	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Asset: Stormwater BMP — Infrastructure

Sea Level Rise/Storm Surge — High Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: Not exposed to coastal flooding by 2070

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based

on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE

Planning Horizon	MHHW	MHW	MTL	MLW	MLLW
	(ft-NAVD88)				
2050	7.7	7.3	2.5	-2.3	-2.6

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation Moderate Risk

Target Planning Horizon: 2050
Return Period: 5-yr (20%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Stormwater BMP	2050	5-Year (20%)	4.8	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat High Risk

Target Planning Horizon: 2050
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Stormwater BMP	2050	50th	56.15	73.97	38.21

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Stormwater BMP	2050	50th	2	10	65

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Stormwater BMP	2050	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

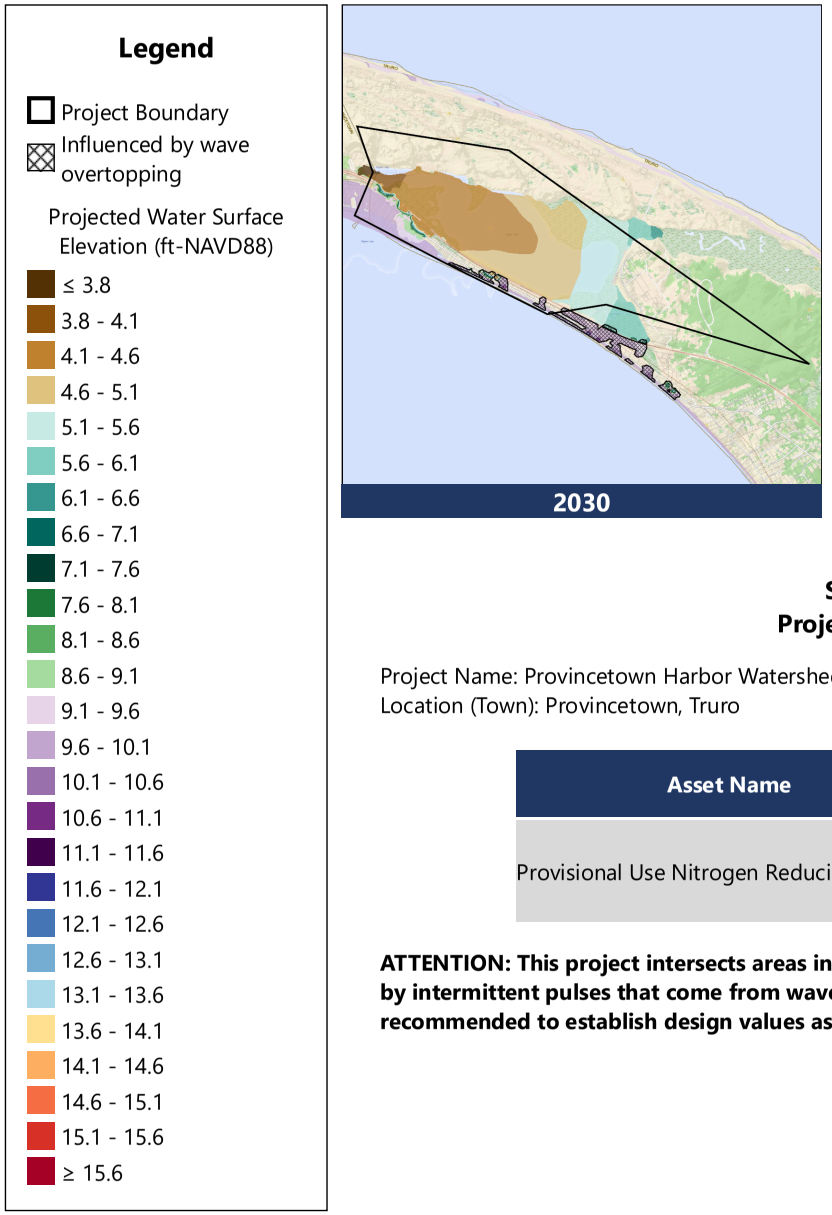
Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

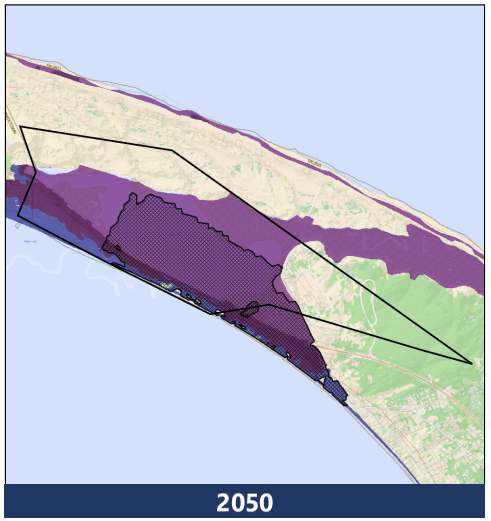
Sea Level Rise/Storm Surge Project Maps

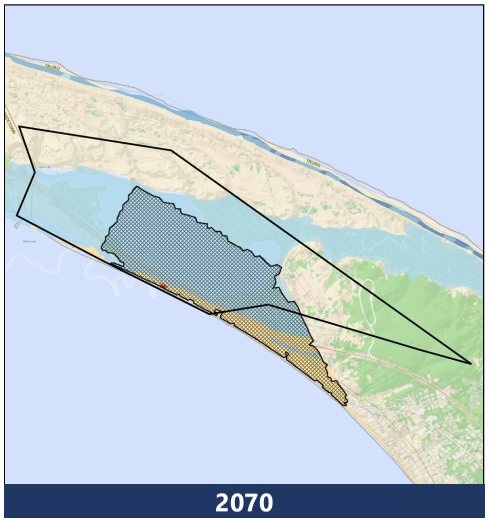
The following three maps illustrate the Projected Water Surface Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Water Surface Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, maps, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.







Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

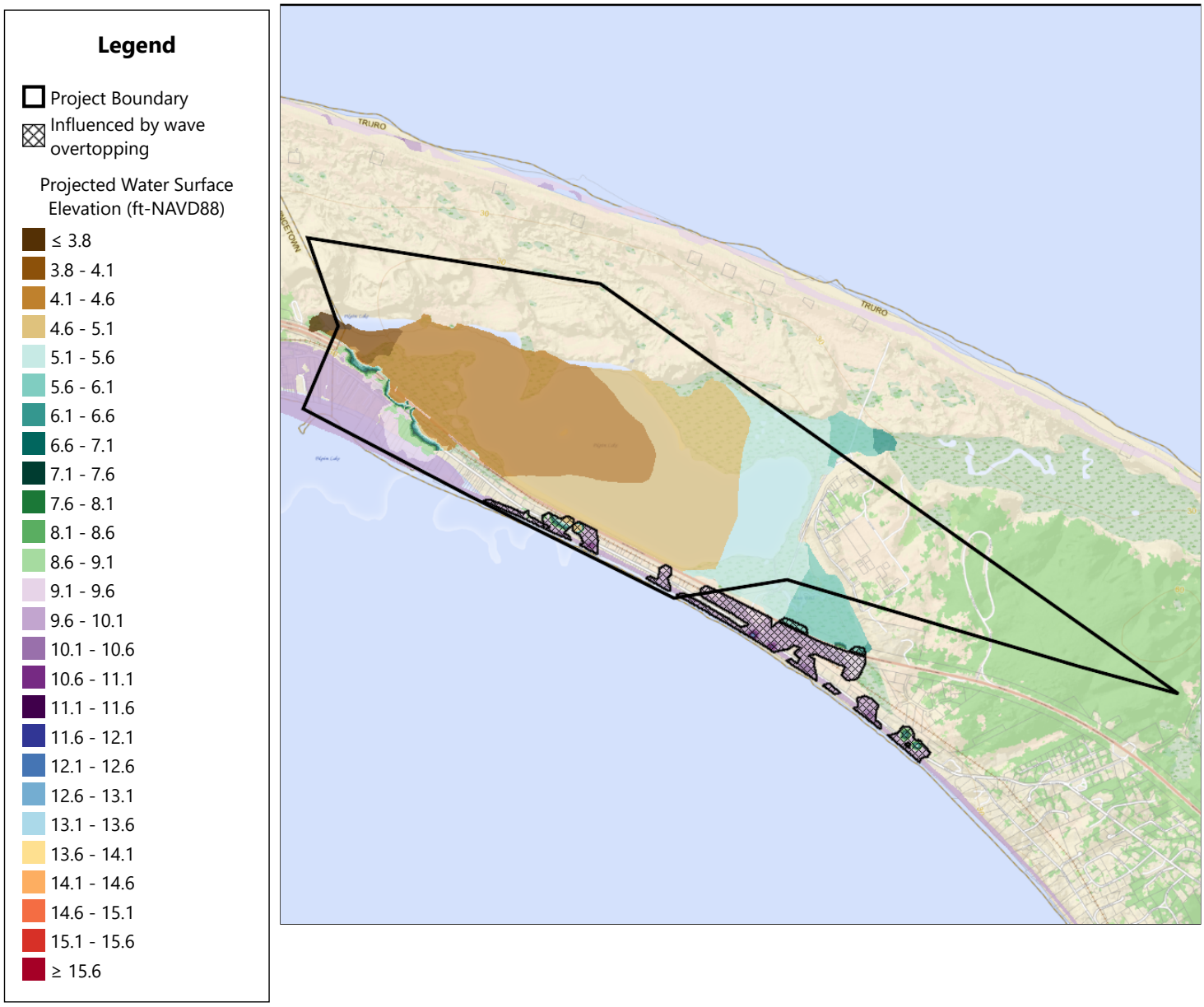
0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average
			(ft-NAVD88)		
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	11.2	3.8	5.3
	2050	2% (50-yr)	14.0	10.7	11.0
	2070	2% (50-yr)	15.6	13.2	13.5

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2030, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

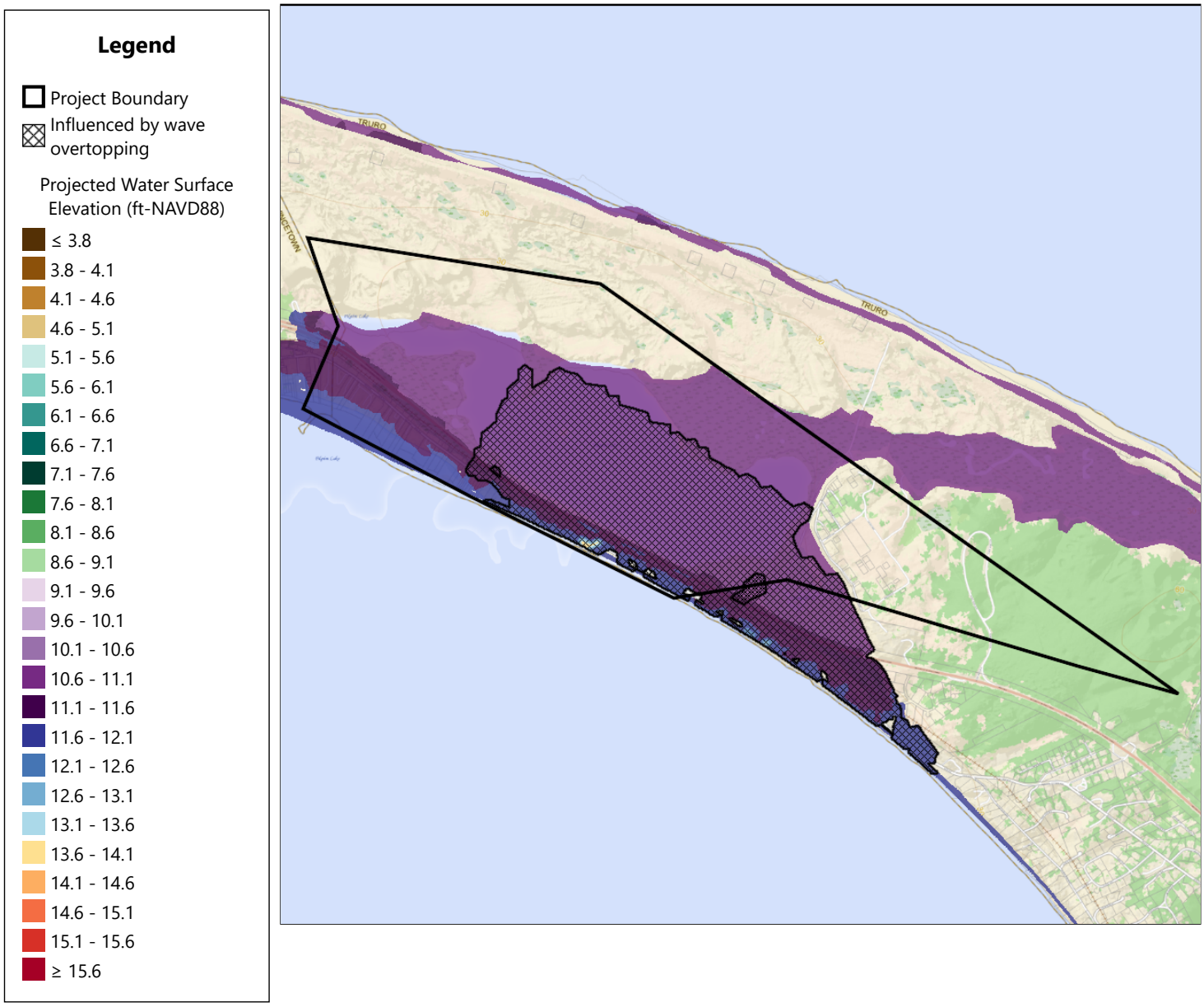
0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	11.2	3.8	5.3

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2050, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

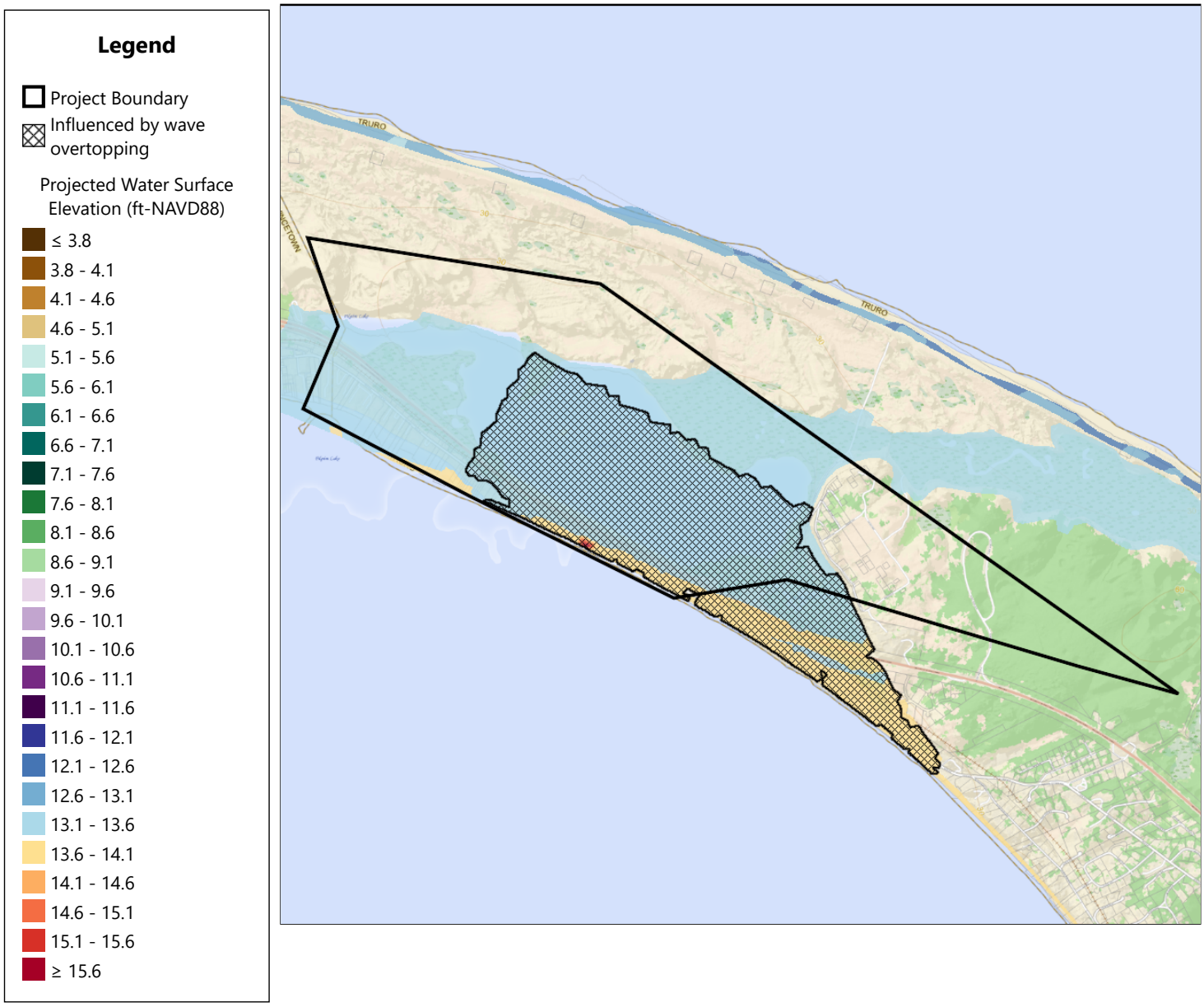
0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2050	2% (50-yr)	14.0	10.7	11.0

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Water Surface Elevation Map: 2070, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2070	2% (50-yr)	15.6	13.2	13.5

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.

Sea Level Rise/Storm Surge Project Maps

The following three maps illustrate the Projected Wave Action Water Elevation for the 2030, 2050, and 2070 planning horizons corresponding to the lowest return period (largest design storm) recommended across the assets identified for this project in the Tool. For projects that only have Natural Resource assets, the maps will show the Projected Wave Action Water Elevations corresponding to the 5% (20-year) return period. Refer to the Climate Resilience Design Standards Output - Sea Level Rise/Storm Surge Section for additional values associated with other assets. The maps include the project area as drawn by the user with a 0.1 mile minimum buffer, but do not reflect the location of specific assets on the site.

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values and maps provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

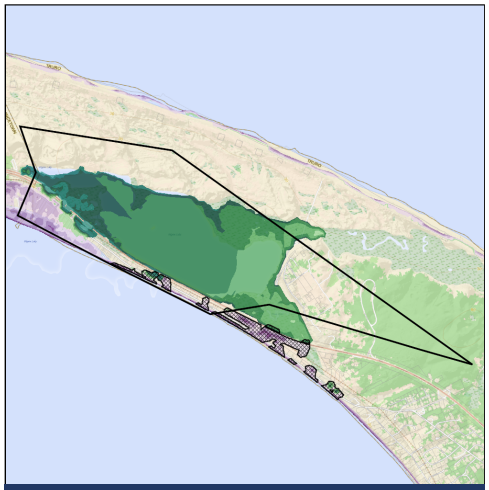
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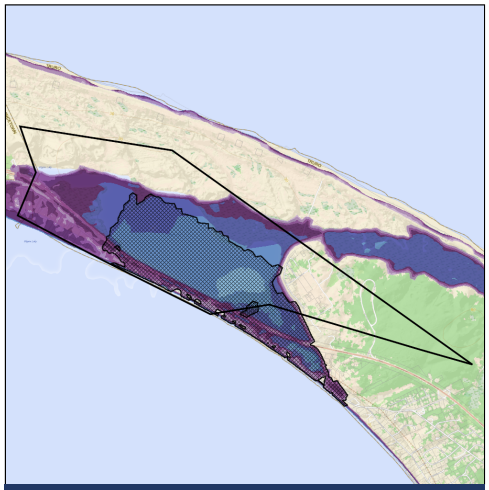
Legend

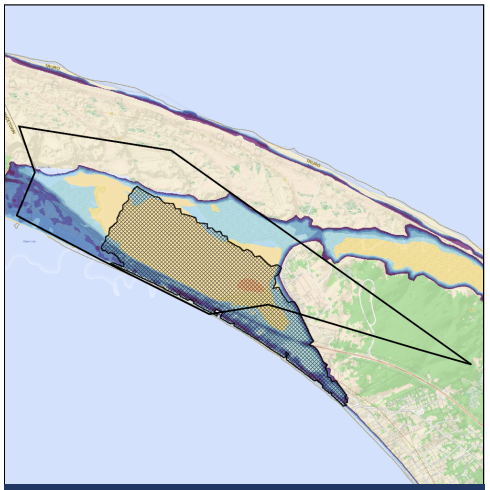
- Project Boundary
- Influenced by wave overtopping

Projected Wave Action Water Elevation (ft-NAVD88)

- ≤ 3.8
- 3.8 - 4.4
- 4.4 - 5.4
- 5.4 - 6.4
- 6.4 - 7.4
- 7.4 - 8.4
- 8.4 - 9.4
- 9.4 - 10.4
- 10.4 - 11.4
- 11.4 - 12.4
- 12.4 - 13.4
- 13.4 - 14.4
- 14.4 - 15.4
- 15.4 - 16.4
- 16.4 - 17.4
- 17.4 - 18.4
- 18.4 - 19.4
- 19.4 - 20.4
- 20.4 - 21.4
- 21.4 - 22.4
- ≥ 22.4







Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

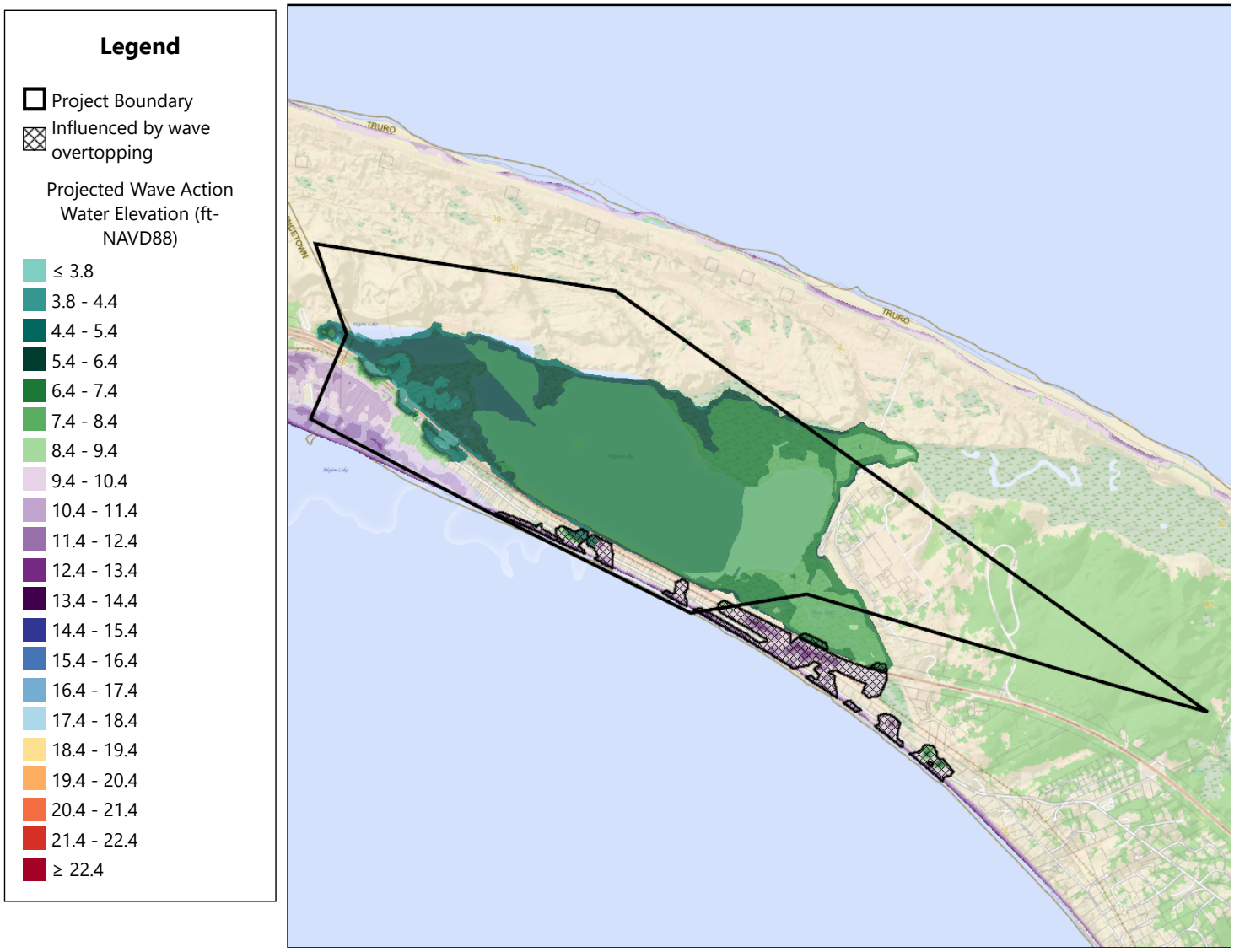
0.5 1.0 2.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	14.7	3.8	7.2
	2050	2% (50-yr)	20.3	10.7	14.7
	2070	2% (50-yr)	22.7	13.2	17.9

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2030, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

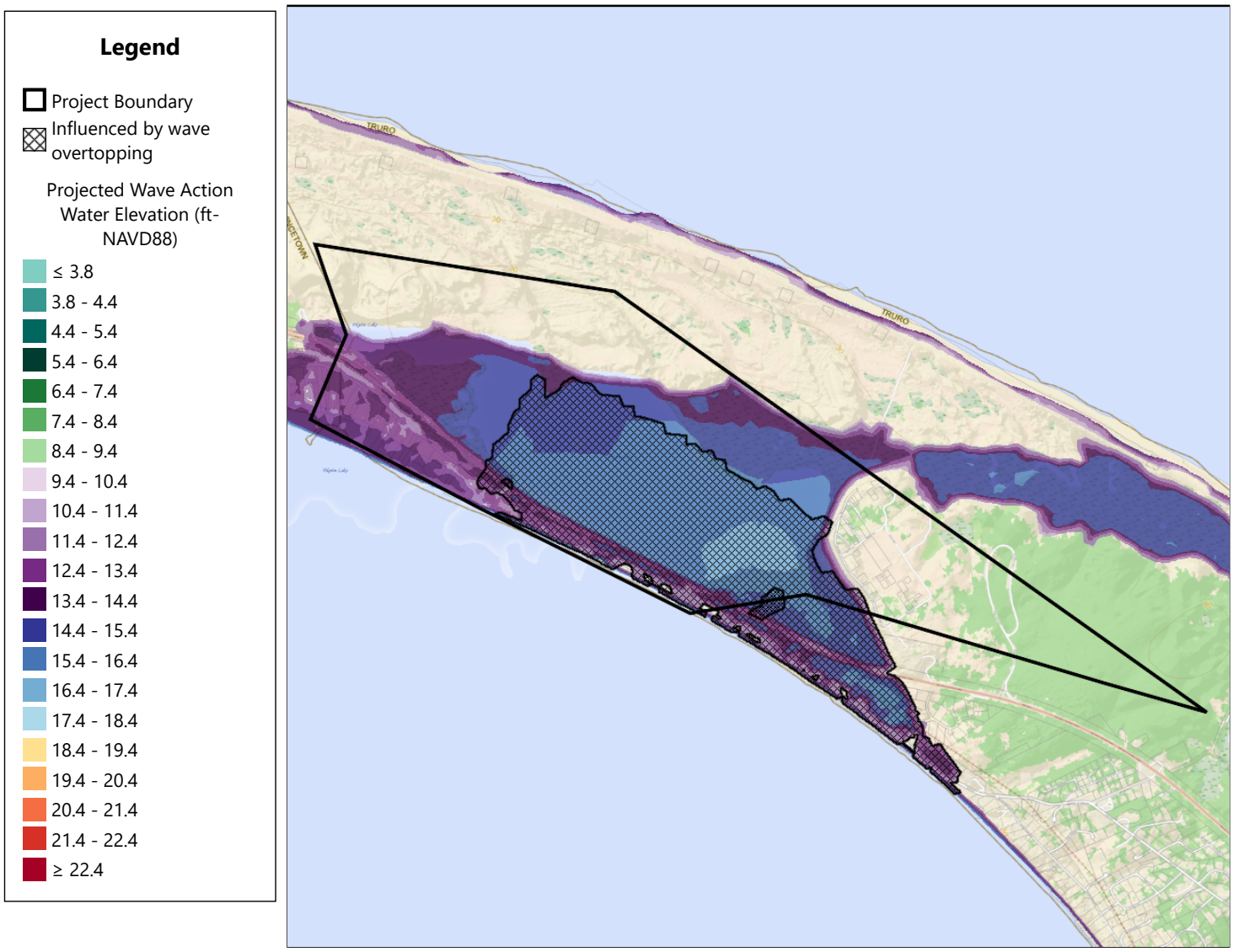
0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2030	2% (50-yr)	14.7	3.8	7.2

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2050, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

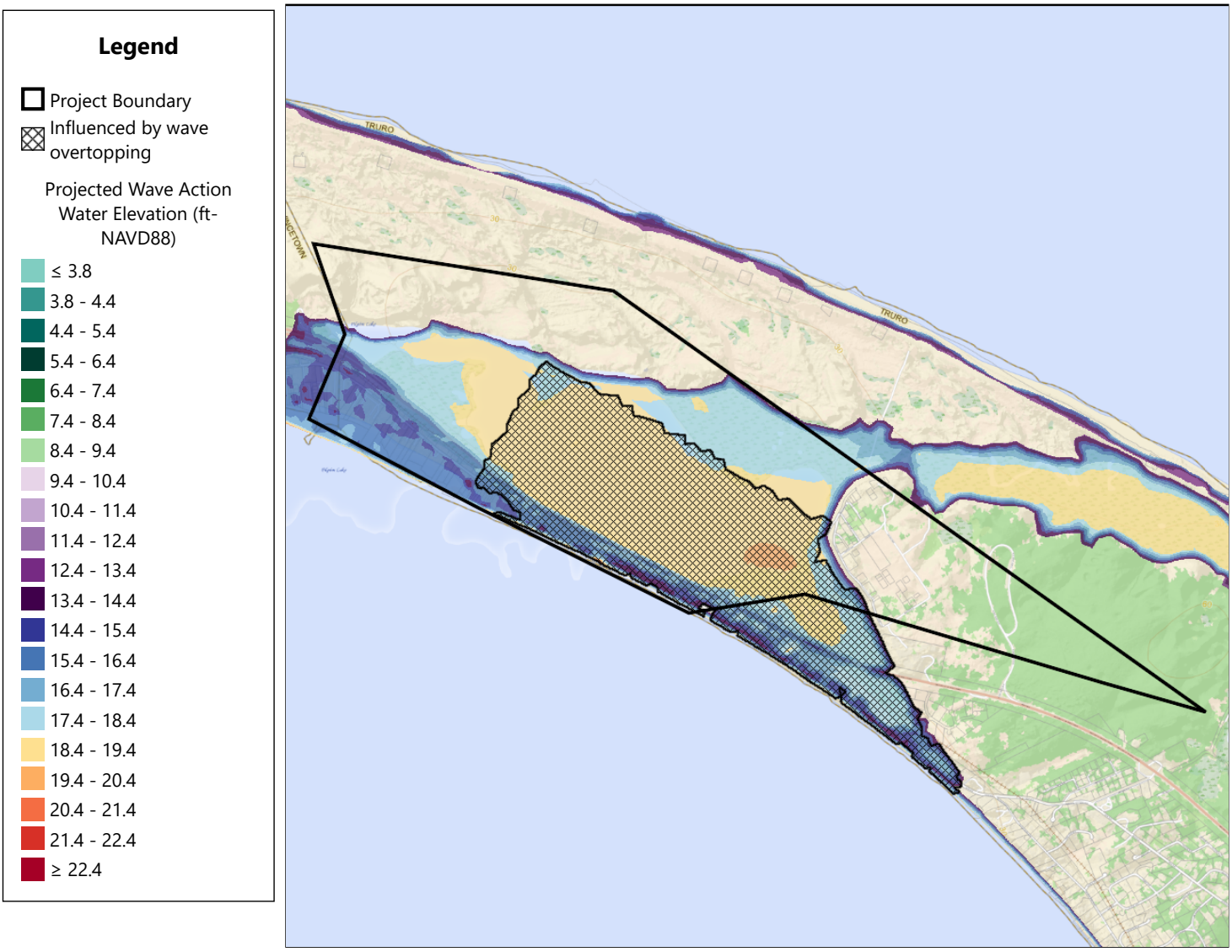
0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2050	2% (50-yr)	20.3	10.7	14.7

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.



Climate Resilience Design Standards Tool:
Sea Level Rise/Storm Surge Design Criteria
Projected Wave Action Water Elevation Map: 2070, 2% (50-yr)

Project Name: Provincetown Harbor Watershed
Location (Town): Provincetown, Truro

0.25 0.5 1.0 Miles

Created by: hannah.framson
Date Created: 9/15/2025
Tool Version: 1.4

N

Asset Name	Planning Horizon	Return Period	Max	Min	Area Weighted Average (ft-NAVD88)
Provisional Use Nitrogen Reducing Systems	2070	2% (50-yr)	22.7	13.2	17.9

ATTENTION: This project intersects areas influenced by wave overtopping based flooding. These areas are where flooding is caused by intermittent pulses that come from wave run-up and overtopping at a coastal structure. Additional site analyses are recommended to establish design values associated with design criteria.

Project Inputs

Core Project Information

Name:	Provincetown Harbor Watershed
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2060
Location of Project:	Provincetown, Truro
Estimated Capital Cost:	$1,800,000
Who is the Submitting Entity?	City/Town Truro Julia Khrakovsky (julia.khrakovsky@ghd.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	No
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	Planning
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	Yes
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The regulatory review process this project is being submitted as part of is MEPA. The purpose of this project is to implement nitrogen management strategies in the Town of Truro to address TMDLs. The recommended approach for the Town's watershed of Provincetown Harbor includes provisional use nitrogen reducing systems, stormwater BMP's, and fertilizer bylaws. A Comprehensive Watershed Nitrogen Management Plan is currently being developed and will be submitted to MassDEP at a later date.

Project Ecosystem Service Benefits

Factors Influencing Output

- ✓ Project protects public water supply
- ✓ Project recharges groundwater
- ✓ Project improves water quality
- ✓ Project protects fisheries, wildlife, and plant habitat
- ✓ Project protects land containing shellfish
- ✓ Project remediates existing sources of pollution
- ✓ Project prevents pollution

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may provide flood protection
- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Incorporate strategies that reduce carbon emissions
- ✓ Incorporate green infrastructure to filter stormwater
- ✓ Incorporate nature-based solutions that sequester carbon carbon
- ✓ Incorporate vegetation that provides pollinator habitat
- ✓ Provide opportunities for passive and/or active recreation through open space
- ✓ Increase plants, trees, and/or other vegetation to provide oxygen production
- ✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
- ✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No
Recharges groundwater	Yes
Protects public water supply	Yes
Filters stormwater using green infrastructure	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	Yes
Remediates existing sources of pollution	Yes

Protects fisheries, wildlife, and plant habitat	Yes
Protects land containing shellfish	Yes
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Hazard Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	No
Are existing trees being removed as part of the proposed project?	No

Project Assets

Asset: Provisional Use Nitrogen Reducing Systems
Asset Type: Utility Infrastructure
Asset Sub-Type: Wastewater
Construction Type: Major Repair/Retrofit
Construction Year: 2030
Useful Life: 30

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable for more than a day, but less than a week after natural hazard without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts would be limited to local area and/or municipality

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?
No

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would be expected to result in minor impacts to people's health, including minor injuries or minor impacts to chronic illnesses

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
Spills and/or releases of hazardous materials are expected with moderately difficult cleanup

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources will require remediation/rehabilitation

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Asset: Stormwater BMP
Asset Type: Green Infrastructure
Asset Sub-Type: Bioswale
Construction Type: New Construction
Construction Year: 2030
Useful Life: 20

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
Will the infrastructure reduce the risk of flooding?
Yes
If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries
If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings
If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million
Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources can be mitigated naturally
If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services
What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Report Comments

N/A

Climate Resilience Design Standards Tool Project Report

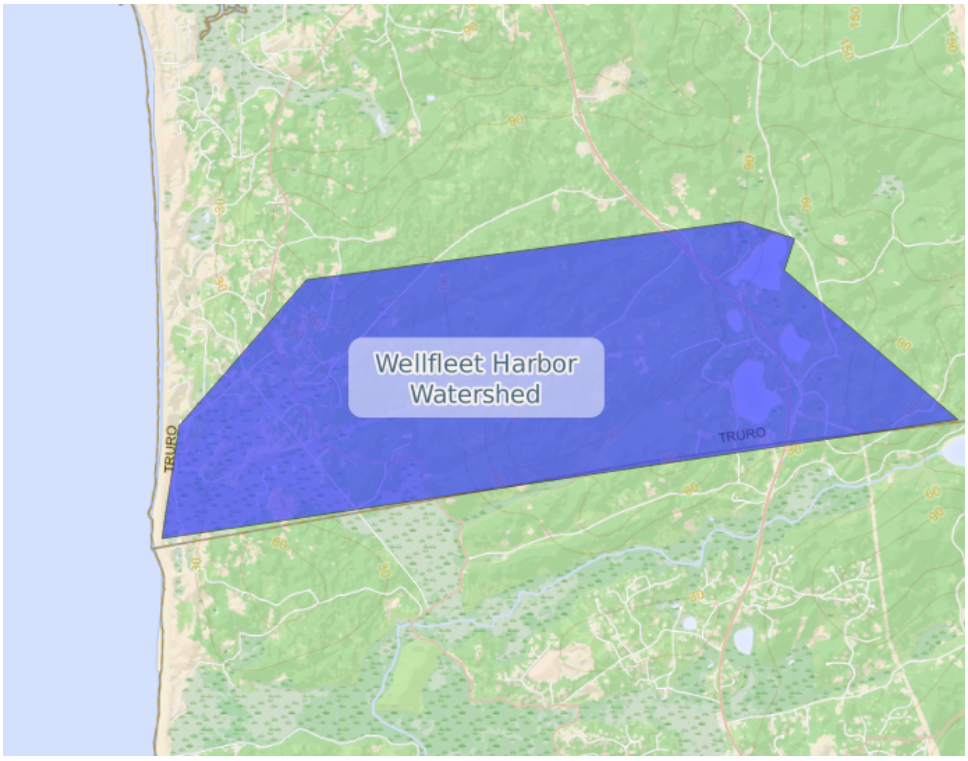
Wellfleet Harbor Watershed
Date Created: 9/24/2025 9:53:05 PM
Created By: hannah.framson
Date Report Generated: 9/30/2025 12:49:39 PM
Tool Version: Version 1.4
Project Contact Information: Julia Khrakovsky (julia.khrakovsky@ghd.com)

Project Summary

Link to Project

Estimated Capital Cost: $1800000.00
End of Useful Life Year: 2050
Project within mapped Environmental Justice neighborhood: No

Ecosystem Service Benefits	Scores
Project Score	Moderate
Exposure	**Scores**
Sea Level Rise/Storm Surge	Moderate Exposure
Extreme Precipitation - Stormwater Flooding	Moderate Exposure
Extreme Precipitation - Riverine Flooding	High Exposure
Extreme Heat	Low Exposure



Asset Preliminary Climate Risk Rating Summary

Number of Assets: 1

Asset Risk	Sea Level Rise/Storm Surge	Extreme Precipitation - Stormwater Flooding	Extreme Precipitation - Riverine Flooding	Extreme Heat
Stormwater BMP	Moderate Risk	Moderate Risk	High Risk	Low Risk

Climate Resilience Design Standards Summary

	Target Planning Horizon	Intermediate Planning Horizon	Percentile	Return Period	Tier
Sea Level Rise/Storm Surge					
Stormwater BMP	2050				
Extreme Precipitation					
Stormwater BMP	2050			5-yr (20%)	Tier 2
Extreme Heat					
Stormwater BMP	2050		50th		Tier 2

Scoring Rationale - Project Exposure Score

The purpose of the Exposure Score output is to provide a preliminary assessment of whether the overall project site and subsequent assets are exposed to impacts of natural hazard events and/or future impacts of climate change. For each climate parameter, the Tool will calculate one of the following exposure ratings: Not Exposed, Low Exposure, Moderate Exposure, or High Exposure. The rationale behind the exposure rating is provided below.

Sea Level Rise/Storm Surge

This project received a "Moderate Exposure" because of the following:

- Exposed to the 1% annual coastal flood event as early as 2030
- Located within the 0.1% annual coastal flood event within the project's useful life
- Not located within the predicted mean high water shoreline by 2030

Extreme Precipitation - Stormwater Flooding

This project received a "Moderate Exposure" because of the following:

- Maximum annual daily rainfall exceeds 10 inches within the overall project's useful life
- No historic flooding at project site
- No increase to impervious area
- Existing impervious area of the project site is less than 10%

Extreme Precipitation - Riverine Flooding

This project received a "High Exposure" because of the following:

- Part of the project is within a mapped FEMA floodplain, outside of the Massachusetts Coast Flood Risk Model (MC-FRM)
- Part of the project is within 200ft of a waterbody and less than 30ft above the waterbody
- No historic riverine flooding at project site
- Project is not likely susceptible to riverine erosion

Extreme Heat

This project received a "Low Exposure" because of the following:

- Existing impervious area of the project site is less than 10%
- Located within 100 ft of existing water body
- No increase to the impervious area of the project site
- No tree removal
- < 10 day increase in days over 90 deg. F within project's useful life

Scoring Rationale - Asset Preliminary Climate Risk Rating

A Preliminary Climate Risk Rating is determined for each infrastructure and building asset by considering the overall project Exposure Score and responses to Step 4 questions provided by the user in the Tool. Natural Resource assets do not receive a risk rating. The following factors are what influenced the risk ratings for each asset.

Asset - Stormwater BMP
Primary asset criticality factors influencing risk ratings for this asset:

- Asset can be inaccessible/inoperable more than a week after natural hazard event without consequences
- Loss/inoperability of the asset would have impacts limited to the location of infrastructure only
- Inoperability of the asset would not be expected to result in injuries
- Cost to replace is less than $10 million
- Impact on natural resources can be mitigated naturally with the inoperability of the asset

Project Climate Resilience Design Standards Output

Climate Resilience Design Standards and Guidance are recommended for each asset and climate parameter. The Design Standards for each climate parameter include the following: recommended planning horizon (target and/or intermediate), recommended return period (Sea Level Rise/Storm Surge and Precipitation) or percentile (Heat), and a list of applicable design criteria that are likely to be affected by climate change. Some design criteria have numerical values associated with the recommended return period and planning horizon, while others have tiered methodologies with step-by-step instructions on how to estimate design values given the other recommended design standards.

Asset: Stormwater BMP — Infrastructure

Sea Level Rise/Storm Surge — Moderate Risk

Target Planning Horizon: 2050
Intermediate Planning Horizon: Not Applicable
Return Period: Not exposed to coastal flooding by 2070

LIMITATIONS: The recommended Climate Resilience Design Standards for the Sea Level Rise / Storm Surge Design Criteria are based on the user drawn polygon and relationships as defined in the Supporting Documents. The projected values provided through the Tool are based on the Massachusetts Coast Flood Risk Model (MC-FRM) outputs as of 9/13/2021, which included GIS-based data for three planning horizons (2030, 2050, 2070) and six return periods (0.1%, 0.2%, 0.5%, 1%, 2%, 5%). These values are projections based on assumptions as defined in the model and the LiDAR used at the time. For additional information on the MC-FRM, review the additional resources provided on the Start Here page.

The projected values, Standards, and Guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Projected Tidal Datums: APPLICABLE
Note: The site is exposed to Sea Level Rise/Storm Surge, but projected Tidal Datums are not available within the site. Additional site-specific analyses are recommended to identify projected Tidal Datums for the recommended planning horizon. Consult a professional coastal engineer or modeler to estimate projected Tidal Datums based on the recommended Standards and additional outputs provided through this Tool.

Projected Water Surface Elevation: NOT APPLICABLE

Projected Wave Action Water Elevation: NOT APPLICABLE

Projected Wave Heights: NOT APPLICABLE

Projected Duration of Flooding: APPLICABLE
Methodology to Estimate Projected Values

Projected Design Flood Velocity: APPLICABLE
Methodology to Estimate Projected Values

Projected Scour & Erosion: APPLICABLE
Methodology to Estimate Projected Values

Extreme Precipitation — Moderate Risk

Target Planning Horizon: 2050
Return Period: 5-yr (20%)

LIMITATIONS: The recommended Standards for Total Precipitation Depth & Peak Intensity are determined by the user drawn polygon and relationships as defined in the Supporting Documents. The projected Total Precipitation Depth values provided through the Tool are based on the climate projections developed by Cornell University as part of EEA's Massachusetts Climate and Hydrologic Risk Project, GIS-based data as of 10/15/21. For additional information on the methodology of these precipitation outputs, see Supporting Documents.

While Total Precipitation Depth & Peak Intensity for 24-hour Design Storms are useful to inform planning and design, it is recommended to also consider additional longer- and shorter-duration precipitation events and intensities in accordance with best

practices. Longer-duration, lower-intensity storms allow time for infiltration and reduce the load on infrastructure over the duration of the storm. Shorter-duration, higher-intensity storms often have higher runoff volumes because the water does not have enough time to infiltrate infrastructure systems (e.g., catch basins) and may overflow or back up during such storms, resulting in flooding. In the Northeast, short-duration high intensity rain events are becoming more frequent, and there is often little early warning for these events, making it difficult to plan operationally. While the Tool does not provide recommended design standards for these scenarios, users should still consider both short- and long-duration precipitation events and how they may impact the asset.

The projected values, standards, and guidance provided within this Tool may be used to inform plans and designs, but they do not provide guarantees for future conditions or resilience. The projected values are not to be considered final or appropriate for construction documents without supporting engineering analyses. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence.

Applicable Design Criteria

Tiered Methodology: Tier 2

Projected Total Precipitation Depth & Peak Intensity for 24-hr Design Storms: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Return Period (Design Storm)	Projected 24-hr Total Precipitation Depth (inches)	Step-by-Step Methodology for Peak Intensity
Stormwater BMP	2050	5-Year (20%)	4.9	Downloadable Methodology PDF

Projected Riverine Peak Discharge & Peak Flood Elevation: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Extreme Heat Low Risk

Target Planning Horizon: 2050
Percentile: 50th Percentile

LIMITATIONS: The recommended standards are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Applicable Design Criteria

Projected Annual/Summer/Winter Average Temperatures: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Annual Average Temperature [°F]	Projected Summer Average Temperature [°F]	Projected Winter Average Temperature [°F]
Stormwater BMP	2050	50th	56.15	73.97	38.21

LIMITATIONS: The recommended Standards for Projected Average Annual/Summer/Winter Temperature are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Growing Degree Days: NOT APPLICABLE

Projected Days Per Year With Max Temp > 95°F, >90°F, <32°F: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Days with Max Temp >95°F (days)	Projected Days with Max Temp >90°F (days)	Projected Days with Max Temp <32°F (days)
Stormwater BMP	2050	50th	2	10	65

LIMITATIONS: The recommended Standards for ProjectedÂ Days per Year with Max Temp >95Â°F, >90Â°F, <32Â°F are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to

seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Number of Heat Waves Per Year & Average Heat Wave Duration: APPLICABLE

Asset Name	Recommended Planning Horizon	Recommended Percentile	Projected Number of Heat Waves Per Year (events)	Projected Average Heat Wave Duration (days)
Stormwater BMP	2050	50th	0	0

LIMITATIONS: The recommended Standards for ProjectedÂ Number of Heat Waves Per Year and Average Heat Wave DurationÂ are determined by the user-drawn polygon and relationships as defined in the supporting Section Documents. The guidance provided within this Tool may be used to inform plans and designs, but is not comprehensive and does not provide guarantees for resilience. The guidance provided within this Tool is intended to be general and users are encouraged to do their own due diligence. One avenue to seek more information would be to access the comprehensive temperature and precipitation projections including additional return periods, time horizons, and seasons at the Climate Projections Dashboard.

Projected Cooling Degree Days & Heating Degree Days (base = 65°F): NOT APPLICABLE

Projected Heat Index: APPLICABLE
Methodology to Estimate Projected Values : Tier 2

Project Inputs

Core Project Information

Name:	Wellfleet Harbor Watershed
Given the expected useful life of the project, through what year do you estimate the project to last (i.e. before a major reconstruction/renovation)?	2050
Location of Project:	Truro, Wellfleet
Estimated Capital Cost:	$1,800,000
Who is the Submitting Entity?	City/Town Truro Julia Khrakovsky (julia.khrakovsky@ghd.com)
Is this project identified as a priority project in the Municipal Vulnerability Preparedness (MVP) plan or the local or regional Hazard Mitigation Plan (HMP)?	No
Is this project being submitted as part of a state grant application?	No
Which grant program?	
What stage are you in your project lifecycle?	No physical assets planned for this project
Is climate resiliency a core objective of this project?	No
Is this project being submitted as part of the state capital planning process?	Yes
Is this project being submitted as part of a regulatory review process or permitting?	Yes
Brief Project Description:	The regulatory review process this project is being submitted as part of is MEPA. The purpose of this project is to implement nitrogen management strategies in the Town of Truro to address TMDLs. The recommended approach for the Town's watershed of Wellfleet Harbor includes stormwater BMP's and fertilizer bylaws. A Comprehensive Watershed Nitrogen Management Plan is currently being developed and will be submitted to MassDEP at a later date.

Project Ecosystem Service Benefits

Factors Influencing Output

- ✓ Project protects public water supply
- ✓ Project improves water quality
- ✓ Project protects fisheries, wildlife, and plant habitat
- ✓ Project protects land containing shellfish
- ✓ Project remediates existing sources of pollution
- ✓ Project prevents pollution

Factors to Improve Output

- ✓ Incorporate nature-based solutions that may provide flood protection
- ✓ Incorporate nature-based solutions that may reduce storm damage
- ✓ Incorporate strategies that reduce carbon emissions
- ✓ Incorporate green infrastructure or nature-based solutions that recharge groundwater
- ✓ Incorporate green infrastructure to filter stormwater
- ✓ Incorporate nature-based solutions that sequester carbon carbon
- ✓ Incorporate vegetation that provides pollinator habitat
- ✓ Provide opportunities for passive and/or active recreation through open space
- ✓ Increase plants, trees, and/or other vegetation to provide oxygen production
- ✓ Mitigate atmospheric greenhouse gas concentrations and other toxic air pollutants through nature-based solutions
- ✓ Incorporate education and/or protect cultural resources as part of your project

Is the primary purpose of this project ecological restoration?

No

Project Benefits

Provides flood protection through nature-based solutions	No
Reduces storm damage	No
Recharges groundwater	No
Protects public water supply	Yes
Filters stormwater using green infrastructure	No
Improves water quality	Yes
Promotes decarbonization	No
Enables carbon sequestration	No
Provides oxygen production	No
Improves air quality	No
Prevents pollution	Yes
Remediates existing sources of pollution	Yes
Protects fisheries, wildlife, and plant habitat	Yes

Protects land containing shellfish	Yes
Provides pollinator habitat	No
Provides recreation	No
Provides cultural resources/education	No

Project Climate Hazard Exposure

Is the primary purpose of this project ecological restoration?	No
Does the project site have a history of coastal flooding?	No
Does the project site have a history of flooding during extreme precipitation events (unrelated to water/sewer damages)?	No
Does the project site have a history of riverine flooding?	No
Does the project result in a net increase in impervious area of the site?	No
Are existing trees being removed as part of the proposed project?	No

Project Assets

Asset: Stormwater BMP
Asset Type: Green Infrastructure
Asset Sub-Type: Bioswale
Construction Type: New Construction
Construction Year: 2030
Useful Life: 20

Identify the length of time the asset can be inaccessible/inoperable without significant consequences.
Infrastructure may be inaccessible/inoperable more than a week after natural hazard event without consequences.

Identify the geographic area directly affected by permanent loss or significant inoperability of the infrastructure.
Impacts limited to location of infrastructure only

Identify the population directly served that would be affected by the permanent loss or significant inoperability of the infrastructure.
Less than 5,000 people

Identify if the infrastructure provides services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.
The infrastructure does not provide services to populations that reside within Environmental Justice neighborhoods or climate vulnerable populations.

Will the infrastructure reduce the risk of flooding?
Yes

If the infrastructure became inoperable for longer than acceptable in Question 1, how, if at all, would it be expected to impact people's health and safety?
Inoperability of the infrastructure would not be expected to result in injuries

If there are hazardous materials in your infrastructure, what are the extents of impacts related to spills/releases of these materials?
There are no hazardous materials in the infrastructure

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts on other facilities, assets, and/or infrastructure?
Minor – Inoperability will not likely affect other facilities, assets, or buildings

If the infrastructure was damaged beyond repair, how much would it approximately cost to replace?
Less than $10 million

Does the infrastructure function as an evacuation route during emergencies? This question only applies to roadway projects.
No

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the environmental impacts related to natural resources?
Impact on natural resources can be mitigated naturally

If the infrastructure became inoperable for longer than acceptable in Question 1, what are the impacts to government services (i.e. the infrastructure is not able to serve or operate its intended users or function)?
Loss of infrastructure is not expected to reduce the ability to maintain government services

What are the impacts to loss of confidence in government resulting from loss of infrastructure functionality (i.e. the infrastructure asset is not able to serve or operate its intended users or function)?
Reduced morale and public support

Report Comments

N/A

Appendix E

Environmental Justice Screening Form

Environmental Justice Screening Form

Project Name	**Town of Truro Comprehensive Watershed Management Plan**
Anticipated Date of MEPA Filing	**TBD**
Proponent Name	**Town of Truro**
Contact Information (e.g., consultant)	**Julia Khrakovsky, GHD Inc** **Julia.Khrakovsky@ghd.com**
Public website for project or other physical location where project materials can be obtained (if available)	**Health | Truro, MA**
Municipality and Zip Code for Project (if known)	**Truro, Massachusetts 02666**
Project Type* (list all that apply)	**Wastewater - CWMP**
Is the project site within a mapped 100-year FEMA flood plain? Y/N/ unknown	**Y**
Estimated GHG emissions of conditioned spaces (click **here** for GHG Estimation tool)	**N/A**

Project Description

1. Provide a brief project description, including overall size of the project site and square footage of proposed buildings and structures if known.
   The Truro CWMP outlines a strategy for meeting nitrogen-reduction targets in the Town's coastal waterbodies, protecting drinking water resources, and safeguarding public health. The CWMP proposes wastewater, fertilizer, and stormwater management policies and projects to meet these goals over a 20 year period from 2027-2047. The Recommended Plan proposed in the CWMP includes cluster wastewater collection and treatment systems, nitrogen-reducing septic systems, permeable reactive barriers, and fertilizer and stormwater regulations.
2. List anticipated MEPA review thresholds (301 CMR 11.03) (if known)
   The Recommended Plan is not anticipated to exceed any MEPA Mandatory Review Thresholds. Any variances from the Wetlands Protection Act that may be required for upgrading individual septic systems will be coordinated with the appropriate agencies as necessary.
   Should strategies outlined in the contingency plan be pursued in the future through adaptive management, the MEPA review thresholds will be reevaluated.
3. List all anticipated state, local and federal permits needed for the project (if known)
   Anticipated State agency permits and actions for the CWMP are summarized in Table 9.1. Permits anticipated as part of the Truro Recommended Plan are indicated in bold text.

Agency	Agency Permits / Actions

Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA)	**CWMP approval.**
Massachusetts Department of Environmental Protection (MassDEP)	WP68: Treatment Works Approval for New/Modified Facility associated with Groundwater Discharge Non-Industrial or Reclaimed Water Use Permits – for new pump stations proposed for the project and connection to Provincetown collection system and WWTF. **Notice of Intent (NOI) Wetlands Protection Act (WPA) Form 3 (as applicable) and Truro Conservation Commission approvals (as applicable for work within the 100-foot buffer to a wetland (310 CMR 10.00).** **Emergency Engine and Emergency Turbine Compliance – required for all new emergency or standby engines with a rated power output equal to or greater than 37 kW or emergency turbine with a rated power output less than one megawatt constructed, substantially reconstructed, or altered after March 23, 2006.** **Underground Injection Control (UIC) permit for the Permeable Reactive Barrier.** **WP 83: Hydrogeologic Evaluation Report** **WP 79: Individual Groundwater Discharge Permit** **WP 95: Watershed Permit Application**
Massachusetts Office of Coastal Zone Management (CZM)	**Federal Consistency Review.**
Massachusetts Division of Fisheries & Wildlife	**Natural Heritage & Endangered Species Program (NHESP), MES (321 CMR 10.00) and/or WP (310 CMR 10.00) for work below the mean high-water line, in a fish run, or in a priority or estimated habitat.**
Massachusetts Historical Commission (MHC)	**Consultation/review for any collection system components and pump stations to be constructed outside of road right-of-way.**
Cape Cod Commission	**Section 208 Plan Update Consistency Approval**
Town of Truro	**Building permits for the construction of structures recommended in the CWMP.** **Wastewater Department sewer connection permitting.** **Chapter 277 Stormwater Management Rules and Regulations.** **Article III. Construction and Post-Construction Stormwater Management.** **Conservation Commission Approvals** **Planning Board Approvals** **Zoning Board Approvals**

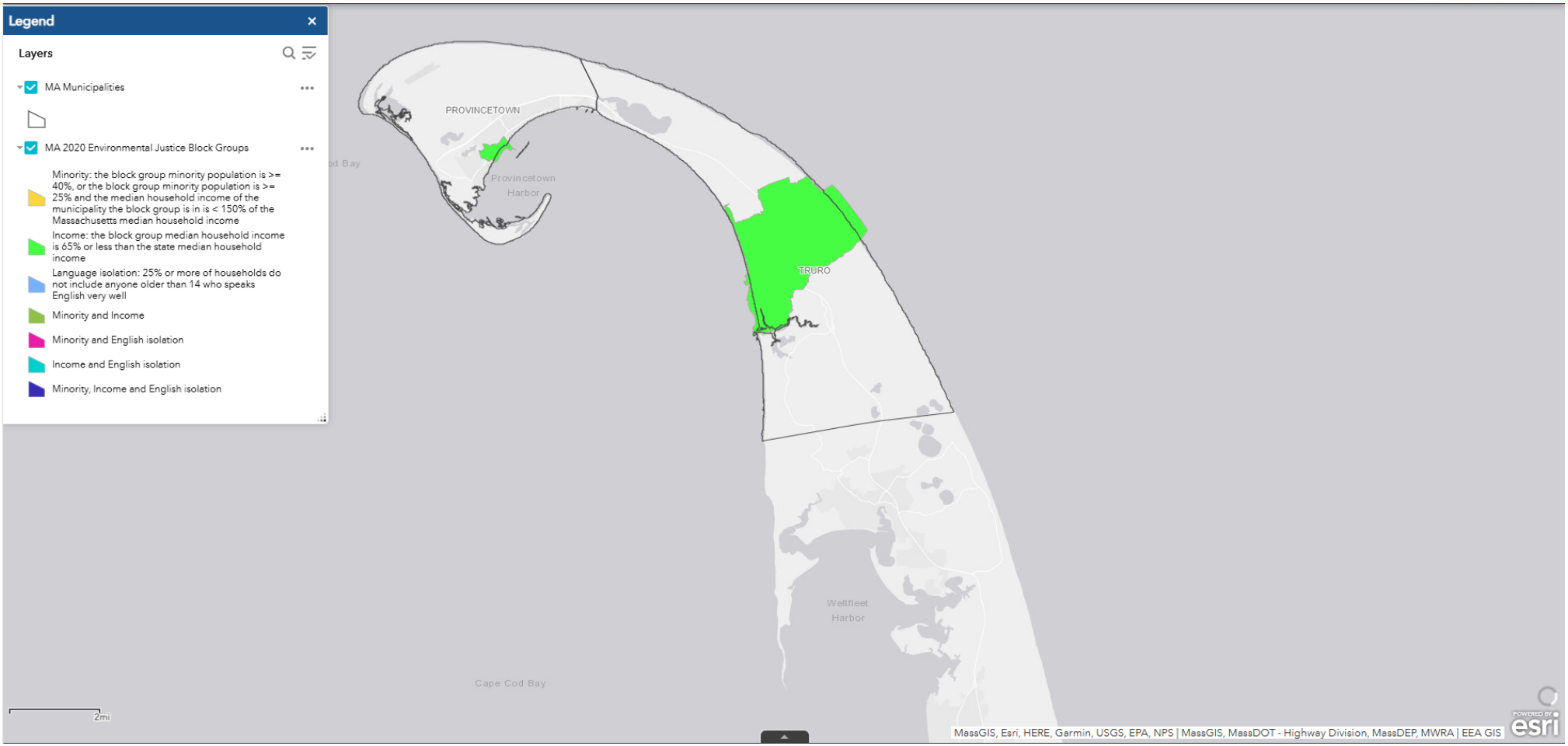
4. Identify EJ populations and characteristics (Minority, Income, English Isolation) within 5 miles of project site (can attach map identifying 5-mile radius from EJ Maps Viewer in lieu of narrative)

   See attachment.

5. Identify any municipality or census tract meeting the definition of "vulnerable health EJ criteria" in the DPH EJ Tool located in whole or in part within a 1 mile radius of the project site

   There are no communities in Truro or within 1 mile of the town boundaries that meet the definition of "vulnerable health EJ criteria".

6.	Identify potential short-term and long-term environmental and public health impacts that may affect EJ Populations and any anticipated mitigation **The primary adverse effect of this project on EJ populations is temporary disturbance during the construction phase. The Town and Contractor will enact comprehensive mitigation measures to ensure public safety and minimize the impact of noise, dust, and traffic congestion on abutters. There a no anticipated long term negative environmental or public health impacts associated with the CWMP.**
7.	Identify project benefits, including "Environmental Benefits" as defined in 301 CMR 11.02, that may improve environmental conditions or public health of the EJ population **The primary benefit of this project is improved water quality through improved nitrogen management. This will benefit the entire community by enhancing environmental health and supporting a stronger local economy. The project will increase access to clean natural resources—including estuarine, freshwater, and groundwater systems—thereby promoting greater use and enjoyment of recreational areas such as waterways, freshwater ponds, and public bathing beaches.**
8.	Describe how the community can request a meeting to discuss the project, and how the community can request oral language interpretation services at the meeting . Specify how to request other accommodations, including meetings after business hours and at locations near public transportation. **A meeting request can be made through the Town of Truro's Health and Conservation Department at ebeebe@truro-ma.gov. Please specify and accommodations in the request. Additional community meetings will also be held upon request prior to submission of the Environmental Impact Report.**


Legend
Layers
MA Municipalities
MA 2020 Environmental Justice Block Groups
Minority: the block group minority population is >= 40%, or the block group minority population is >= 25% and the median household income of the municipality the block group is in is < 150% of the Massachusetts median household income
Income: the block group median household income is 65% or less than the state median household income
Language isolation: 25% or more of households do not include anyone older than 14 who speaks English very well
Minority and Income
Minority and English isolation
Income and English isolation
Minority, Income and English isolation
PROVINCETOWN
Provincetown Harbor
TRURO
Wellfleet Harbor
Cape Cod Bay
2mi
MassGIS, Esri, HERE, Garmin, USGS, EPA, NPS | MassGIS, MassDOT - Highway Division, MassDEP, MWRA | EEA GIS
esri



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→ The Power of Commitment