Lake Tashmoo Targeted Watershed Plan

Town of Tisbury

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Project Update

May 18, 2023

Table 4 – Summary of Eelgrass Surveys 1995 - 2021

Survey	Areal extent
DEP Mapped Eelgrass in Tashmoo – 1995	91 acres
DEP Mapped Eelgrass in Tashmoo – 2001	38 acres
DEP Mapped Eelgrass in Tashmoo – 2006-2007	38 acres
DEP Mapped Eelgrass in Tashmoo – 2010-2013	45 acres
DEP Mapped Eelgrass in Tashmoo – 2015-2017	47 acres
DMF Lake Tashmoo Survey - 2021	47 acres

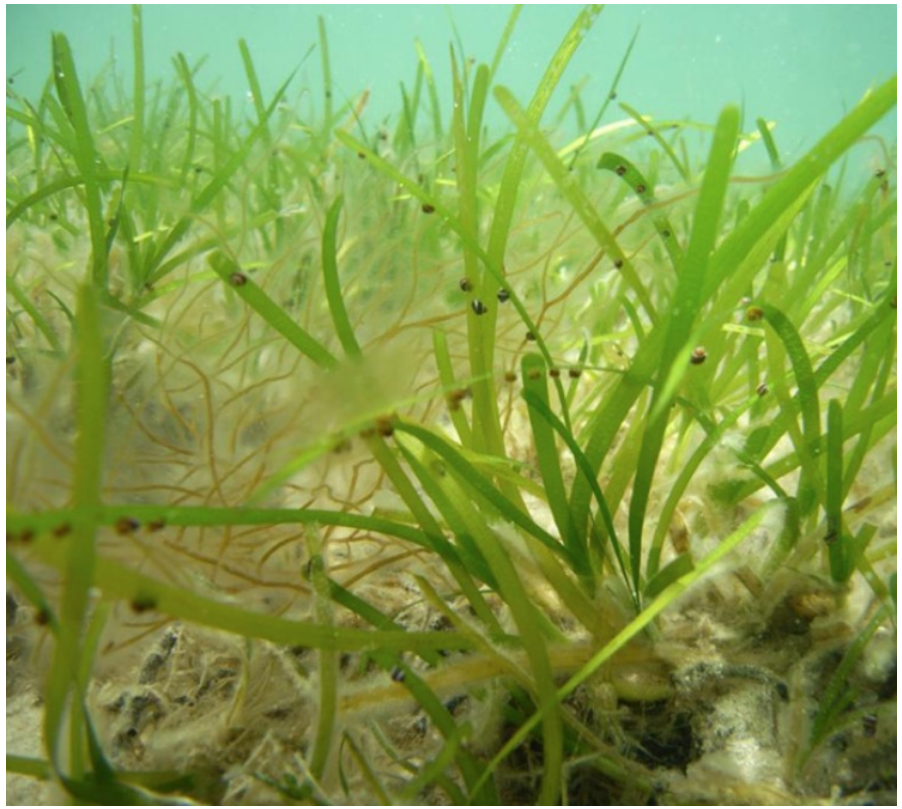


Table 1 - Summary of Nitrogen Loads and Required Reduction (kg/year)

Septic Systems	6861	75%
Wastewater Treatment Facility	107	1%
Landfill	56	1%
Turf Fertilizer	457	5%
Agriculture Fertilizers	179	2%
Agriculture Animals	277	3%
Stormwater	715	8%
Natural Sources	502	5%
Total MEP Watershed Loading (2010)	9154	
Watershed Loading (2023)	9831	
Watershed Loading (2043)	10510	
MEP Threshold (Critical Level)	6244	
Reduction Required (2010)	2910	32%
Reduction Required (2023)	3587	36%
Reduction Required (2043)	4266	41%

Table 2 Inventory of Septic Systems in Tashmoo Watershed (Town of Tisbury) - March 2023 (Source: Tisbury Department of Health)

Total number of septic systems	860
I/A systems (FAST, Bioclere, Waterloo, Advantix)	25
Enhanced I/A systems (NitROE)	19
Cesspools	28
Title 5 systems pending upgrade (General Approval)	2
Title 5 systems pending upgrade (Provisional Approval)	5

Table 3. Number and Percentage of Septic Systems in Tashmoo Watershed

Tisbury	860	76%
West Tisbury	261	23%
Oak Bluffs	9	1%
Total	1130	

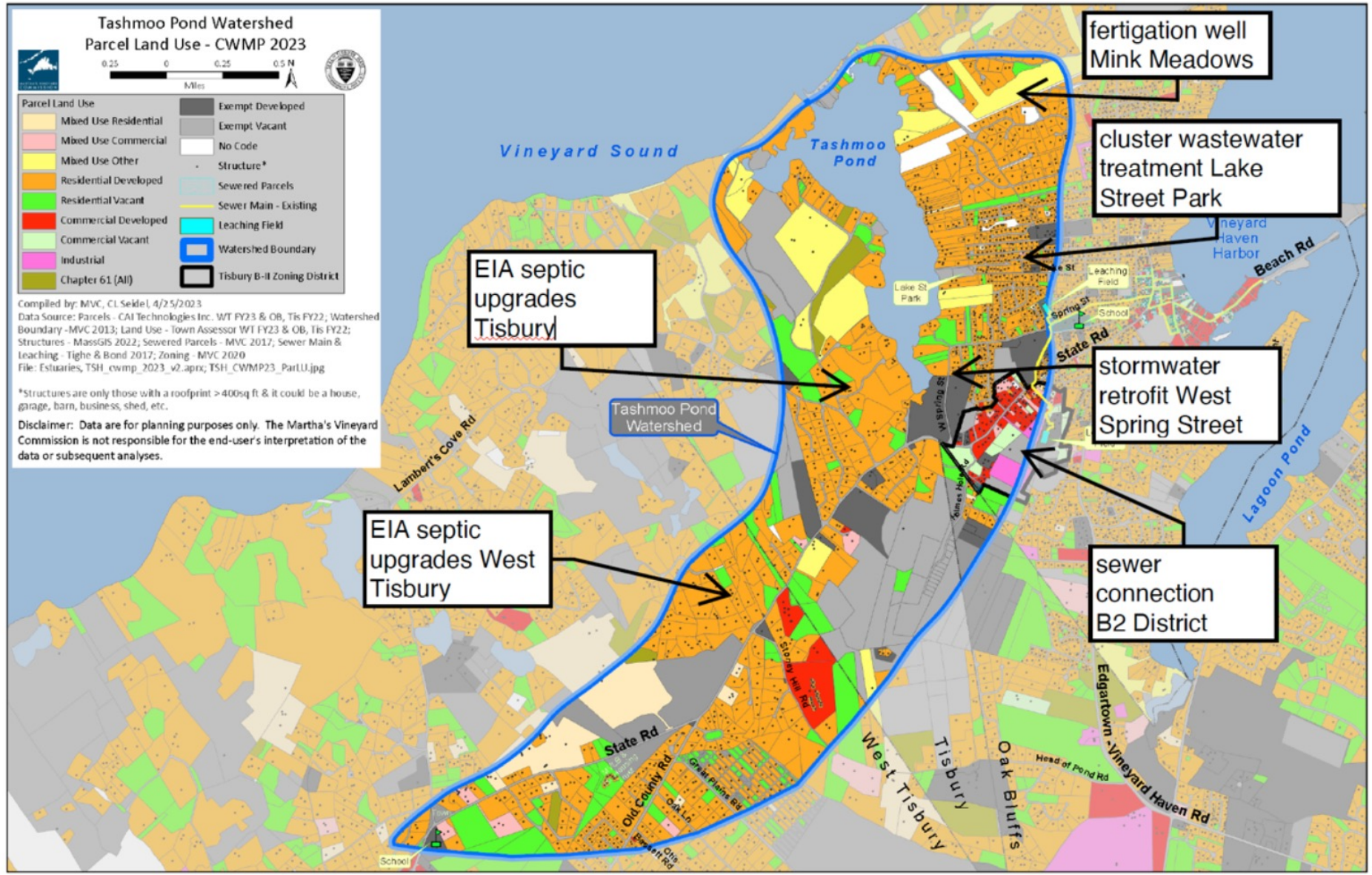


Figure 1 – Tashmoo Watershed Plan Overview (Map prepared by the Martha's Vineyard Commission, CL Seidel, 4/25/2023)

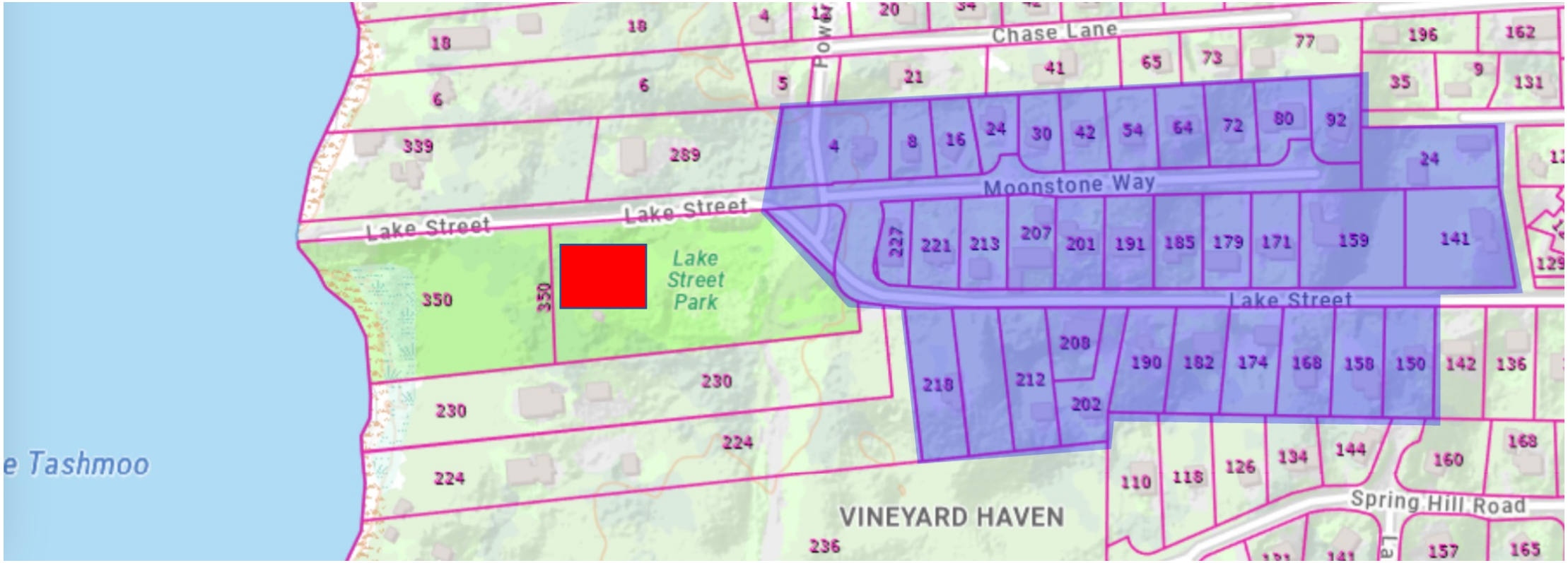
Table 5 – Summary of Hybrid Plan

Technology/Strategy	Calculation Summary			Reduction (kg/yr)
Sewering (B2 District)	36000	gals/day	x 26.25 mg/liter	1306
Enhanced I&A Septics	700	upgrades	x 171 gals/day x (26.25 - 11) mg/liter	2524
Cluster Treatment	9900	gals/day	x (26.25 - 5) mg/liter	291
Fertilizer Management	12.5	percent	x 457 kg/year	57
Stormwater Retrofits	12.5	percent	x 715 kg/year	89
TOTAL				**4266**

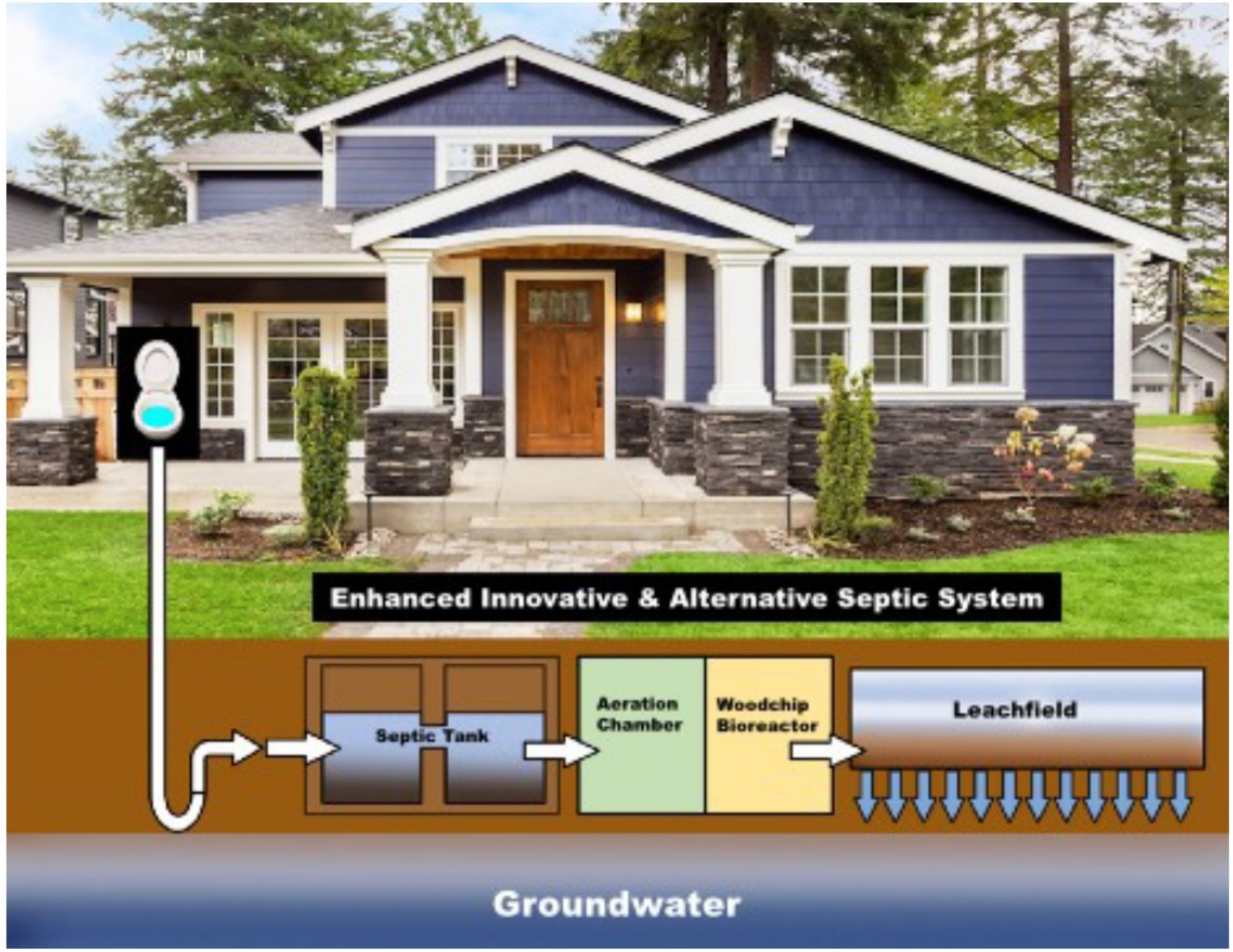
Note: Calculations include conversion factors of 3.785 liters/gallon and 1,000,000 mg/kg

Sewering of B2 District

Potential Cluster Wastewater Treatment System – Lake Street Park



Note: Conceptual Plan


Vent
Enhanced Innovative & Alternative Septic System
Septic Tank
Aeration Chamber
Woodchip Bioreactor
Leachfield
Groundwater

Comparative Nitrogen Loading (Title 5, I&A, WWTF)

	mg/liter	load (kg/year)	net reduction (kg/year)	percent reduction
Title 5 system	26.25	6.20		
I&A @ 19 mg/liter	19	4.49	1.71	28%
I&A @ 11 mg/liter	11	2.60	3.60	58%
I&A @ 8 mg/liter	8	1.89	4.31	70%
I&A @ 5 mg/liter	5	1.18	5.02	81%
WWTF @ 5 mg/liter	5	1.18	5.02	81%
WWTF @ 3 mg/liter	3	0.71	5.49	89%

Note: Assumes 171 gals/day-system (90% of water use)

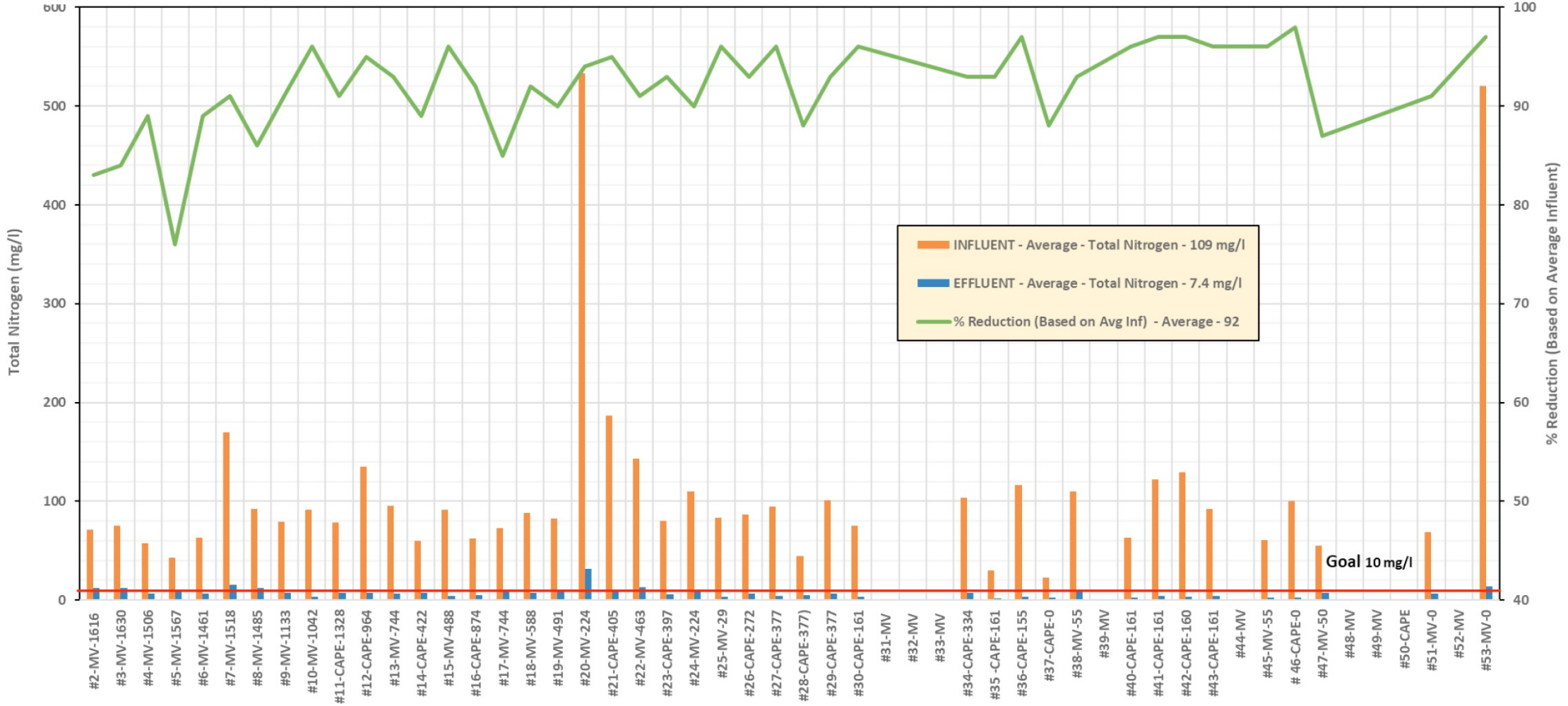
KleanTu Wastewater Treatment Technologies ®

Average Total Nitrogen - Influent & Effluent

Installation #

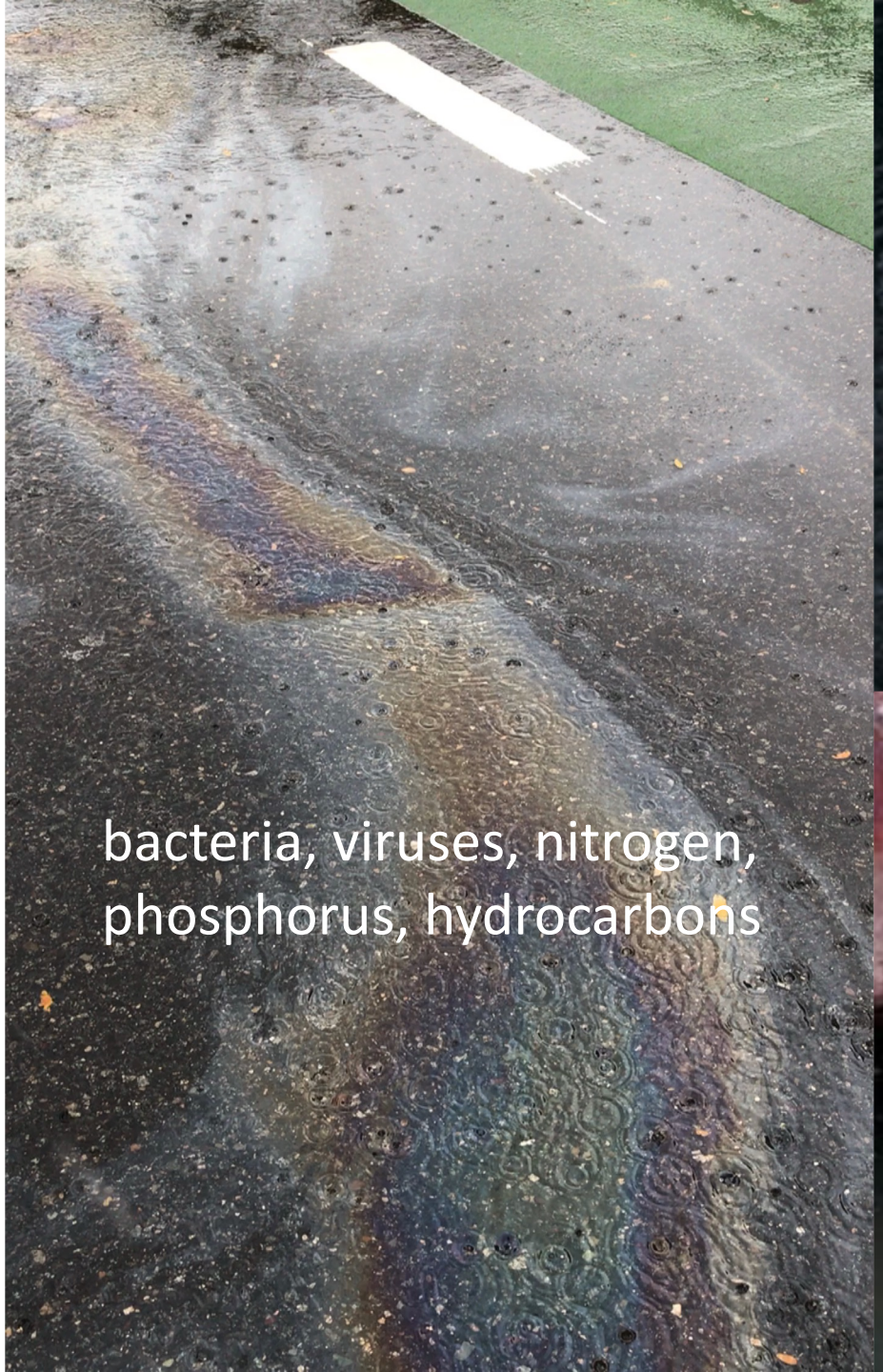
Location - MV/ Cape Cod

Total Days of Operational Monitoring



Enhanced I&A Septic Systems – Actual Costs

			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
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						



STORMWATER MANAGEMENT

Figure 3. Lake Street Park swale (Environmental Partners, 2018)

Table 6 – Stormwater Best Management Practices

Stormwater Treatment Practice	Nitrogen Removal Estimates	
	MADEP[12]	Cape Cod Commission[13]
Bioretention	30 – 50%	55%
Constructed Wetland	20 – 55%	30 – 55%
Infiltration System	40 – 70%	40 – 65%

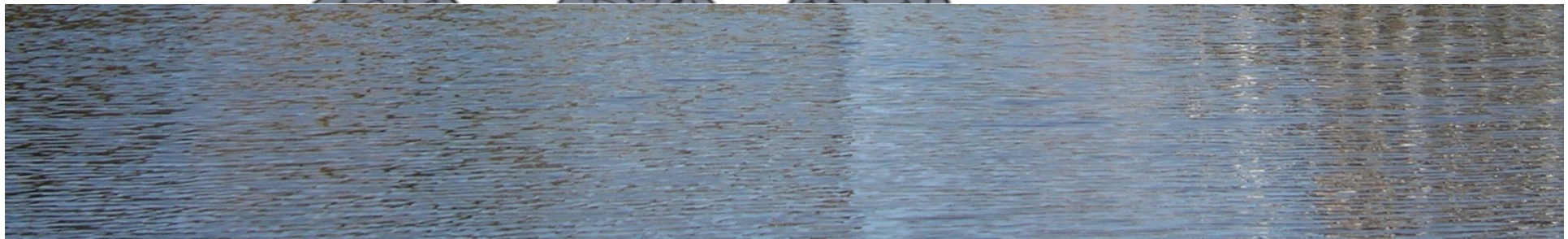
Figure 4a - Bioretention/Rain Garden: Stormwater flows into this vegetated practice, then infiltrates down through the root zone.

Figure 4b - Constructed Wetland: Stormwater flows into the wetland and then moves laterally through the root zone which is constantly saturated providing excellent treatment.

Figure 4c - Infiltration System: Stormwater flows into a series of subsurface structures open to the bottom where it is filtered by native soils.

Fertilizers

Phytoremediation



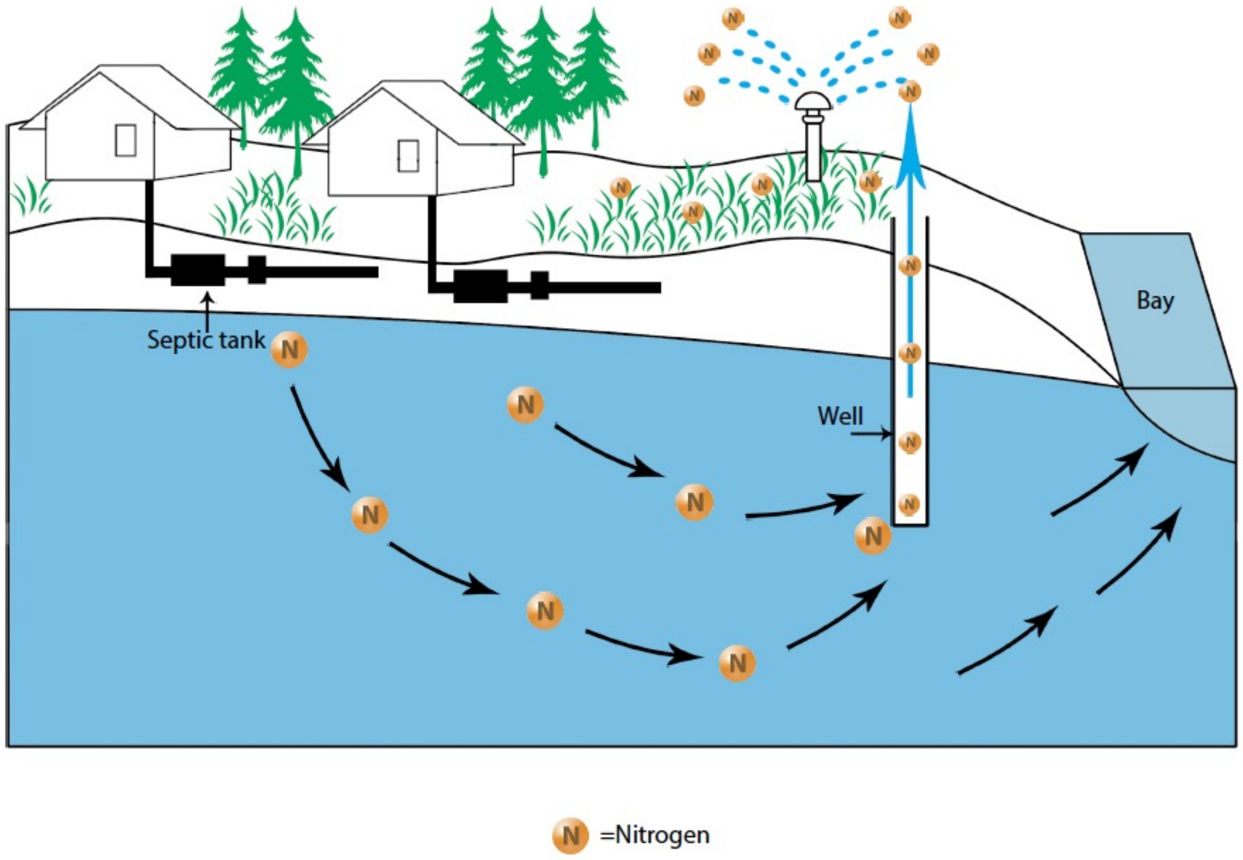
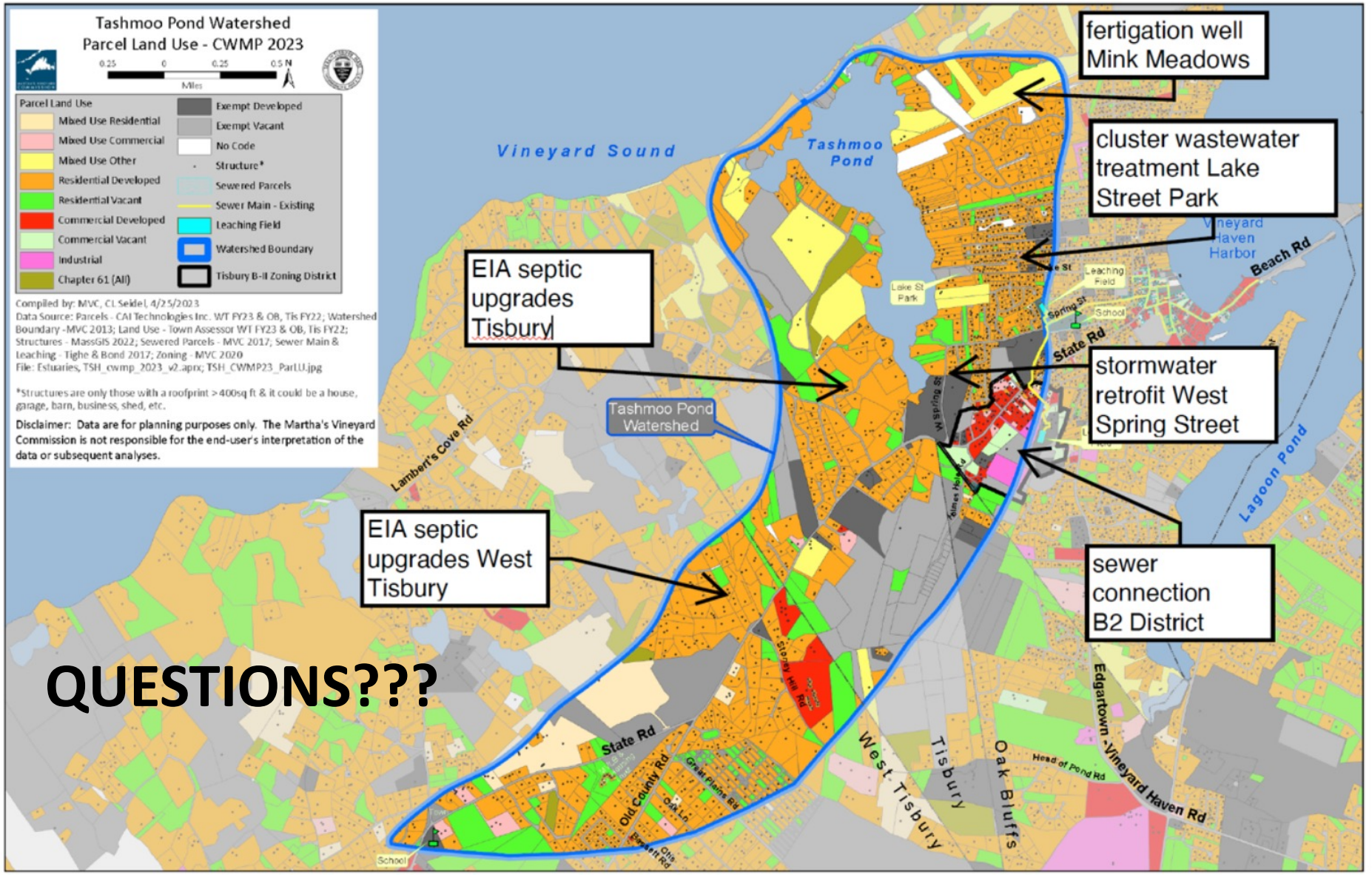


Figure 5 – Fertigation Well



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