

Enhanced Innovative/Alternative (EIA) Septic Systems Update

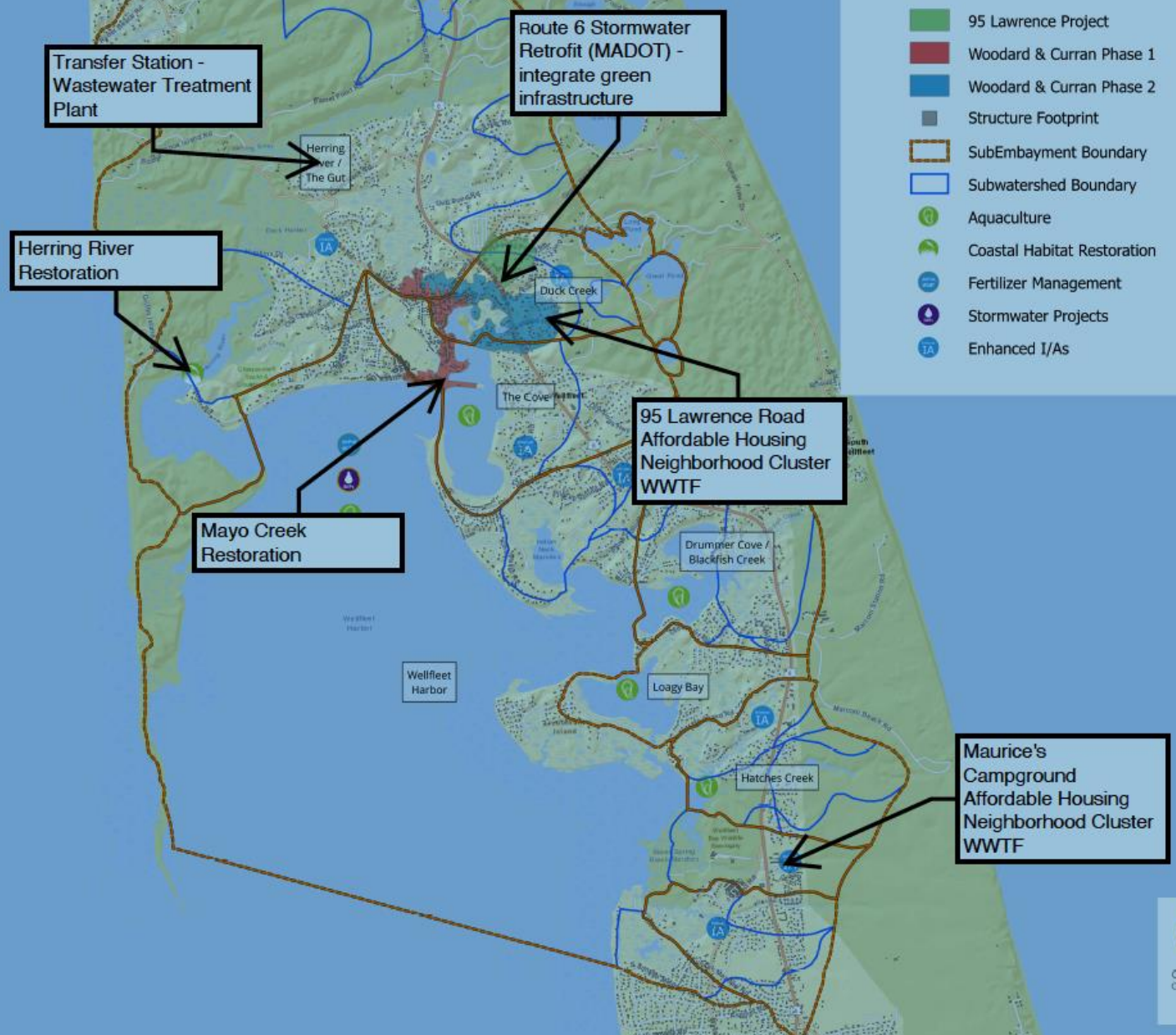
Case Studies - Wellfleet and Tisbury

- ▶ **NEWEA Annual Conference 2024 - Innovation Pavilion
1/23/24**
- ▶ **Scott Horsley, Water Resources Consultant**
 - ▶ **Guests - Michael & Melinda Loberg, Tisbury Board of Health**



Wellfleet Targeted Watershed Management Plan (TWMP) Update
September 23, 2023
Scott Horsley, Water Resources Consultant

WELLFLEET TARGETED WATERSHED PLAN



- 95 Lawrence Project
- Woodard & Curran Phase 1
- Woodard & Curran Phase 2
- Structure Footprint
- SubEmbayment Boundary
- Subwatershed Boundary
- Aquaculture
- Coastal Habitat Restoration
- Fertilizer Management
- Stormwater Projects
- Enhanced I/As



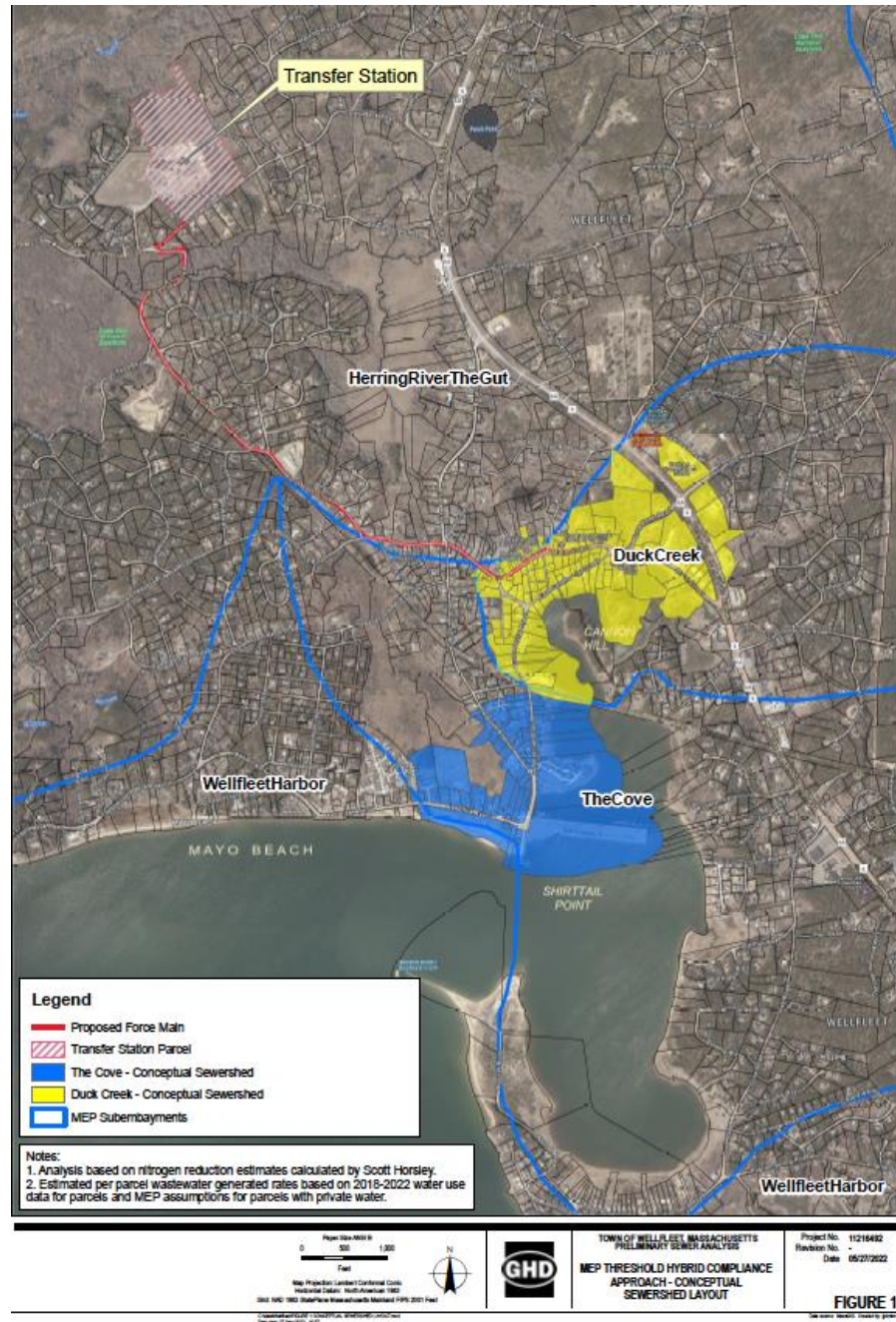
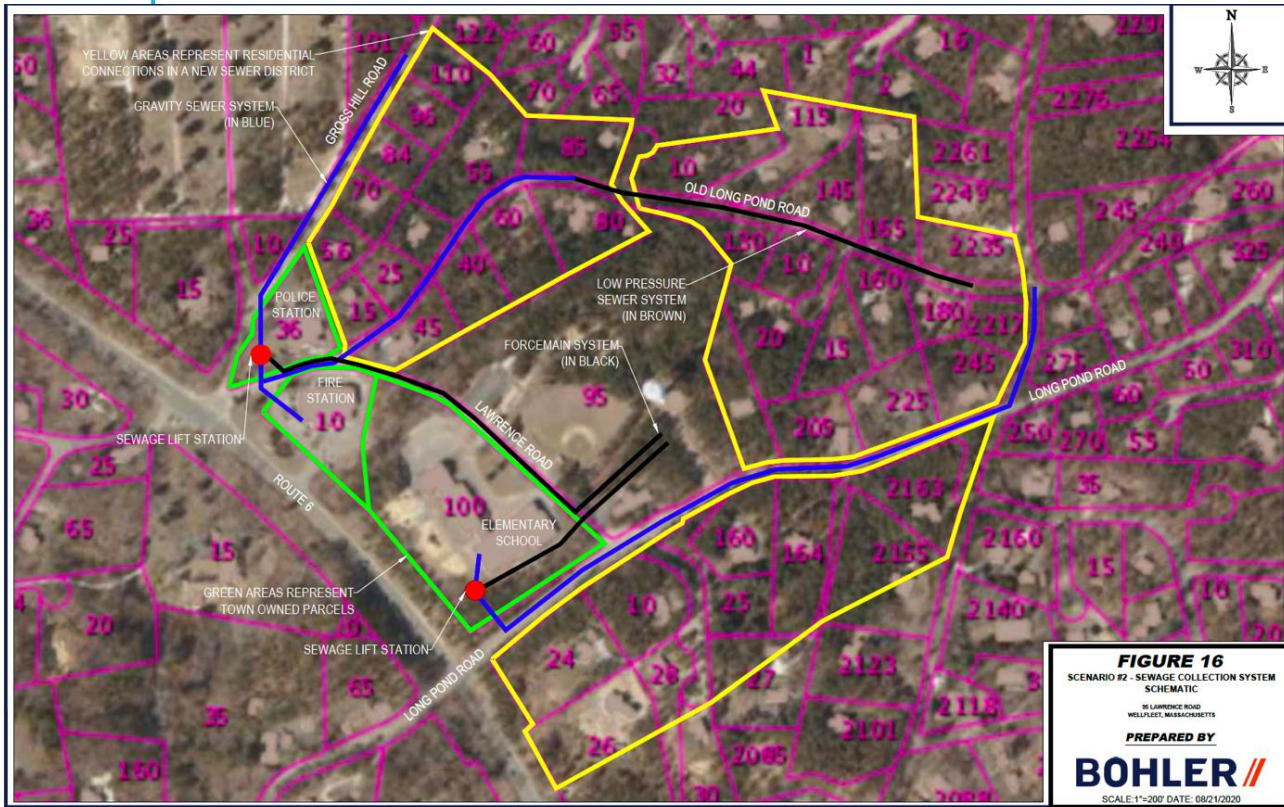
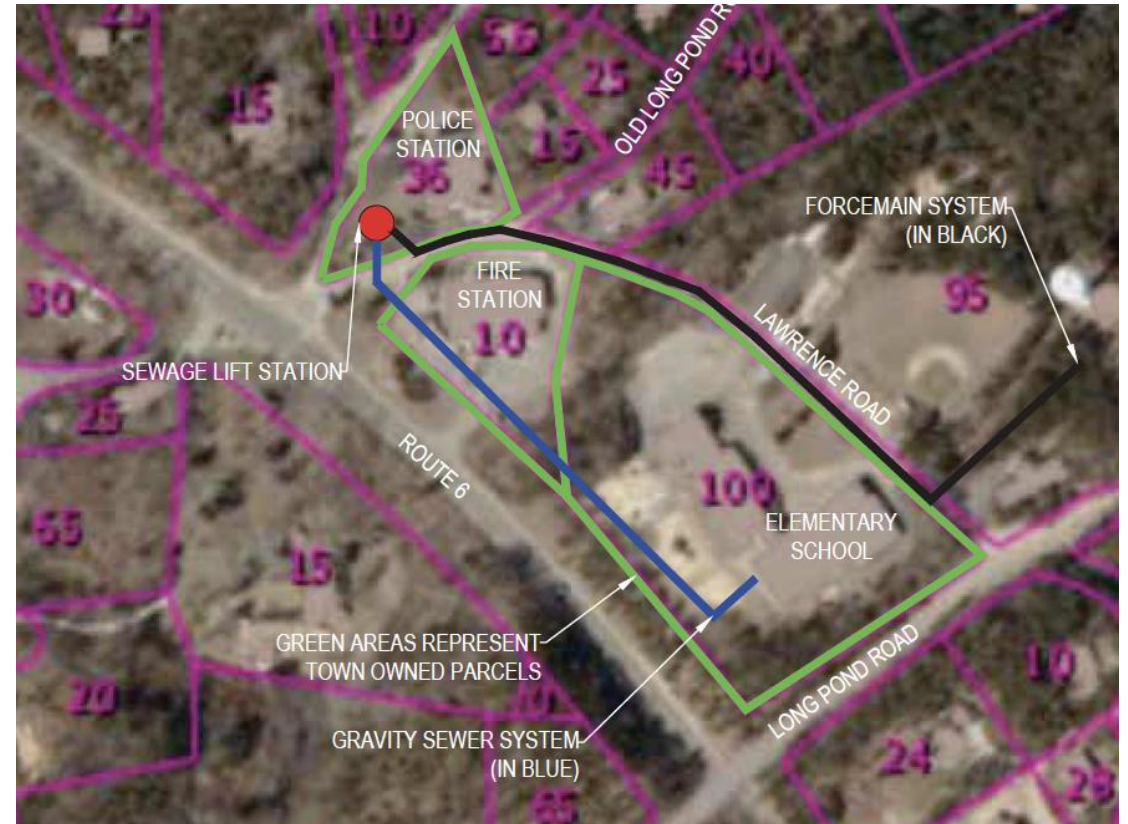


FIGURE 1

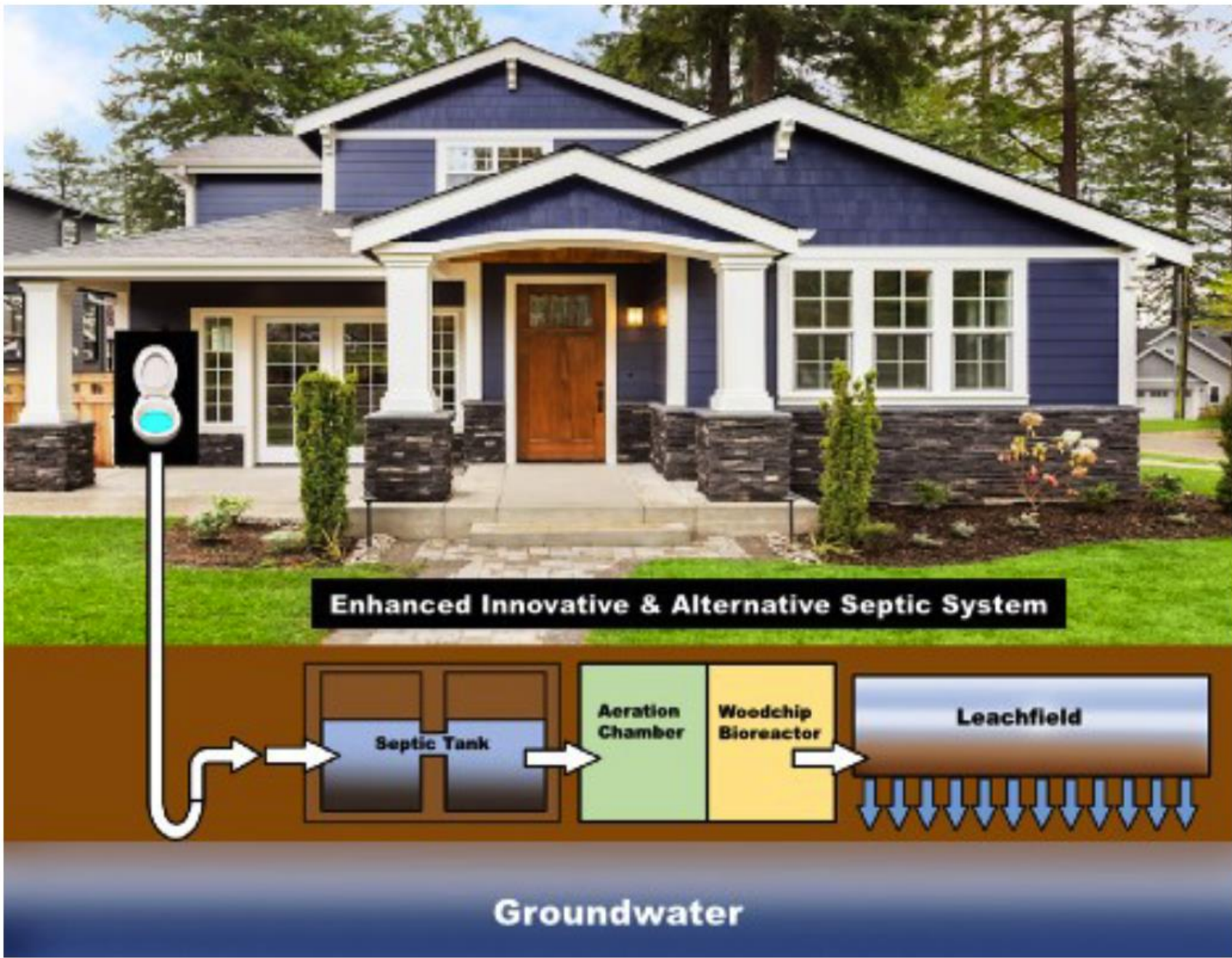
95 LAWRENCE ROAD AFFORDABLE HOUSING PROJECT



Option A – Neighborhood System



Option B – Municipal Buildings



Wellfleet Targeted Watershed Management Plan - Cost/Sensitivity Analysis

Table 8 – Comparative Costs – Wastewater Alternatives

	Concentration	N load	N reduction		Cost	
	mg/liter	kg/year	kg/year	percentage	capital	\$/kg
Title 5 system	23.6	4.73				
I&A @ 5 mg/liter	5	0.90	3.83	81%	\$ 35,000	\$ 457
I&A @ 8 mg/liter	8	1.44	3.29	69%	\$ 35,000	\$ 533
I&A @ 11 mg/liter	11	1.98	2.74	58%	\$ 35,000	\$ 638
I&A @ 19 mg/liter	19	3.43	1.30	28%	\$ 35,000	\$ 1,344
Town-wide WW @ 3 mg/l	3	0.54	4.19	89%	\$ 76,400	\$ 912
Town-wide WW @ 5 mg/l	5	0.90	3.83	81%	\$ 76,400	\$ 998
Downtown WW @ 3 mg/l	3	0.54	4.19	89%	\$ 109,800	\$ 1,311
Downtown WW @ 5 mg/l	5	0.90	3.83	81%	\$ 109,800	\$ 1,435
Cluster Treatment A @ 6 mg/l	6	174	511	75%	\$ 4,703,300	\$ 460
Cluster Treatment A @ 10 mg/l	10	290	395	58%	\$ 4,703,300	\$ 595
Cluster Treatment B @ 6 mg/l	6	124	365	75%	\$ 2,546,210	\$ 349
Cluster Treatment B @ 10 mg/l	10	207	282	58%	\$ 2,546,210	\$ 451

Wellfleet TWMP Costs (\$ M)

Sewer
Collection &
Treatment

	Scenario A Hybrid	Scenario B Traditional
Collection System	\$9.4	\$80.4
Wastewater Treatment	\$10.9	\$32.7
Sewer Laterals	\$3.2	\$27.5
Design	\$2.0	\$11.3
Construction Services	\$5.0	\$30.7
Total Municipal Centralized Infrastructure	\$30.5	\$182.6
Collection System	\$0.8	\$0.8
Wastewater Treatment	\$0.9	\$0.9
Leaching System	\$0.2	\$0.2
Design & Contingencies	\$0.6	\$0.6
Total 95 Lawrence Capital Costs	\$2.5	\$2.5
I&A Septics	\$63.0	\$44.9
Design	\$10.6	\$7.5
Total I&A Septics	\$73.6	\$52.4
TOTAL COSTS (millions)	\$106.6	\$237.5

95 Lawrence Road
Affordable
Housing WWTF

I&A Septics



- ▶ Lake Tashmoo Targeted Watershed Management Plan (TWMP)
- ▶ Town of Tisbury

- ▶ Scott Horsley
- ▶ Water Resources Consultant

- ▶ July 26, 2023

**Tashmoo Pond Watershed
Parcel Land Use - CWMP 2023**

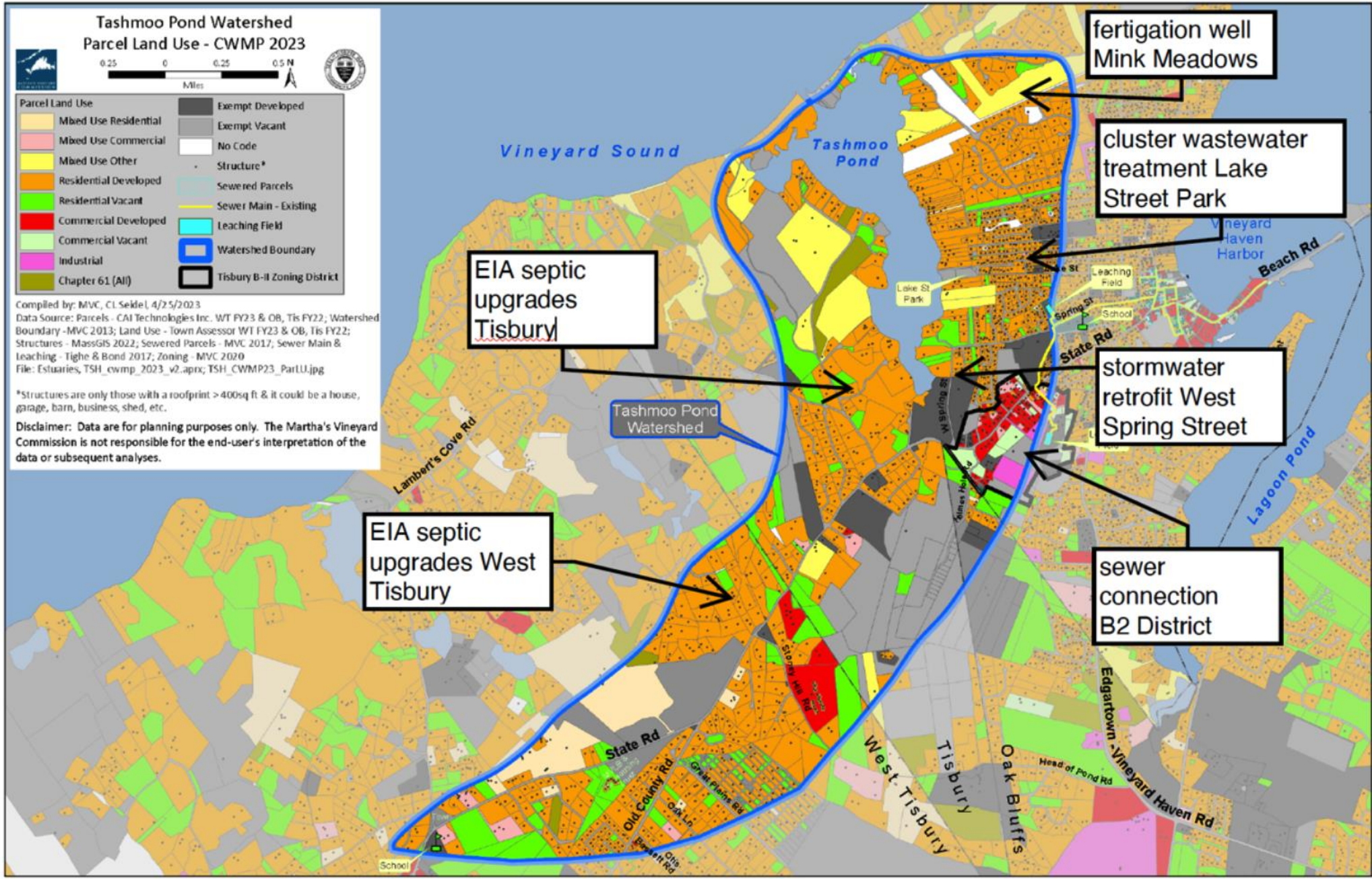


Parcel Land Use	
Mixed Use Residential	Exempt Developed
Mixed Use Commercial	Exempt Vacant
Mixed Use Other	No Code
Residential Developed	Structure*
Residential Vacant	Sewered Parcels
Commercial Developed	Sewer Main - Existing
Commercial Vacant	Leaching Field
Industrial	Watershed Boundary
Chapter 61 (All)	Tisbury B-II Zoning District

Compiled by: MVC, CL Seidel, 4/25/2023
 Data Source: Parcels - CAI Technologies Inc. WT FY23 & OB, Tis FY22; Watershed Boundary - MVC 2013; Land Use - Town Assessor WT FY23 & OB, Tis FY22; Structures - MassGIS 2022; Sewered Parcels - MVC 2017; Sewer Main & Leaching - Tighe & Bond 2017; Zoning - MVC 2020
 File: Estuaries, TSH_cwmp_2023_v2.aprx; TSH_CWMP23_ParLU.jpg

*Structures are only those with a footprint > 400sq ft & it could be a house, garage, barn, business, shed, etc.

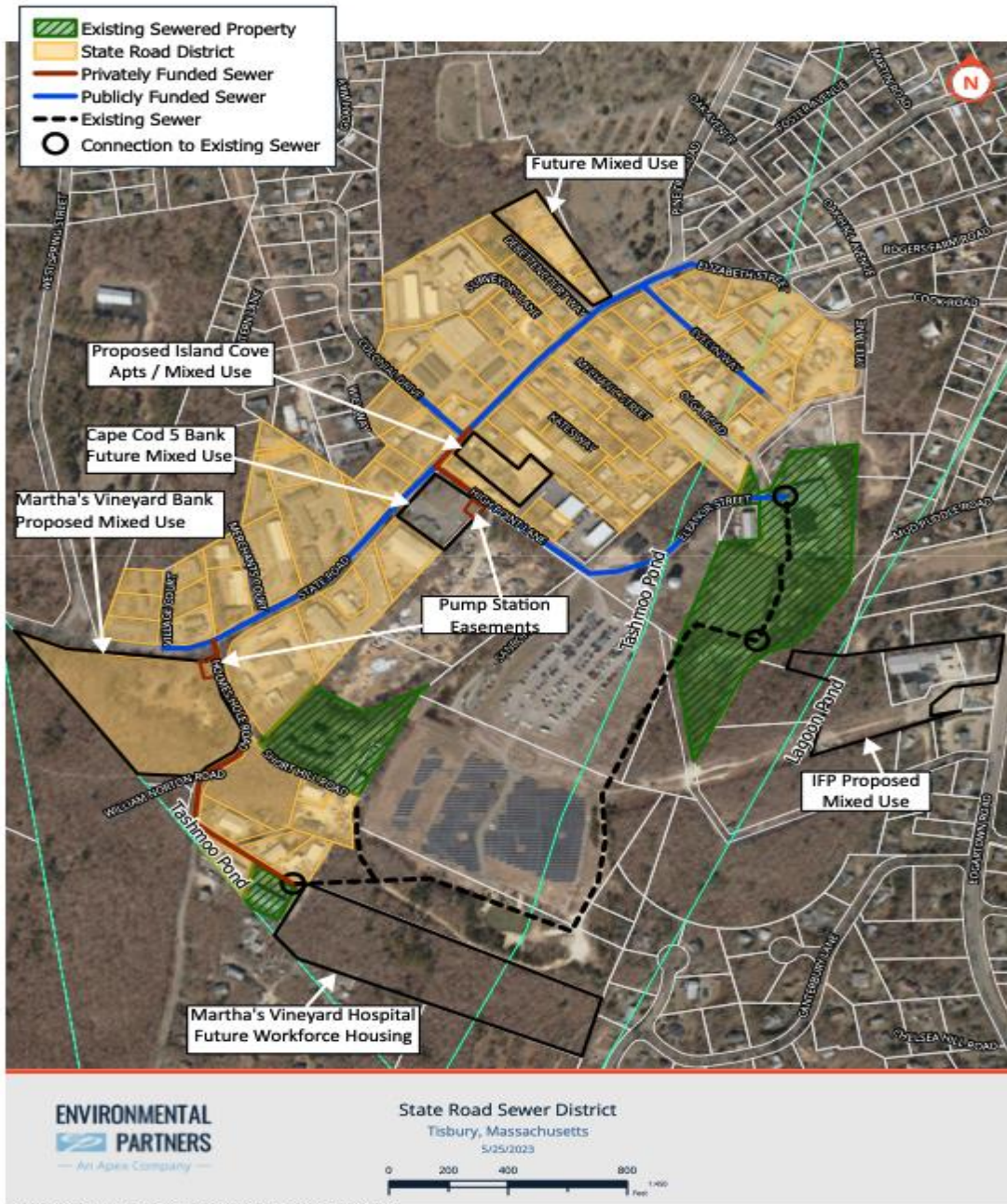
Disclaimer: Data are for planning purposes only. The Marthas Vineyard Commission is not responsible for the end-user's interpretation of the data or subsequent analyses.



NITROGEN REDUCTION STRATEGY (2043)

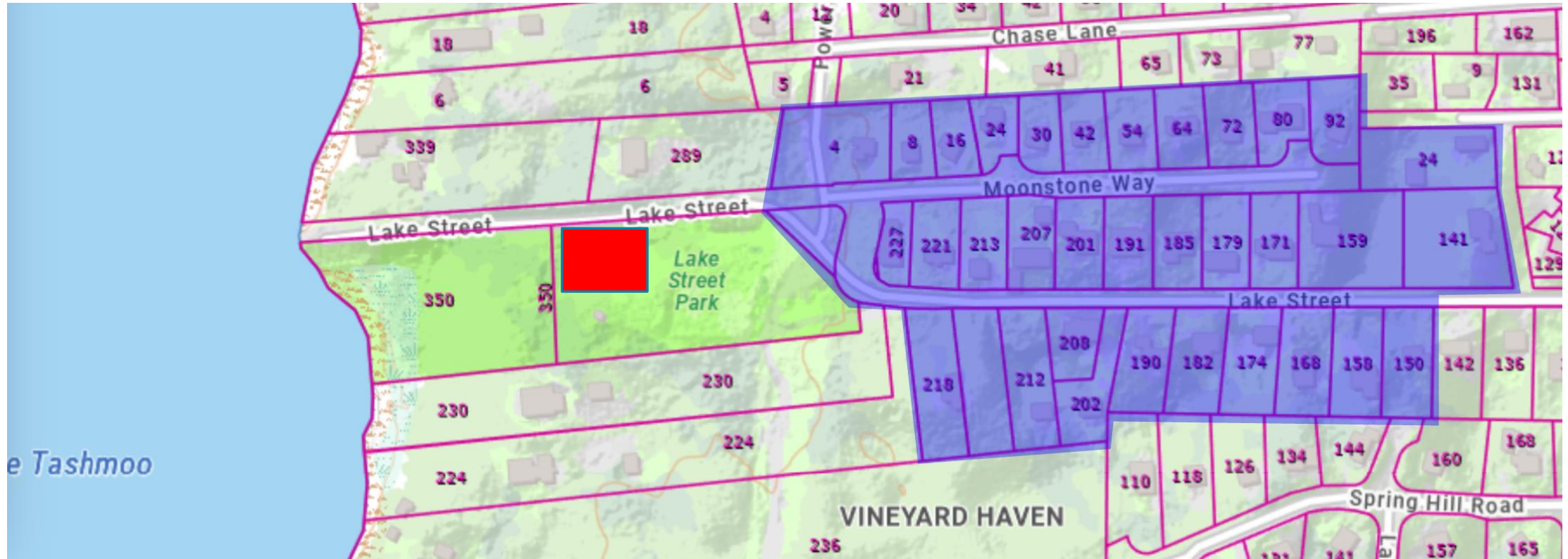
Technology/Strategy	Calculation Summary			Reduction (kg/yr)
Sewering (B2 District)	16330	gals/day		560
Enhanced I&A Septics	838	upgrades x 171 gals/day x (26.25 - 10.0) mg/liter		3217
Cluster Treatment	9900	gals/day x (26.25 - 5.0) mg/liter		291
Fertilizer Management	25	percent x 457 kg/year		114
Stormwater Retrofits	25	percent x 715 kg/year		179
TOTAL				4361

Note: Calculations include conversion factors of 3.785 liters/gallon and 1,000,000 mg/kg

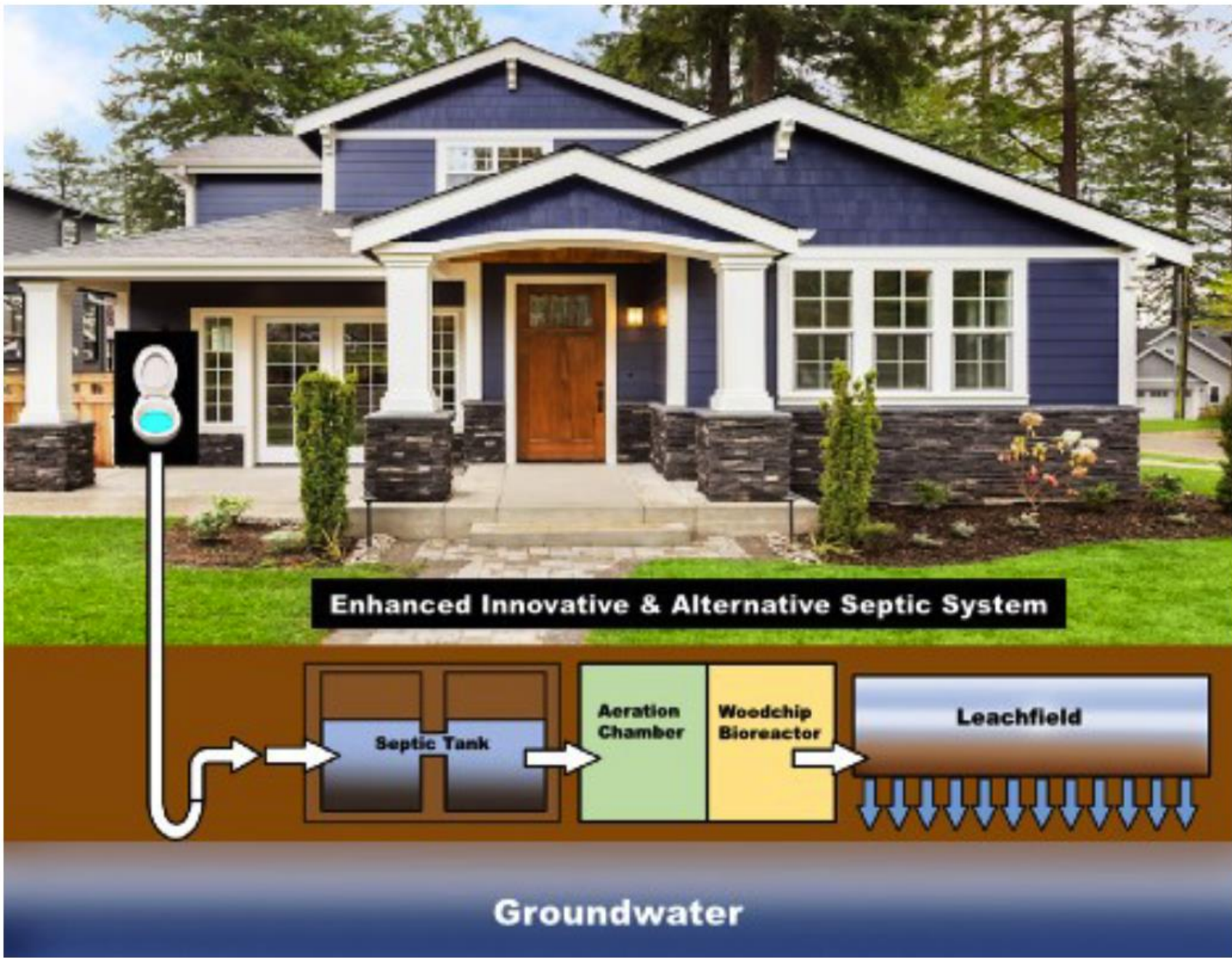


Core Sewer Area B2 Zoning District

CLUSTER WASTEWATER TREATMENT SYSTEM – LAKE STREET PARK



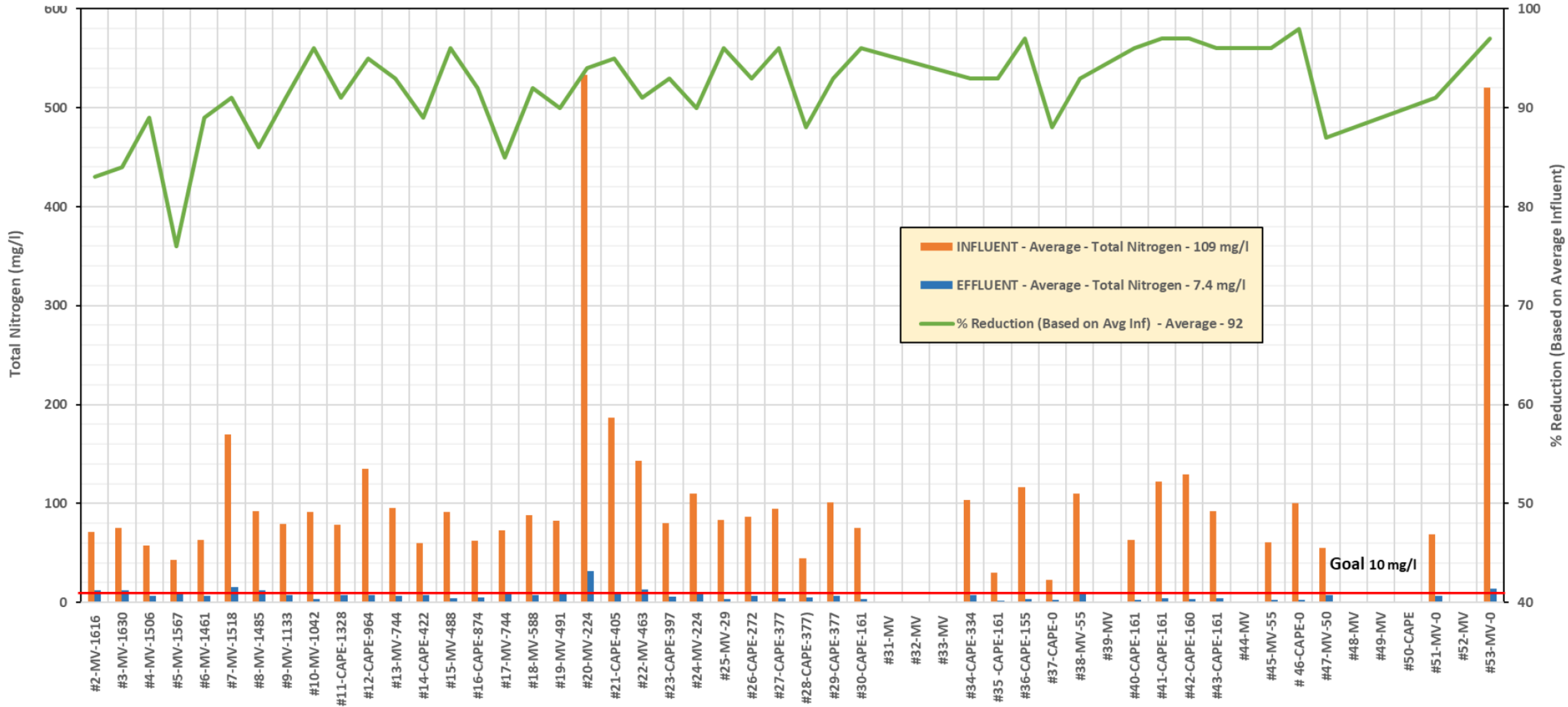
Note: Conceptual Plan





Average Total Nitrogen - Influent & Effluent

Installation #
Location - MV/ Cape Cod
Total Days of Operational Monitoring



ENHANCED INNOVATIVE & ALTERNATIVE (EIA) SEPTIC SYSTEMS ACTUAL (AS-BUILT) COSTS (INCLUDING ENGINEERING DESIGN FEES)

			Number	Construction Cost	Engineering Design	Total Cost Per System	Updated Cost Estimates 2023 (add \$10,000)
Retrofit of Existing Title 5 System							
		Buzzards Bay Coalition	4	\$24,891	\$3,000	\$27,891	
		Barnstable Clean Water Coalition	4	\$19,852	\$6,351	\$26,203	
		Average		\$22,372	\$4,676	\$27,047	\$37,047
Partial Upgrade (replace septic tank or leachfield)							
		Barnstable Clean Water Coalition	2	\$27,981	\$6,351	\$34,332	\$44,332
Full Upgrades (including both septic tank and leachfield)							
		Buzzards Bay Coalition	4	\$35,535	\$3,000	\$38,535	
		Barnstable Clean Water Coalition	2	\$32,808	\$6,351	\$39,159	
		Average		\$34,172	\$4,676	\$38,847	\$48,847
OVERALL AVERAGE COSTS						\$33,409	\$43,409
References:	Buzzards Bay Coalition, Designing a Municipal Model for Mandating, Funding, and Managing I&A Septic Systems, June 2020						
	Barnstable Clean Water Coalition, Schubael's Pond Study, 2022						

TISBURY HEALTH REGULATIONS

SECTION 5. INSTALLATION OF ENHANCED DE-NITRIFICATION TECHNOLOGY

5.2 The following situations are “triggers” for the purposes of section 5.1:

- a) a new wastewater treatment system is required to serve a **Property** (i.e., new construction);
- b) at the time of replacement, upgrade or relocation of a property’s existing wastewater treatment system;
- c) additional development on the **Property** or a change in use or in intensity of use (or potential use) which would increase wastewater Nitrogen discharge beyond the Board of Health approved system capacity irrespective of whether the existing wastewater treatment system has excess sanitation capacity¹;
- d) at the time that a **Property** is transferred to another owner.

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- ▶ **Task Force Self-Education Website**

- ▶ www.newea.org/resources/innovation/resources