EDGARTOWN CWMP UPDATE

Phase 1 Project Overview

Project Director: Ian Catlow, PE
February 12, 2024

Tighe&Bond

OVERVIEW

- **CWMP Drivers & Process**
- **Existing Conditions**
  - Land Use & Demographics
  - Nutrient Loading & TMDLs
  - Wastewater Infrastructure
- **Future Conditions**
  - Population Growth & Development
  - Nutrient Loading
- **Needs Analysis**
- **Next Steps**
  - Alternatives Analysis
  - MEPA Review

Photo Credit: Edgartown Great Pond Cut, Great Pond Foundation

CWMP DRIVERS

20-Year Planning Cycle

- Population Changes
- Infrastructure Assessment

Title 5 Changes

- Sengekontacket TMDL
- Edgartown Great Pond TMDL

Watershed Permit

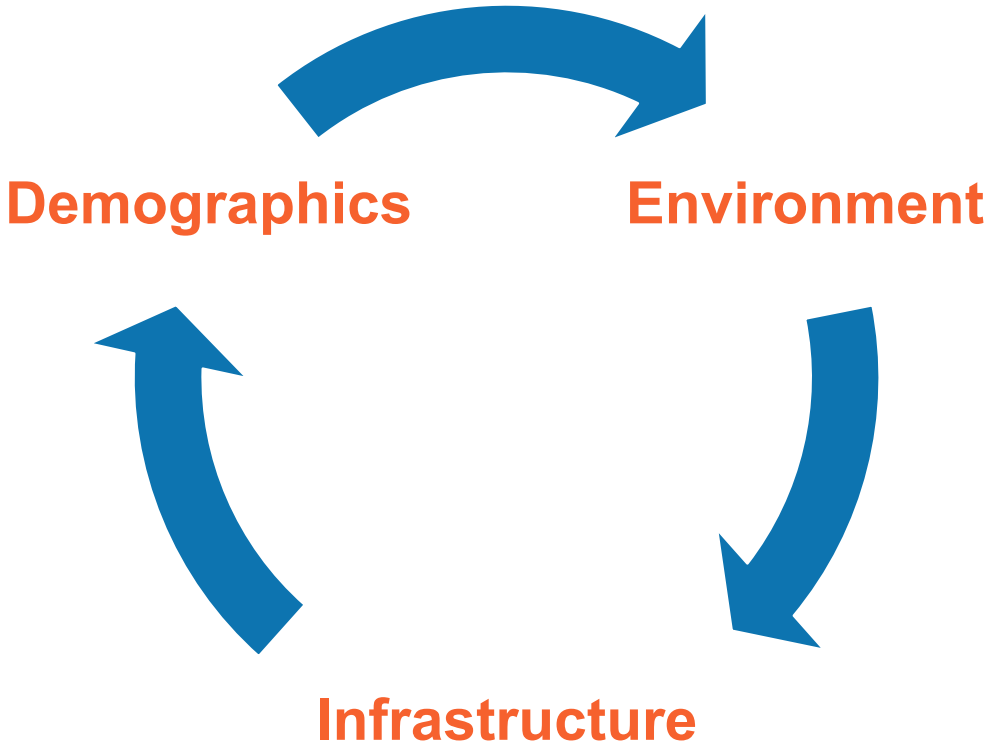
- Extend Title 5 Compliance
- Avoid DEP Sewer Connection Moratorium

CWMP PROCESS

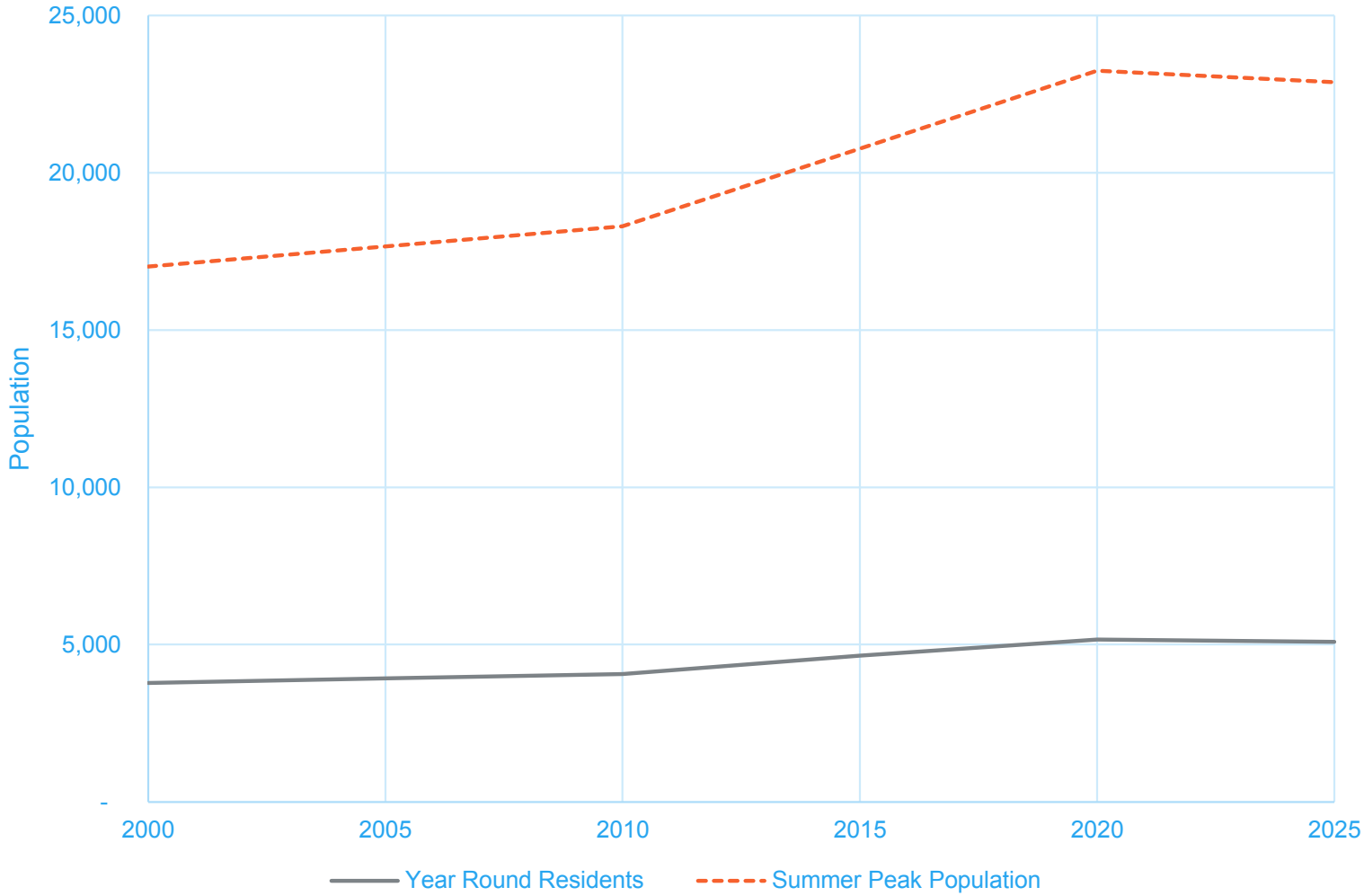
Phase 1	Existing Conditions Assessment Future Conditions Assessment Needs Analysis
Phase 2	Alternatives Analysis Recommended Plan
MEPA Review of CWMP	Public Input Regulatory Review
Watershed Permits	Sengekontacket Pond Edgartown Great Pond Establish 20-Year Plan

EXISTING CONDITIONS ASSESSMENT

- **Demographics**
  - Historic Population Growth
  - Development Patterns
- **Environment**
  - Water Quality Impacts
  - Climate Change Impacts
- **Infrastructure**
  - Capacity Assessment
  - Aging Wastewater Treatment Systems
  - Asset Management Approach

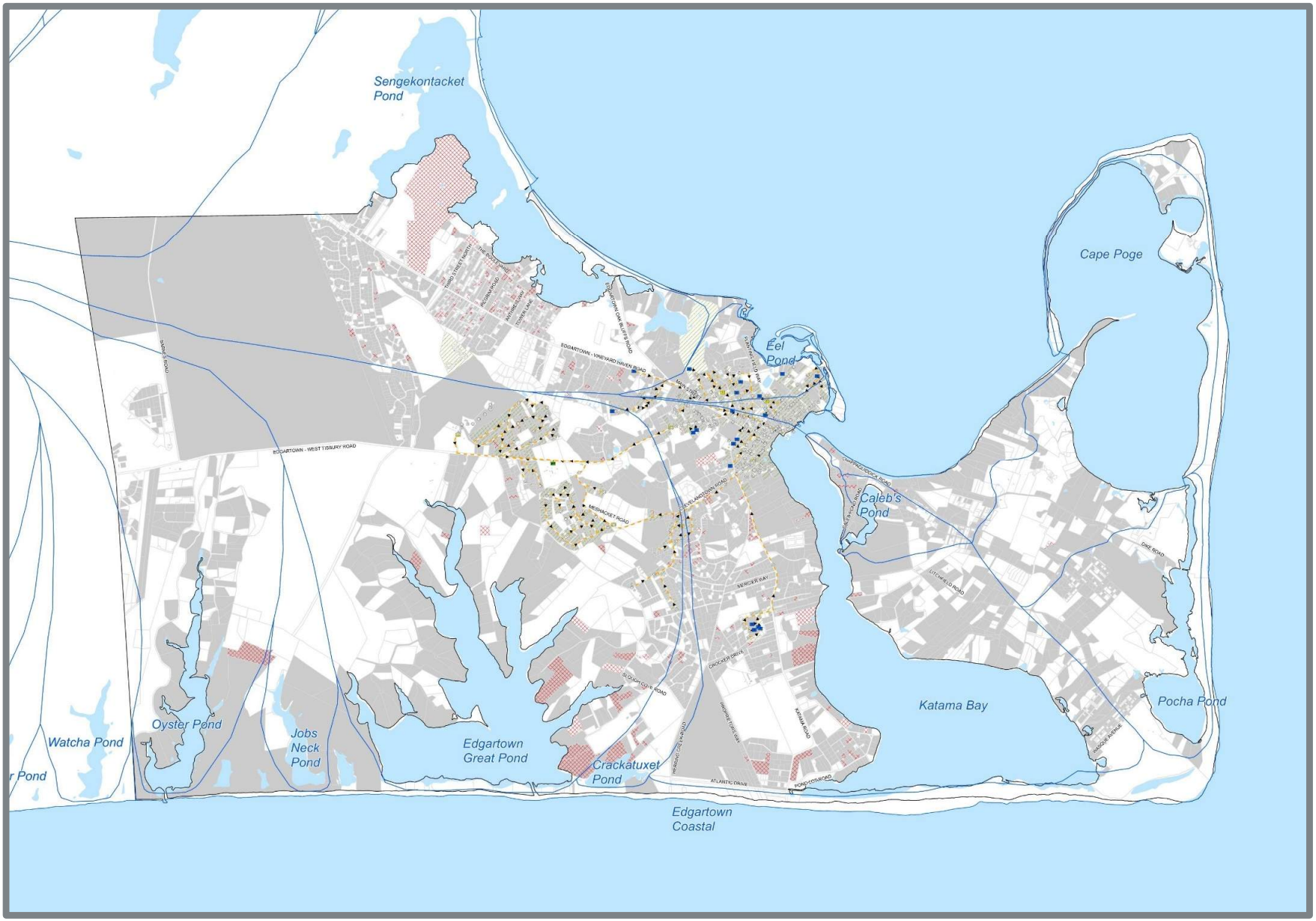


EXISTING POPULATION TREND



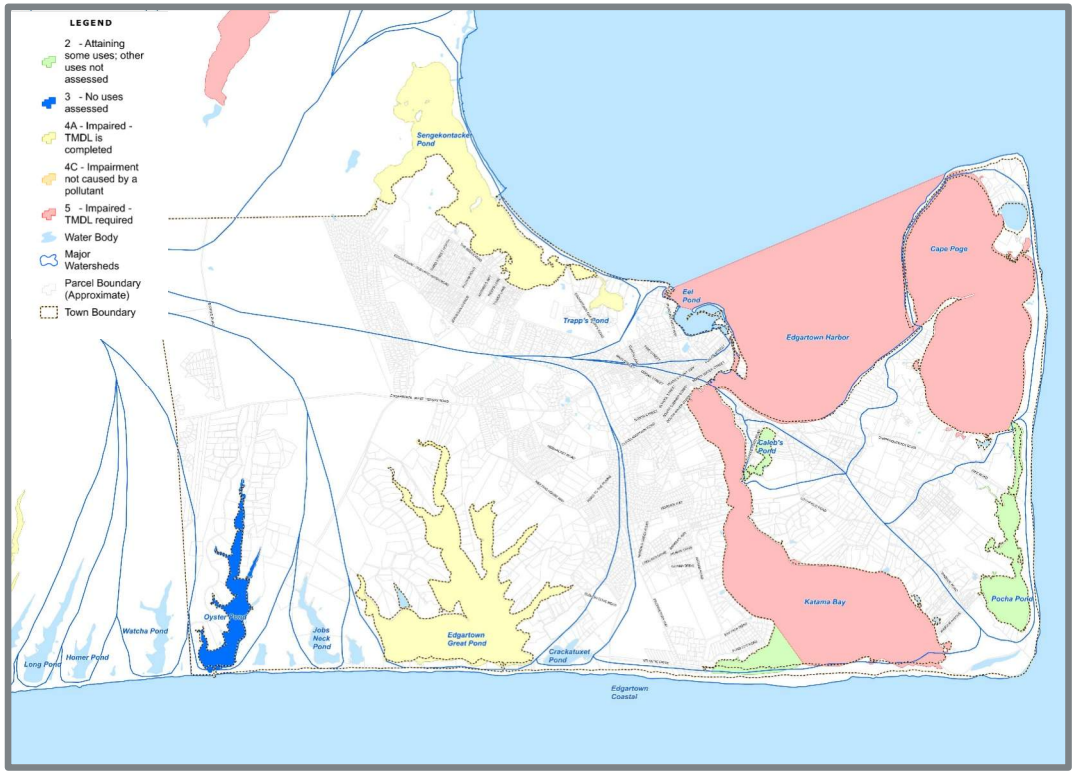
Source: Umass Donahue Institute

DEVELOPMENT PATTERNS

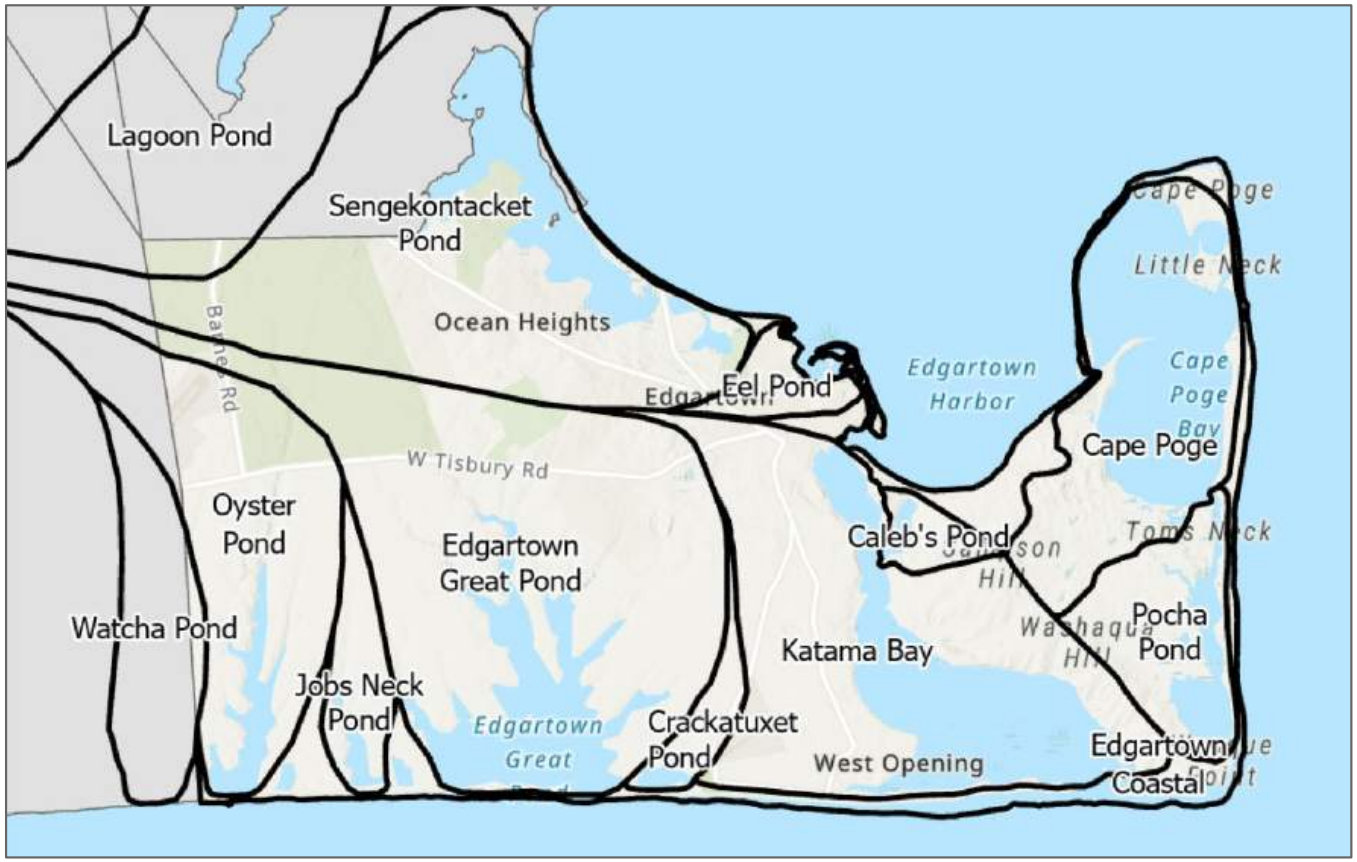


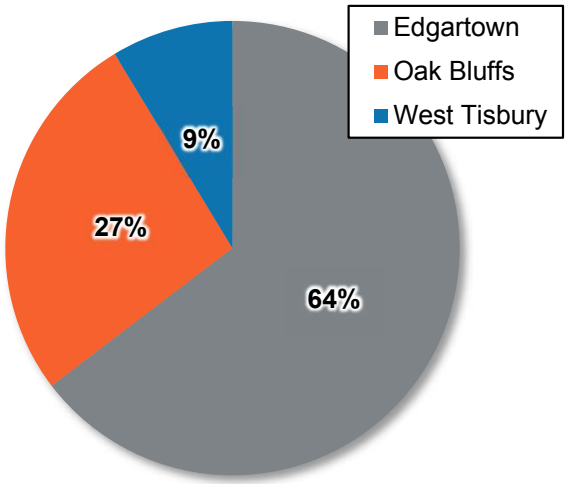
EXISTING WATER QUALITY ISSUES

- **Total Maximum Daily Loads (TMDL)**
- **Approved TMDLs**
  - Edgartown Great Pond
  - Sengekontacket Pond
  - Trapps Pond
- **TMDLs Required**
  - Edgartown Harbor
  - Katama Bay
- **Other Notable Areas**
  - Crackatuxet Pond

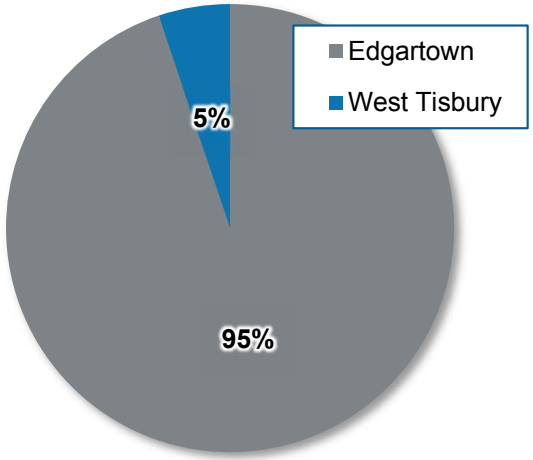


EDGARTOWN'S WATERSHEDS





Sengekontacket Watershed
Land Area Distribution



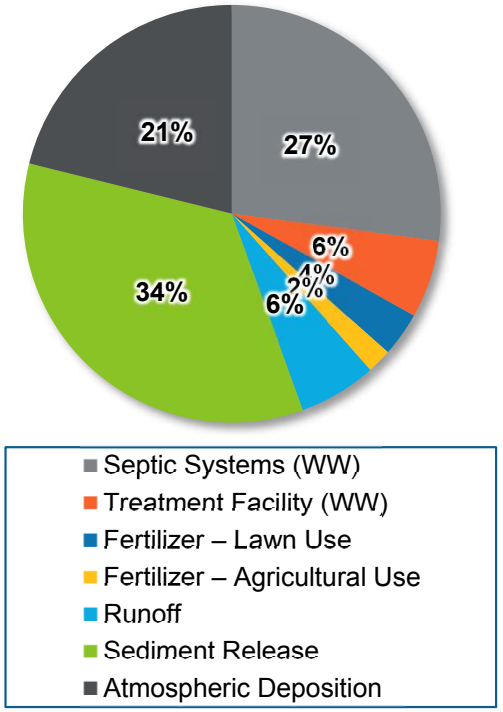
Edgartown Great Pond
Watershed Land Area Distribution

TMDL GOALS – EDGARTOWN GREAT POND

Sources of Nitrogen Loading	2007 MEP Report Projected Nitrogen Load (kg/y)	2023 Watershed Nitrogen Load (kg/y)
Septic Systems (WW)	5,536	5,167
Treatment Facility (WW)	2,404	1,378
Fertilizer – Lawn Use	659	659
Fertilizer – Agricultural Use	368	368
Runoff	1,157	1,157
Sediment Release	6,627	6,627
Atmospheric Deposition	4,068	4,068
Total Load	20,819	**19,424**
Total Maximum Daily Load	**16,812**	
Load Reduction Target	**2,612 (2,482)[2]**	

1 – All septic loadings were developed using 90% of the average water use of 258.5 gpd and a nitrogen concentration of 26.25 mg/L.
2 – Load Reduction Target adjusted for assumption that Edgartown is responsible for 95% of the total load.

Nitrogen Load Distribution by Source (2023 Estimates)

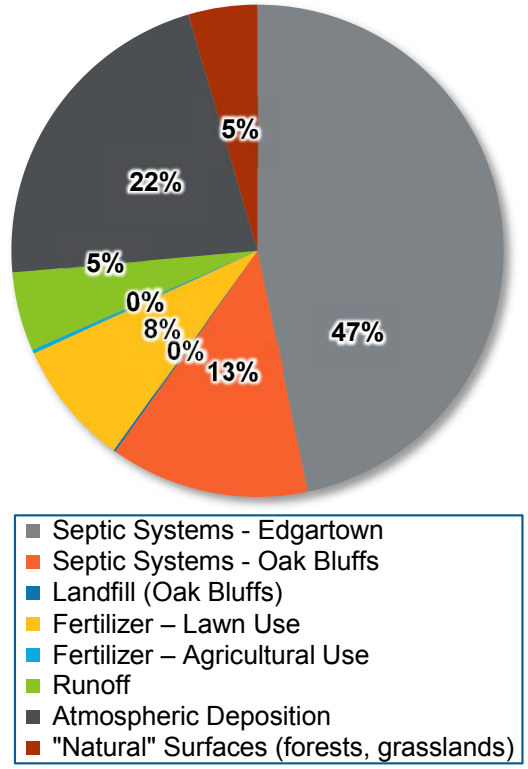


TMDL GOALS – SENGEKONTACKET POND

Sources of Nitrogen Loading	2011 MEP Report Nitrogen Load (kg/y)	2023 Watershed Nitrogen Load (kg/y)
Septic Systems - Edgartown	10,255	8,738
Septic Systems - Oak Bluffs		2,458
Landfill (Oak Bluffs)	26	26
Fertilizer – Lawn Use	1,540	1,540
Fertilizer – Agricultural Use	47	47
Runoff	972	972
Manageable Total	12,840	13,791
Atmospheric Deposition	4,110	4,110
"Natural" Surfaces (forests, grasslands)	851	851
Total Load	17,801	**18,742**
Total Maximum Daily Load	**16,757**	
Load Reduction Target	**1,985 (1,270)[3]**	

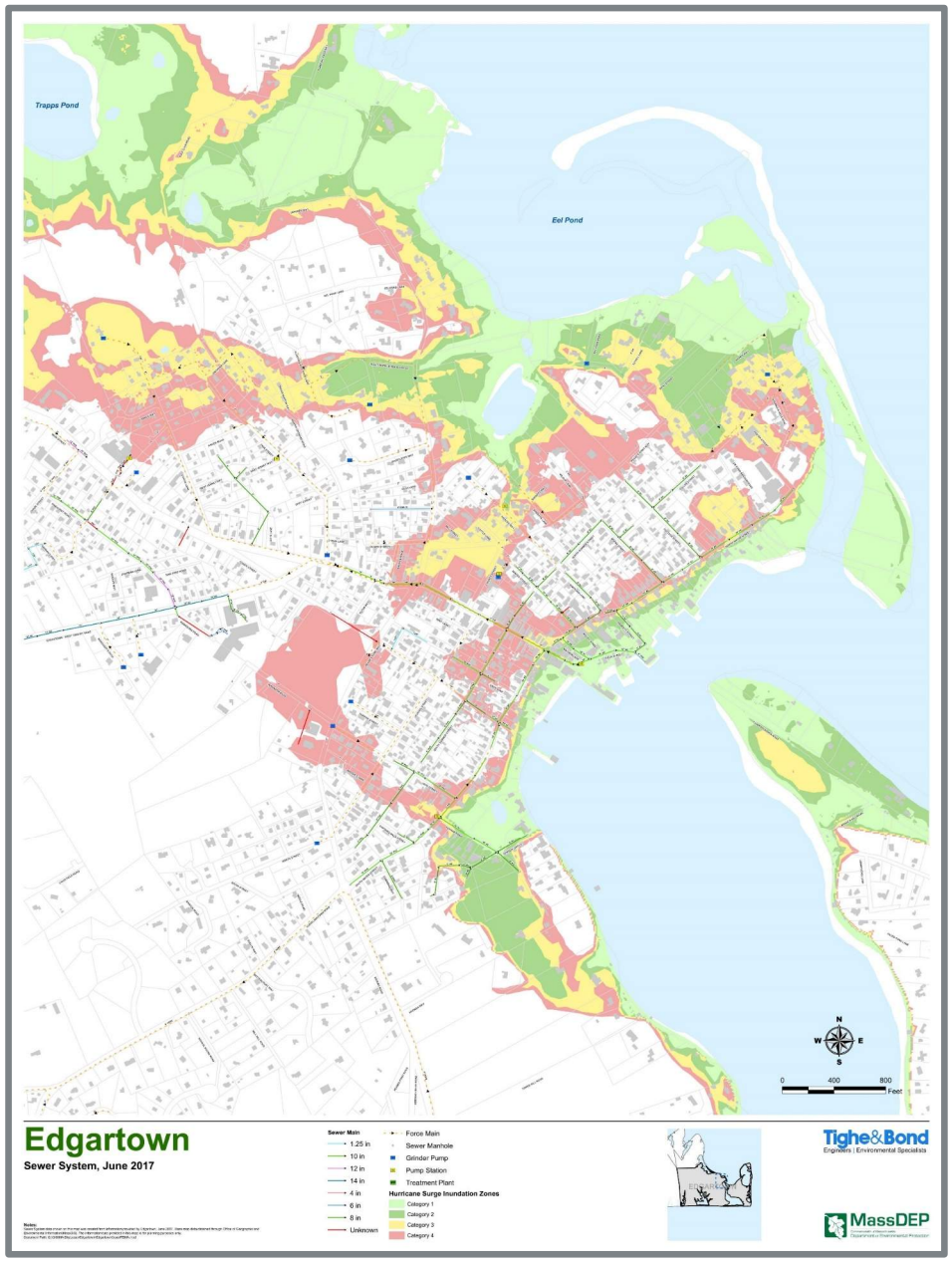
1 - Edgartown septic loadings were developed using 90% of the average water use of 258.5 gpd and a nitrogen concentration of 26.25 mg/L.
2 - Oak Bluffs septic loadings were developed using 90% of the average water use of 185 gpd and a nitrogen concentration of 26.25 mg/L.
3 - Load Reduction Target adjusted for assumption that Edgartown is responsible for 64% of the total load.

Nitrogen Load Distribution by Source (2023 Estimates)

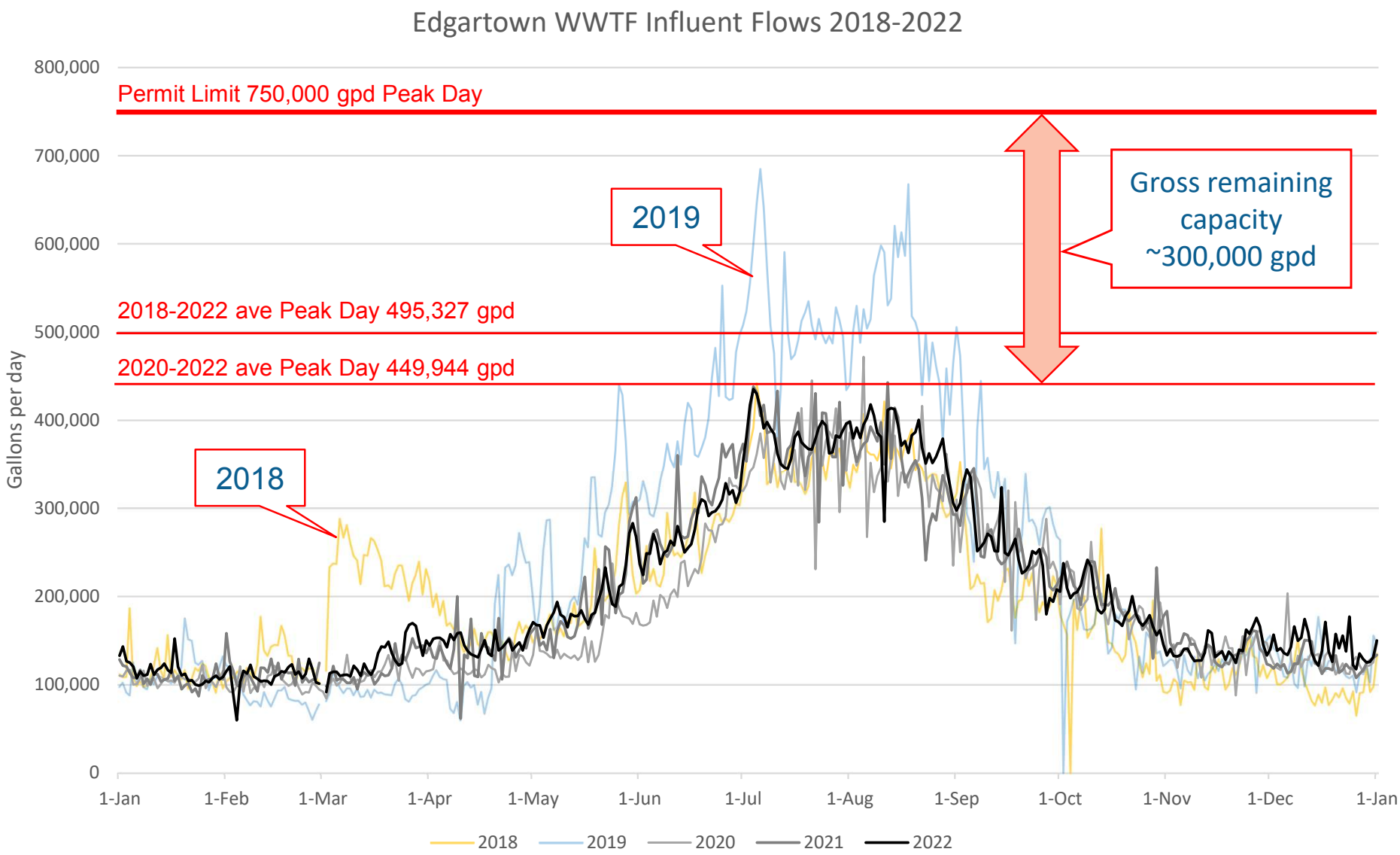


CLIMATE CHANGE & RESILIENCY

- **2050 Sea Level Rise Estimated at 1.6 to 1.8 FT +/-**
- **4 Pump Stations at Risk of Inundation**
- **Coastal Portions of Collection System at Risk**
- **WWTF Outside Inundation Zone**
- **Town Implementing Resiliency Measures**
  - Submersible Pumps
  - Backup Power
  - SCADA/Remote Control Systems



REMAINING WWTF CAPACITY



WWTF - PRELIMINARY CAPACITY ASSESSMENT

Item	Flow (GPD)	Notes
WWTF Permitted Flow	750,000	Max Day Basis
Influent Max Day Flow	449,944	Average 2020 - 2022
Remaining Capacity Subtotal:	**300,056**	
Edgartown Great Pond Reserved Capacity	69,400	Based on Mandatory Sewer Tie-In per BoH Regulation and DEP Memorandum of Understanding.
Net Remaining Capacity Total:	**230,656**	

EXISTING FACILITIES CONDITION ASSESSMENT

Risk Based Assessment

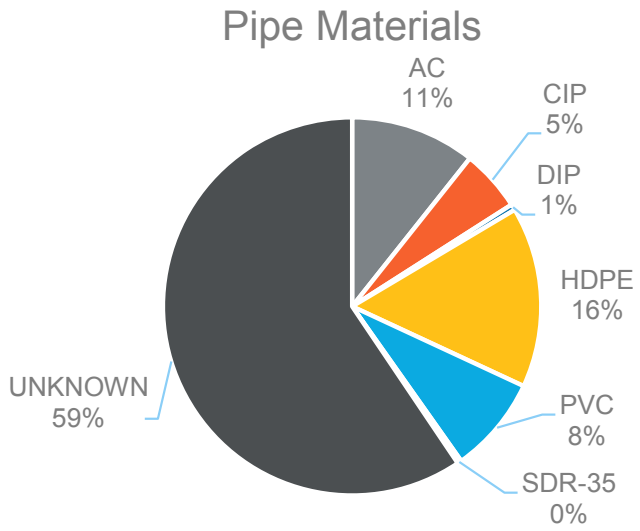
- Risk = Probability of Failure x Consequence of Failure
- Condition Assessment Based on Records Review & Field Survey
- Consequence of Failure Based on Safety, Environmental & Compliance Concerns

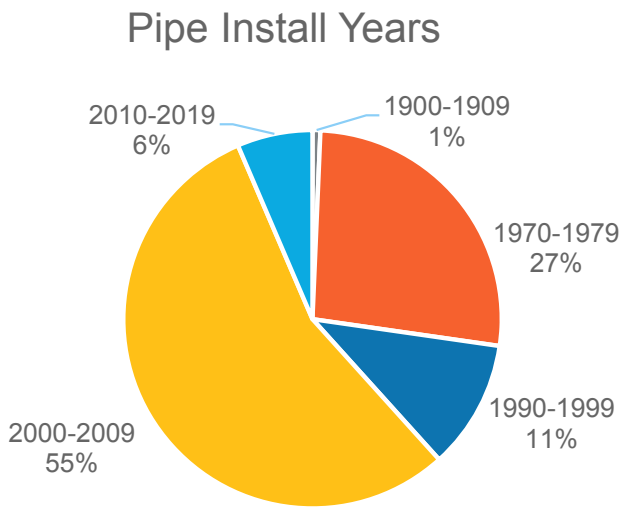
Scope of Assessment

- Collection System
- Wastewater Treatment Facility

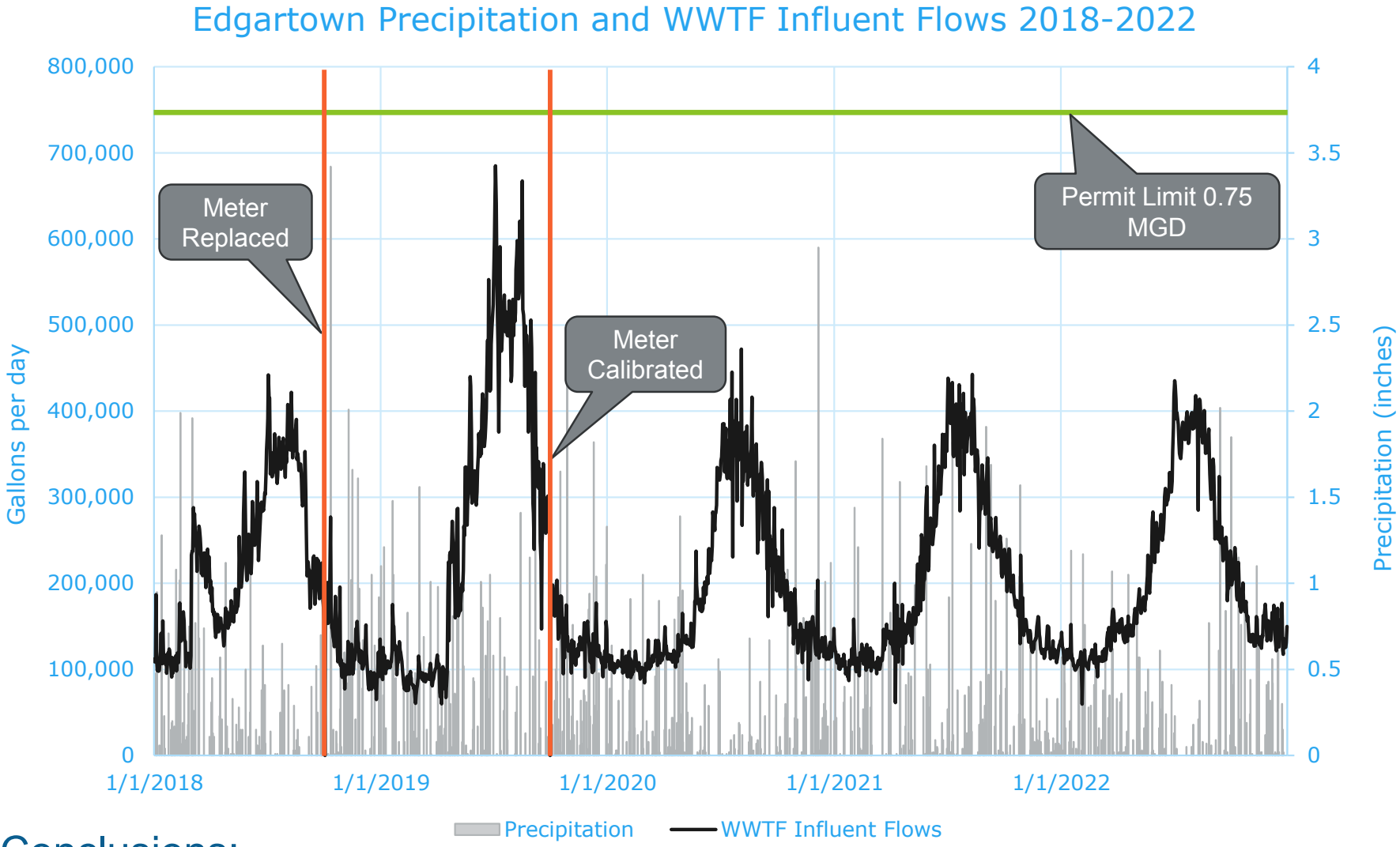
COLLECTION SYSTEM OVERVIEW

- 6.83 Miles Gravity Sewer
- 10.05 Miles Force Main
- 9.7 Miles Low Pressure Main
- 500 +/- e-One Grinder Pumps
- 8 Pump Stations





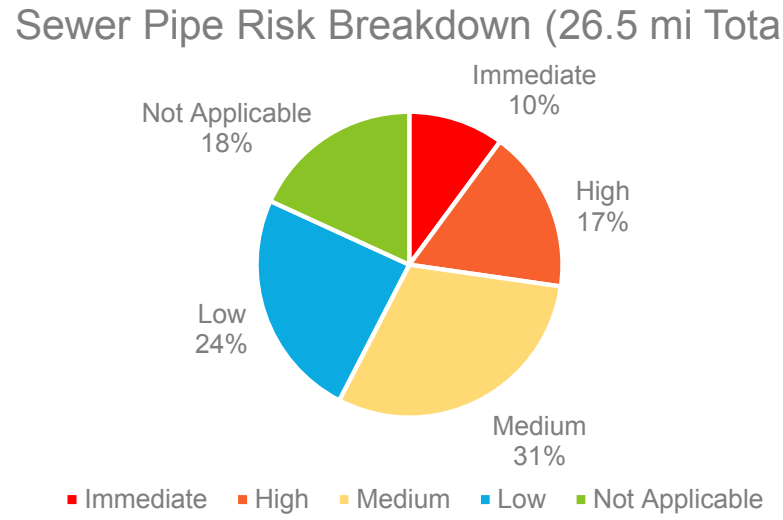
PLANT FLOW VS RAINFALL



Conclusions:

1. WWTF Flow Rates Don't Correlate Well With Rainfall
2. Infiltration & Inflow Is Not A Significant Issue
3. Coastal Areas Should Be Monitored For Tide or Storm Influence

COLLECTION SYSTEM – RISKS AND COSTS



Cost to CCTV By Risk	
Immediate	$37,000
High	$122,000
Medium	$63,000
Low	$8,000
Total	**$230,000**

Costs to Reline/Replace Immediate & High Risk Pipes		
Risk	**Cost to Reline (Worst Case)**	**Cost to Replace (Worst Case)**
Immediate	$1,190,000	$3,010,000
High	$5,490,000	$14,880,000

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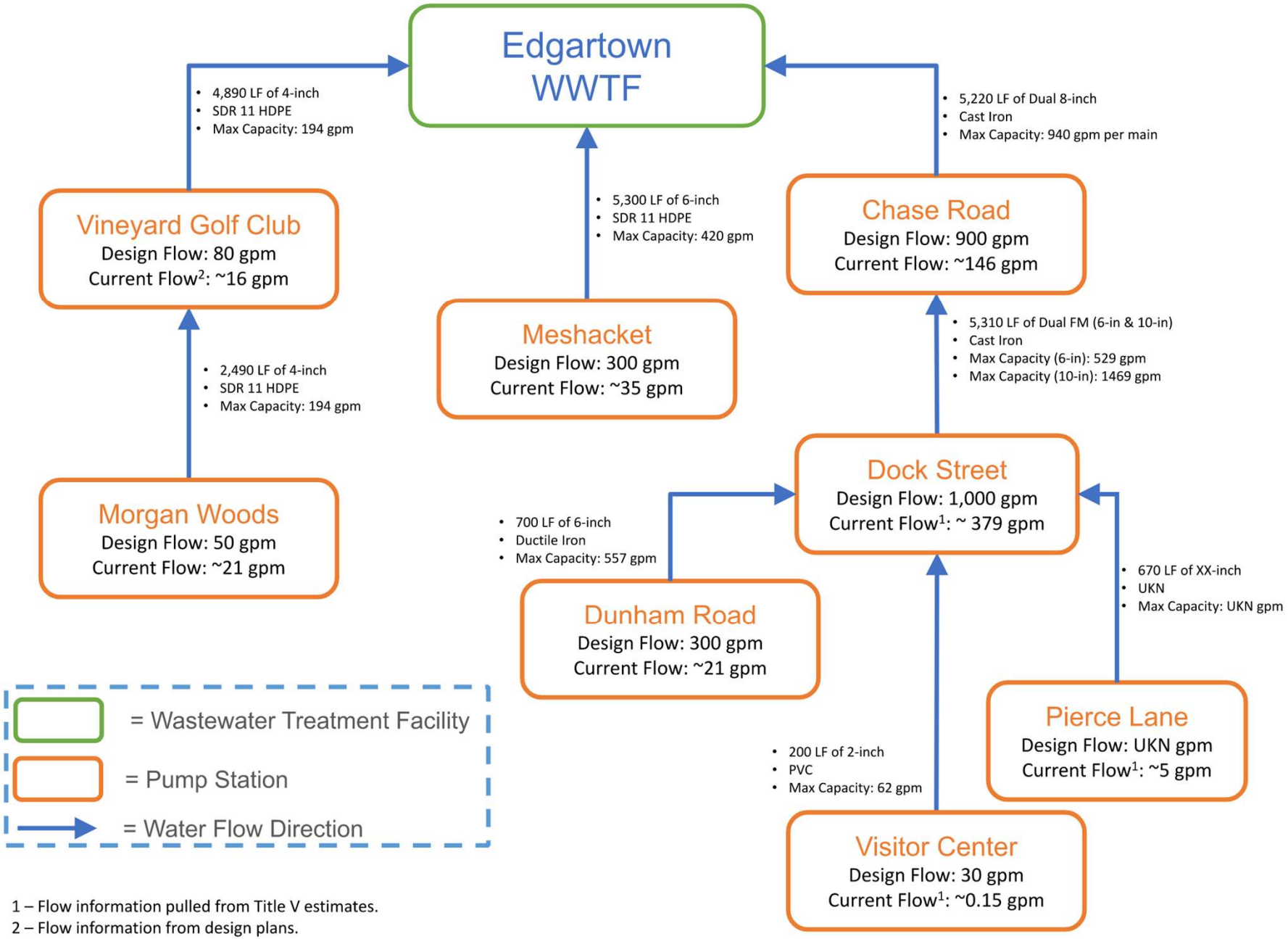
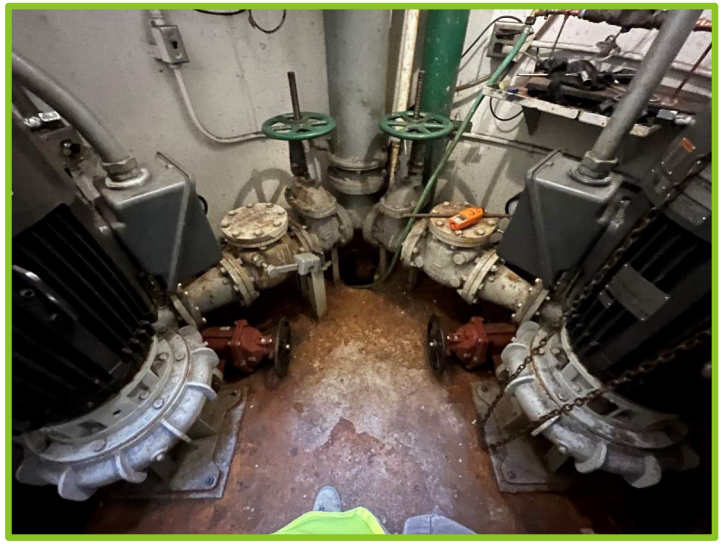
COLLECTION SYSTEM - PUMP STATIONS



1 – Flow information pulled from Title V estimates.
2 – Flow information from design plans.

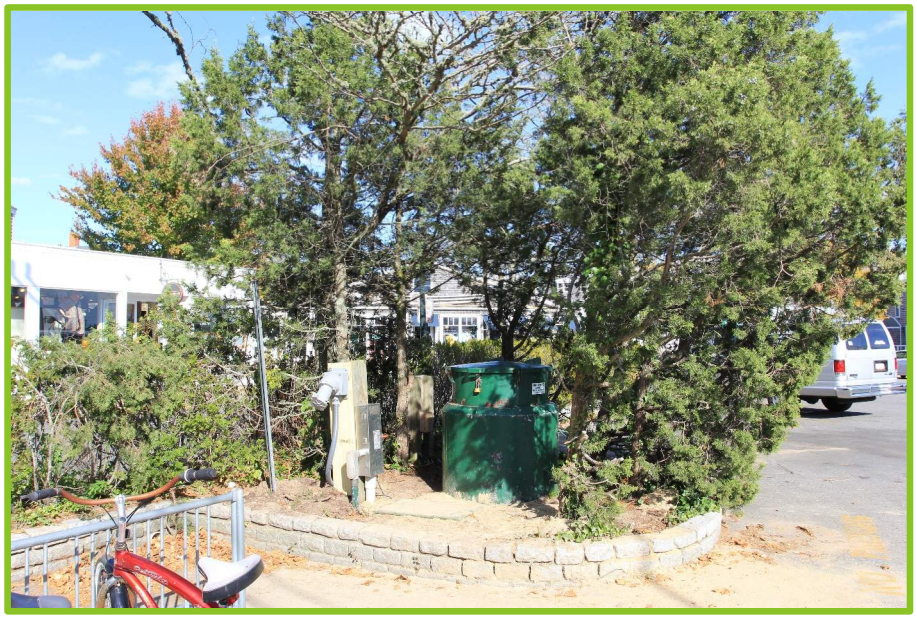
CHASE ROAD PUMP STATION

- **Station Feeds WWTF & Handles 90% of Influent**
- **Recent Upgrade to Pumps, Controls & SCADA (2021)**
- **Immediate Action: Replace 2 Gates & 2 Check Valves**
- **Major Upgrade Anticipated With System Expansion**
  - Difficult Dry Well Access
  - Small Wet Well Limits Capacity
  - Discharge Mains Have History of Breaks



DOCK STREET PUMP STATION

- Second Largest Pump Station Handling Commercial District
- Recent Upgrade to Pumps, Controls, SCADA & Resiliency
- Station Within Flood Zone
- Immediate Action: Install 2 Gates

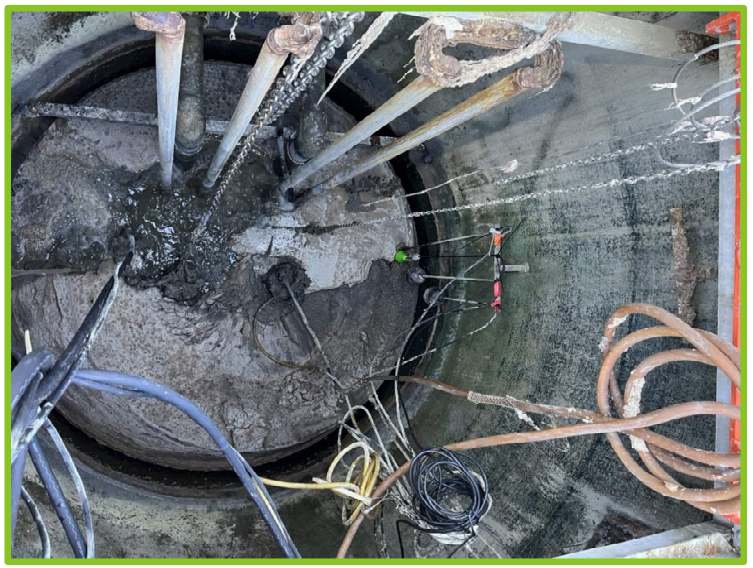


DUNHAM ROAD PUMP STATION

- Small Service Area
- Recent Upgrade to Pumps, Controls, SCADA & Resiliency (2021)
- Station Within Flood Zone
- Immediate Action: Repair Basement Level Structural Leak
- Moderate Risk: Repair Drywell Joints & Replace Hatch

MESCHACKET PUMP STATION

- Moderate Service Area
- Recent Upgrade to SCADA
- Excessive Scum & FOG Issues
- Immediate Actions: Replace Pump Rail Mounts & Level Control System, Improve Wet Well Mixing System



CHURCH STREET & PIERCE LANE PUMP STATIONS

Church Street PS

- Small Service Area
- Station Within Flood Zone
- Recent SCADA Upgrade
- Immediate Action: Upgrade Level Controls
- High Risk: Structural Repairs to Fix Wet Well & Slope to Pumps

Pierce Lane PS

- Small Service Area
- Station Within Flood Zone
  - Controls Susceptible to Inundation
- Medium Risk: Replace With Duplex E-One Station, Backup Power Connection & Transfer Switch

VINEYARD GOLF & MORGAN WOODS PUMP STATIONS

Vineyard Golf PS

- Flow From Morgan Woods
- Recent SCADA Upgrade
- Immediate: Upgrade with Ultrasonic Level Controls
- High Risk: Provide Local Electrical Feed, Controls and Backup Power

Morgan Woods PS

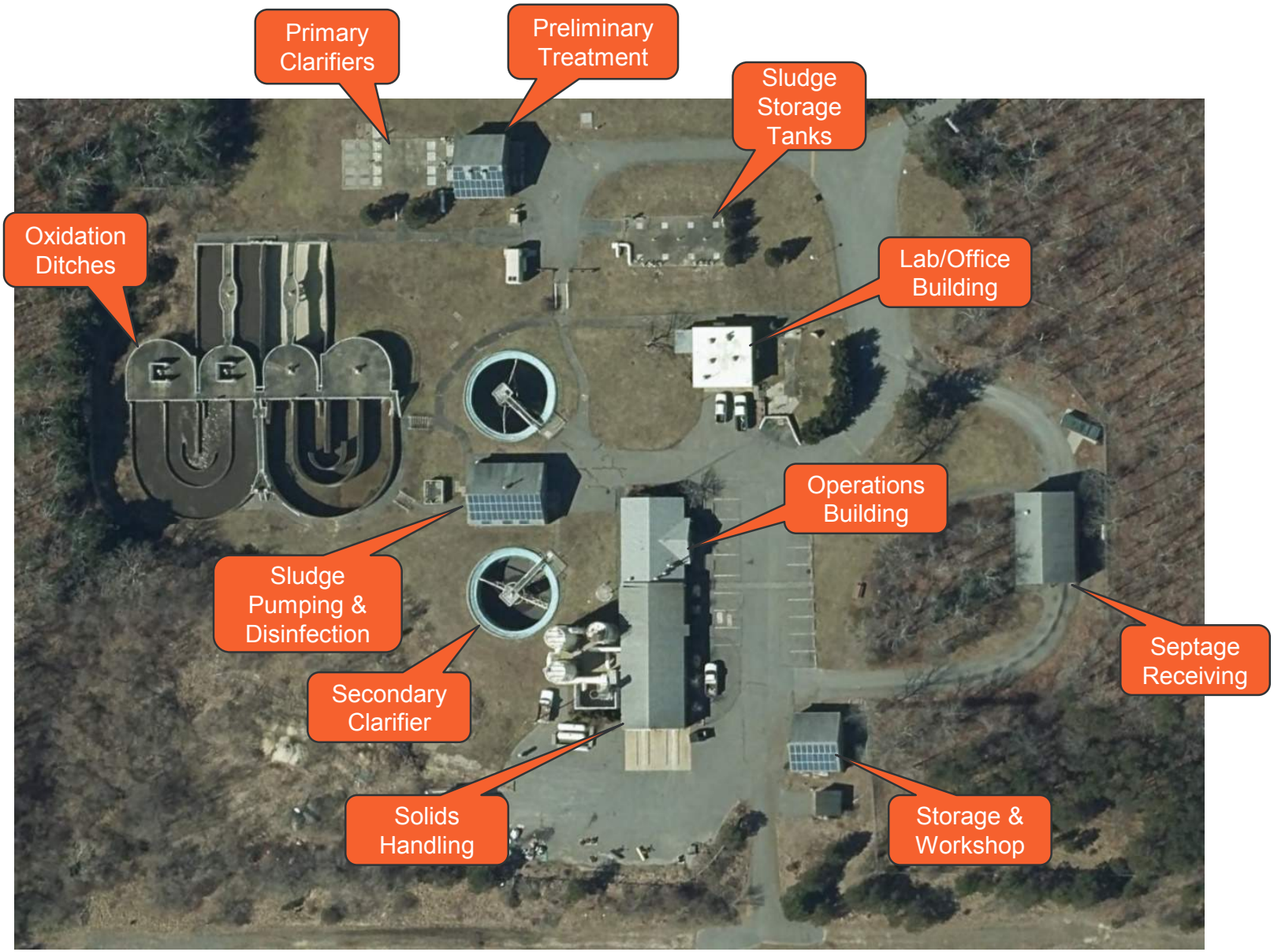
- Moderate Service Area
- Recent Flow Meter and SCADA Upgrade
- Immediate: Upgrade with Ultrasonic Level Controls

PUMP STATION COST SUMMARY

Pump Station	Immediate Risk Cost	High Risk Cost	Near Term Issues
Dunham Rd	$32,000	-	Within Flood Zone, Structural Leak
Chase Rd	$55,000	-	Aged Gate & Check Valves, Poor Access, Small Wet Well, FM Breaks
Dock St	$30,000	-	Within Flood Zone, Aged Gate Valves
Church St	$23,000	$36,000	Redundant Level Controls, Wet Well Improvements
Meschacket	$23,000	-	Pump Mounts Failing, Redundant Level Control & Improved Mixing Needed
Pierce Lane	-	-	Within Flood Zone
Vineyard Golf	$23,000	$211,000	Redundant Level Controls, Local Pump Controls & Backup Power
Morgan Woods	$23,000	-	Redundant Level Controls
TOTAL	**$209,000**	**$247,000**	

**Costs do not include upgrades for future capacity expansion required by CWMP*

WWTF OVERVIEW



PRELIMINARY TREATMENT BUILDING

- Provides Influent Screening, Scum Pumping, Primary Sludge Pumping
- New Screen, Scum Pump & Sludge Pumps (2018 – 2023)
- Immediate Actions: Replace Influent Stop Gates & Influent Sampler
- High Risk: Replace Influent Slide Gates & Plant Water Piping, Repair Leaky Electrical Conduits/Boxes, Replace Headworks Exhaust Fan, Unit Heater & Ductwork, Repair Concrete Floors & Channel

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PRIMARY CLARIFIERS

- Provides Primary Scum & Solids Separation
- All Equipment Original To 1994 Upgrade
- High Risk: Replace Clarifier Mechanisms & Drives; Provide Scum Mixer; Replace Hatches; Repair Degraded Concrete

CAROUSEL AERATION BASINS

- Provides Nitrogen, BOD, and Solids Removal
- Instrumentation Upgraded (2022)
- All Mechanical Equipment Original To 1994 Upgrade
- Immediate Action: Repair Concrete in Tanks
- Medium Risk: Anoxic Mixers, Influent Gates, Surface Aerators, Effluent Weirs, Plant Water Spray System, DenitIR System

SECONDARY CLARIFIERS

- Provides Separation of Activated Sludge from Treated Wastewater
- Drives Replaced 2014; Remaining Equipment From 1994 Upgrade
- Immediate Action: Replace Failed Clarifier Distribution Box Gates
- Medium Risk: Replace Collectors, Blades, Baffles, and Launder Covers. Paint Drives

POST TREATMENT BUILDING

- Houses WAS and RAS Pumps, UV Disinfection, Chemical Feed and Plant Water Systems
- WAS Pump Replaced 2023; UV System Replaced 2018; Remaining Equipment From 1994 Upgrade
- Immediate Action: Replace Effluent Sampler, Plant Water System, Calibrate Flow Meter
- High Risk: Replace Secondary Scum Pump and Chemical Feed Systems
- Medium Risk: Replace RAS Pumps, Odor Control Air Compressors, UV Ballasts & Lamps

SEPTAGE RECEIVING BUILDING

- Septage Discharge Location and Grit Removal
- Grit screw shaft replaced 2023; Remaining Equipment From 2002
- Immediate Action: Repair Grit Screw Screen, Replace Magnetic Flow Meter
- Medium Risk: Odor Control, Air Compressor

SLUDGE HOLDING TANKS

- Primary & Waste Activated Sludge Storage and Aeration
- Instrumentation Upgraded 2022; Remaining Equipment From 1994
- High Risk: Replace Slide Gates, Sluice Gate Operators, Sludge Blowers

LAB / WORKSHOP BUILDING

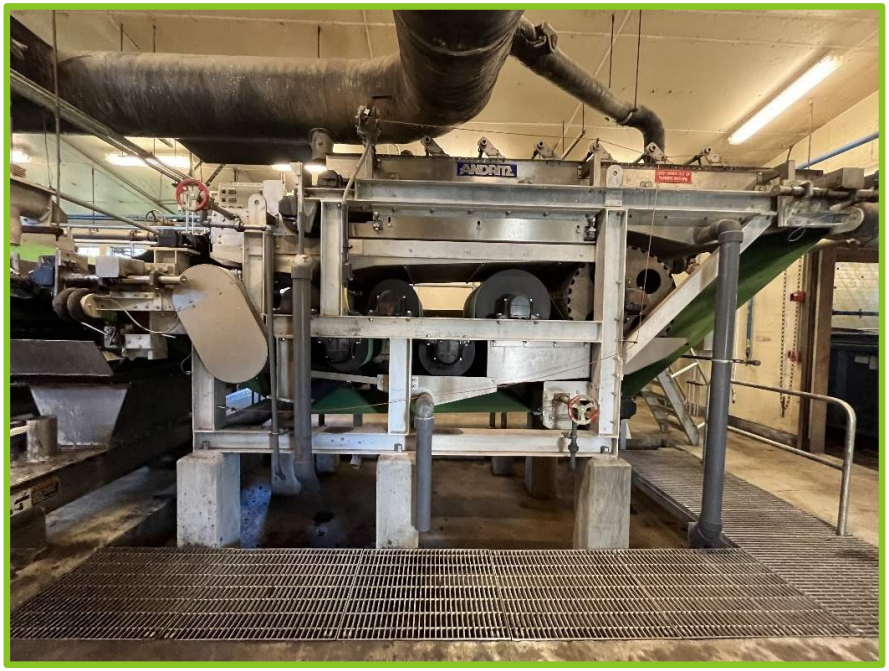
- Houses Sludge Dewatering Feed Pumps, Grinders, Sludge Storage Tank Blowers, Laboratory, Offices
- SCADA Upgrades 2022; Mechanical Equipment From 1994
- Immediate Action: Repair Exterior Cracking, Replace Aeration Timers
- High Risk: Sludge Holding Tank Blowers

OPERATIONS BUILDING – ADMIN SIDE

- Houses SCADA System, Offices, Break and Locker Rooms
- SCADA System Upgraded 2022; Remaining Systems From 1994 Upgrade
- Immediate: Replace HVAC System, Roof Shingles, Doorways; Repair Ceiling and Trusses; Mold Remediation

OPERATIONS BUILDING – SOLIDS HANDLING

- Provides Sludge Dewatering and Disposal
- Dewatering System Upgrade Design Underway; Sludge Cake Pump Repaired (2023), Equipment From 1994
- Immediate: Replace BFP With Screw Press, Upgrade Polymer System, Eye Wash, Repair Exhaust Fans



RAPID INFILTRATION BASINS

- Discharge Location of Treated Effluent
- Rehabilitated in 2022
- Monitor and Maintain: Alternate Basins, Rake and Remove Vegetation

SITEWIDE ASSETS

Emergency Generator:

- Provides Backup Power
- 1994 Upgrade Project
- Medium Risk

Odor Control System:

- Treats Odorous Air From Headworks, Primary Clarifiers, Dewatering Sludge Holding and Septage Tanks
- 1994 Upgrade Project
- Medium Risk

PROJECT PENDING CWMP RECOMMENDATIONS

Potential / Anticipated Needs

- Upgrade RAS Pumps
- Aeration Carrousels - Replace Mixers, Gates, Aerators, Weirs, and Denite IR System
- Additional Secondary Clarifier
- Additional Tankage

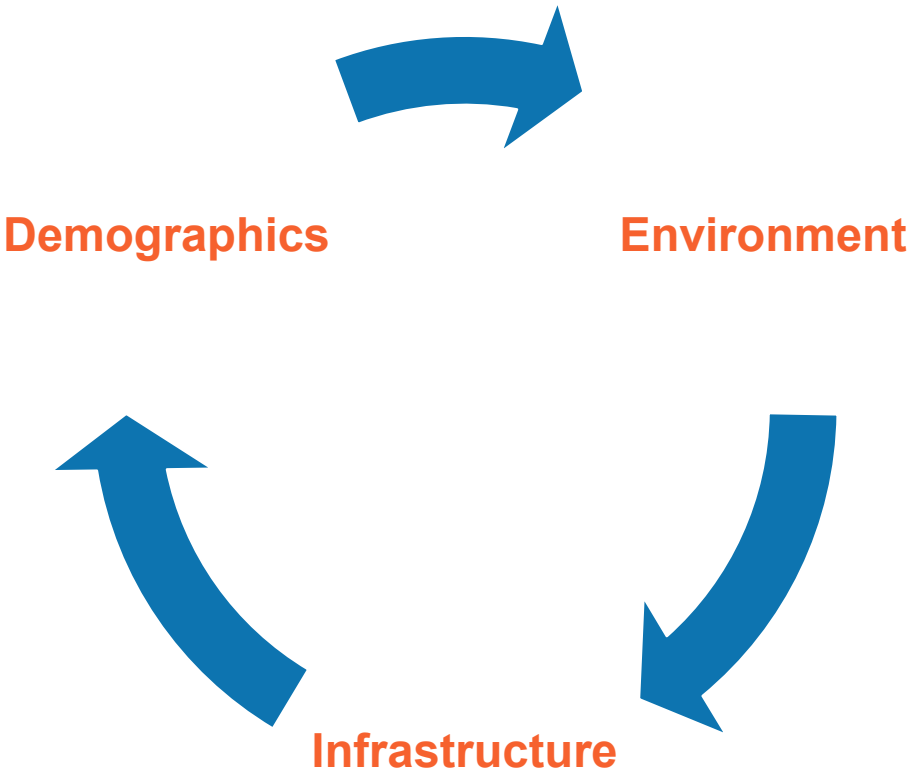
WWTF COST SUMMARY

WWTF Site / Process	Immediate Risk Cost	High Risk Cost
Preliminary Treatment Building	$57,000	$705,000
Primary Clarifiers	-	$1,373,000
Septage Receiving	$80,000	-
Post Treatment Building	$950,000	$1,273,000
Carousel Aeration Basins	$21,000	-
Secondary Clarifiers	$69,000	-
Sludge Holding Tanks	-	$1,312,000
Laboratory Building	$25,000	-
Operations Building - Admin	$796,000	-
Solids Handling	$1,800,000	-
TOTAL	**$3,798,000**	**$4,663,000**

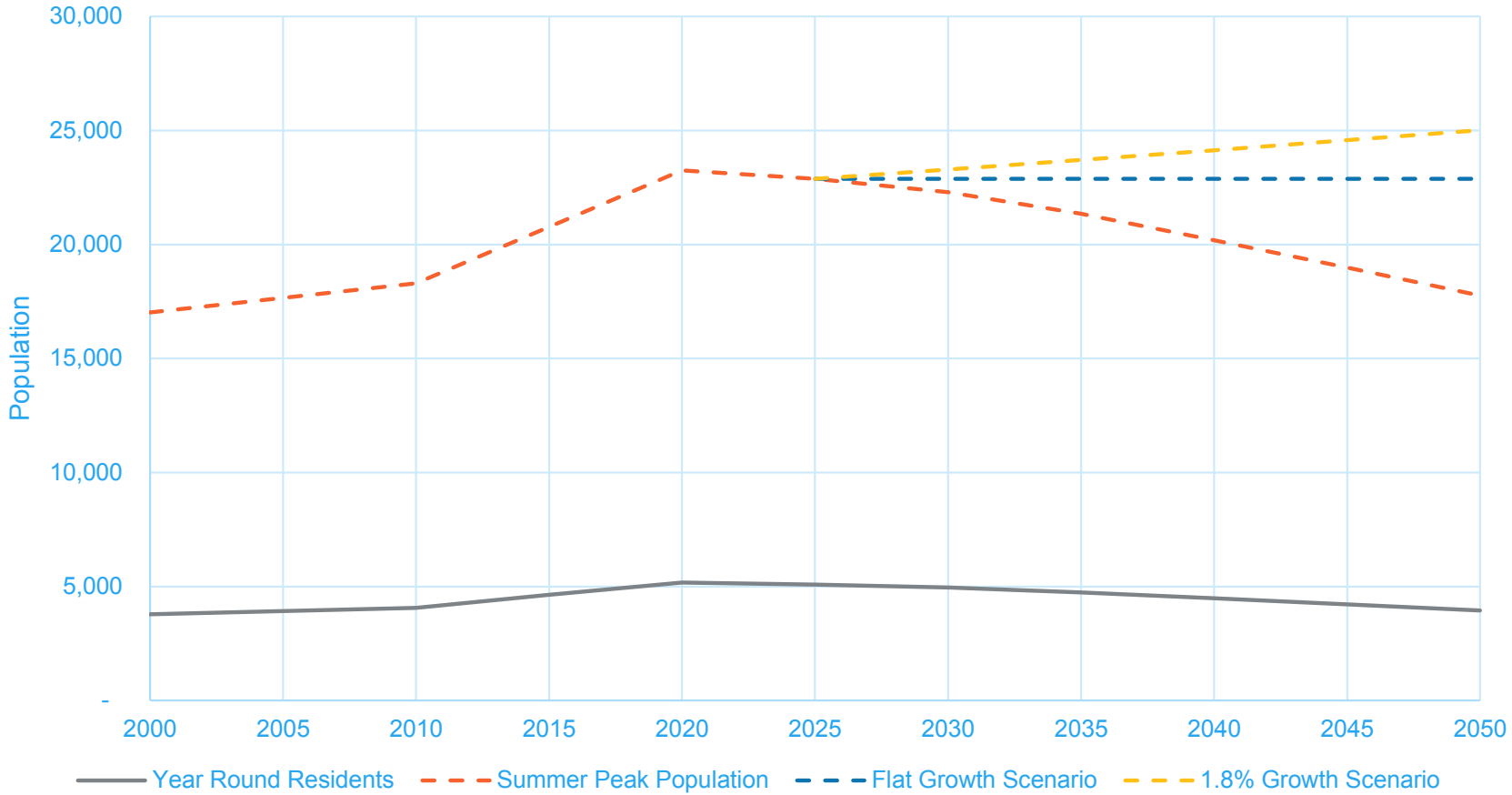
**Costs do not include upgrades for future capacity or expansion required by CWMP*

FUTURE CONDITIONS ASSESSMENT

- **Demographics**
  - Projected Population Growth
  - Development Patterns
- **Environment**
  - Water Quality Impacts
- **Infrastructure**
  - Capacity Assessment



POPULATION PROJECTIONS



Source: Umass Donahue Institute

Notable Trends:

1. Aging population of baby boomers contributes to drop-off in year round population after 2020.
2. Internet and COVID driven remote work options have converted many homes from seasonal to year-round.
3. Continued new home starts drive summer occupancy increases.

FUTURE CONDITIONS – FLOWS AND LOADS

Base Condition

- Flows: Average Day Flows Using Title 5, Scaled With Observed WWTF Flows
- Nitrogen Loads: MEP Method

20-year Buildout

- Changing Age Demographics
- Considers Master Plan Developments
- Considers Historic New Home Permits
- Considers Trends Towards Remote Work/Owner Occupancy
- Assumes All New Development In Existing Service Area Connected to Sewer
- Assumes All New Development Outside Existing Service Area Connected to Septic System
- Infiltration & Inflow Allowance Based on TR-16
- Commercial/Industrial/Redevelopment Allowance

FUTURE FLOW & LOAD PROJECTIONS

Watershed	20-Year Flow (GPD)		20-Year Nitrogen Load (kg/yr)	
	Septic	Sewer	Septic	Sewer
Caleb Pond	8,000	0	300	0
Cape Poge	9,000	0	300	0
Crackatuxet Pond	10,000	0	400	0
Edgartown Harbor Chappy	9,000	0	400	0
Edgartown Harbor Main Island	2,000	33,000	100	1,200
Eel Pond	13,000	23,000	500	900
Edgartown Great Pond North	57,000	26,000	2,000	2,000
Edgartown Great Pond South	23,000	36,000	800	0
Job's Neck Pond	1,000	0	50	0
Katama Bay Chappy	17,000	0	600	0
Katama Bay North	63,000	112,000	2,000	4,000
Katama Bay South	44,000	1,000	2,000	50
Oyster Pond	21,000	0	800	0
Pocha Pond	13,000	0	500	0
Sengekontacket Pond East	58,000	9,000	2,000	300
Sengekontacket Pond North	23,000	0	800	0
Sengekontacket Pond West	17,000	0	600	0
Trapps Pond	6,000	2,000	200	100
Total	**394,000**	**206,000**	**14,350**	**8,550**

[1] Sewer flows reflect currently connected parcels and those abutting sewer in the street. They do not include new connections or sewer extensions.
2. Load estimates based on septic effluent TN of 26.3 mg/L (per MEP study) and WWTF effluent TN of 7.0 mg/L.

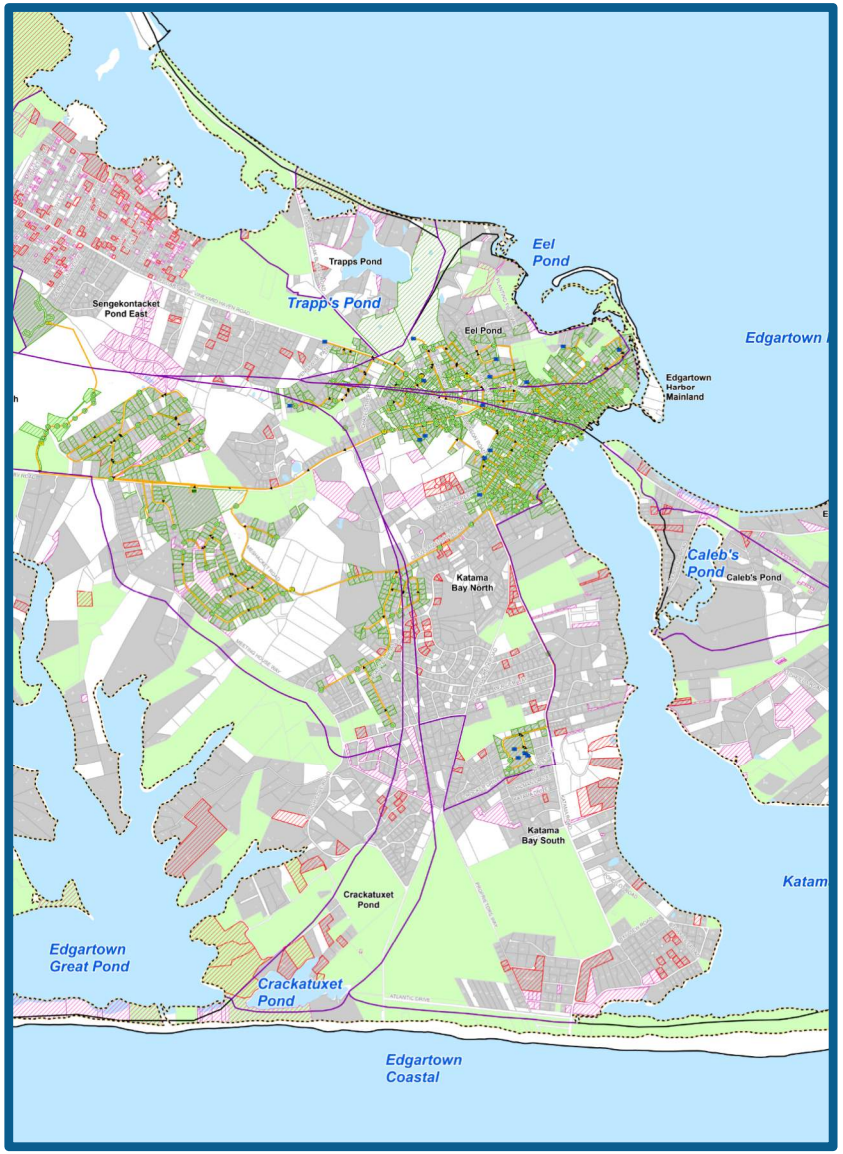
NEEDS ANALYSIS PROCESS

Define Study Areas

- Watershed Based
- Subdivide Watersheds Spanning Water Bodies
- Subdivide Watersheds Based on Development Density/Zoning
- Senge 4 areas, EGP North/South, Katama North/South

Evaluation Criteria

- Lot size
- Soil Drainage Class
- Proximity to Environmental Resources
  - Zone II, TMDL
- Septic Performance, Water Table



STUDY AREA OVERVIEW

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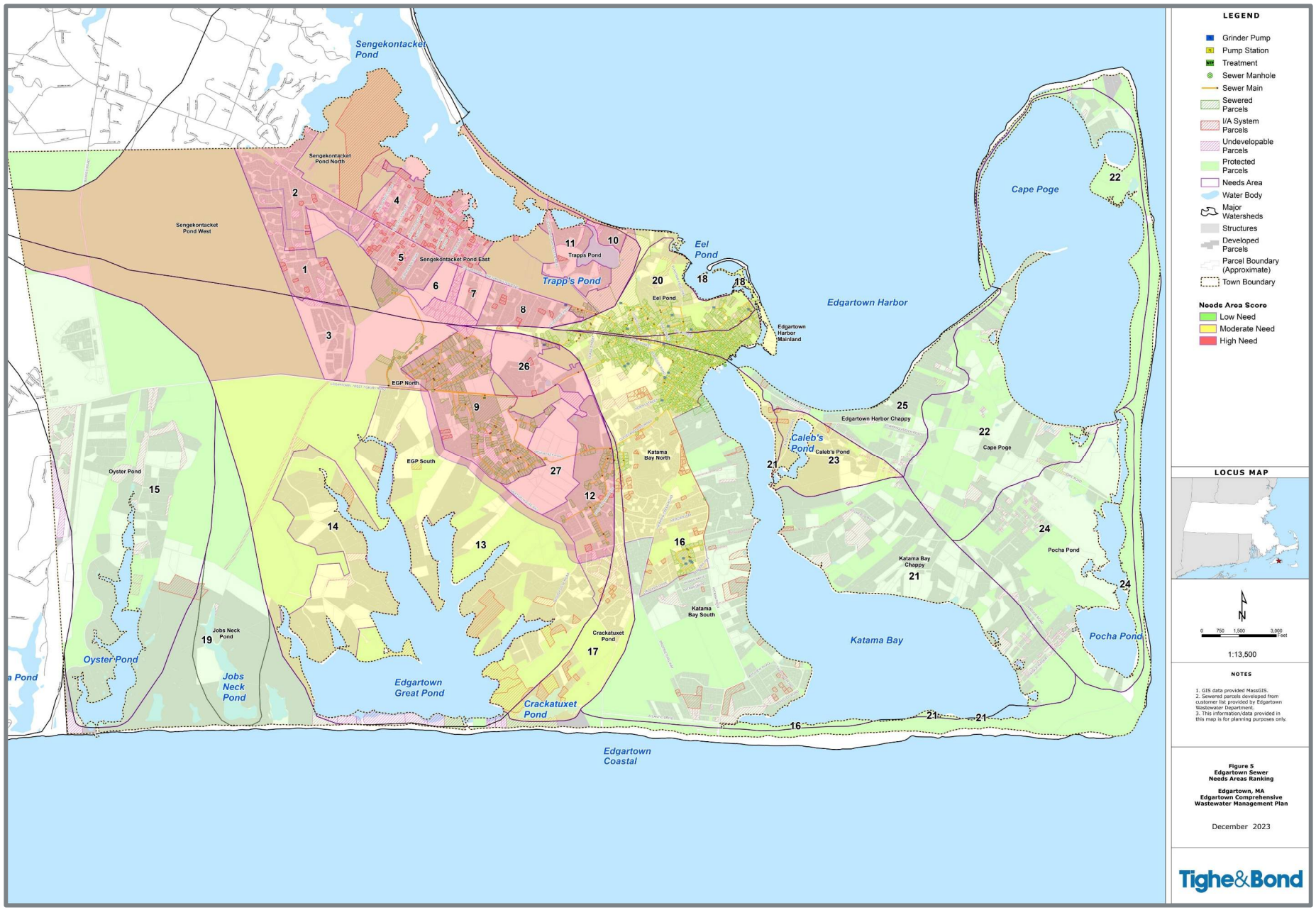
NEEDS ANALYSIS RESULTS



HIGH NEEDS AREAS & THE TMDL

Edgartown Great Pond

- TMDL 16,812 kg/yr
- Edgartown Load Reduction Target 2,482 kg/yr
- Estimated Future Septic Load 2,800 kg/yr
- Moving All Septic Systems to WWTF Reduces Load by 2,055 kg/yr
  - This Increases the WWTF Load by 745 kg/yr

Conclusions

- Connecting All EGP Septic Systems to WWTF Won't Meet TMDL
- Connecting All EGP Septic Systems Is Impractical

Sengekontacket Pond

- TMDL 16,745 kg/yr
- Edgartown Load Reduction Target 1,270 kg/yr
- Estimated Future Septic Load 3,400 kg/yr
- Moving All Septic Systems to WWTF Reduces Load by 2,496 kg/yr
  - This Assumes WWTF Effluent Returned to Senge

Conclusions

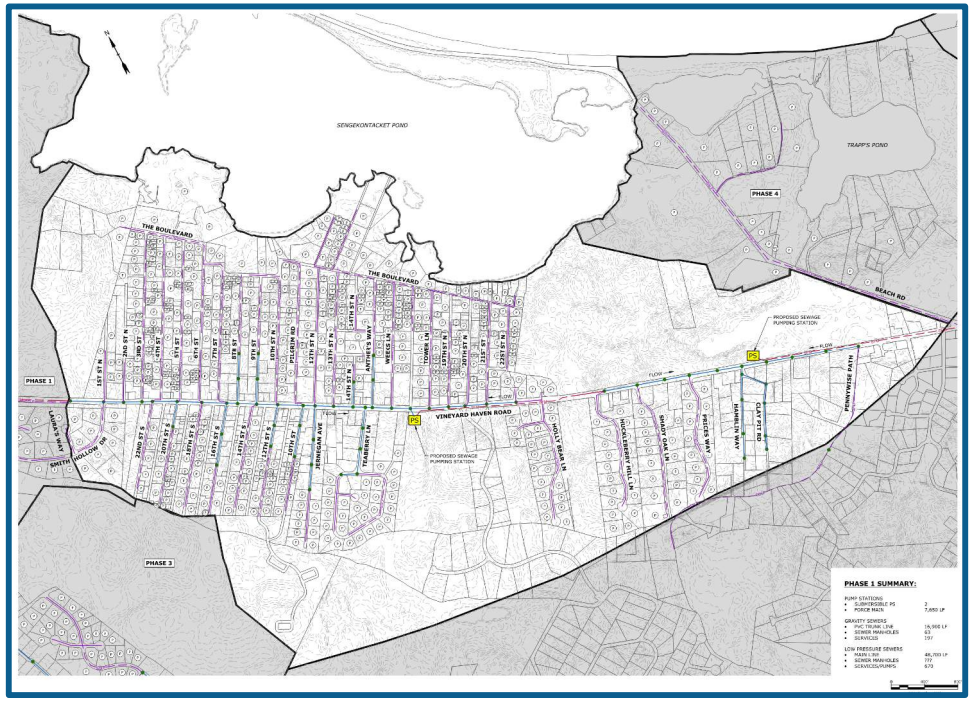
- Connecting Only Senge East (Ocean Heights) to WWTF Reduces Load by 1,468 kg/yr & Exceeds Reduction Target

ONGOING WORK – ALTERNATIVES ANALYSIS

- **Alternatives Under Consideration**
  - Evaluate Centralized Treatment Options
  - Determine Conceptual Sewer Layouts & Costs
  - Identify Opportunities for I/A or Decentralized Systems
  - Identify Opportunities for Non-Traditional Nutrient Mitigation
  - Locate Potential Discharge Areas in Sengekontacket Watershed
  - Determine Costs and Funding Opportunities
- **Develop Recommended Plan**
- **Define Monitoring Plan & Adaptive Management Strategy**
- **Initiate MEPA ENF Review Process**
  - MEPA Likely to Scope Additional Work in an Environmental Impact Report (EIR)

FUTURE WORK FOLLOWING MEPA REVIEW

- **Managed Growth Zoning Provisions**
- **Collection System Preliminary Design**
  - EGP, Senge & Katama Bay
- **Sengekontacket Groundwater Discharge Preliminary Design**
- **WWTF Upgrade Preliminary Design**
- **Permeable Reactive Barrier Pilot Program**
  - Focus On WWTF Discharge Plume



QUESTIONS & DISCUSSION

SENGEKONTACKET EAST STUDY AREA

617 Existing Developed Lots

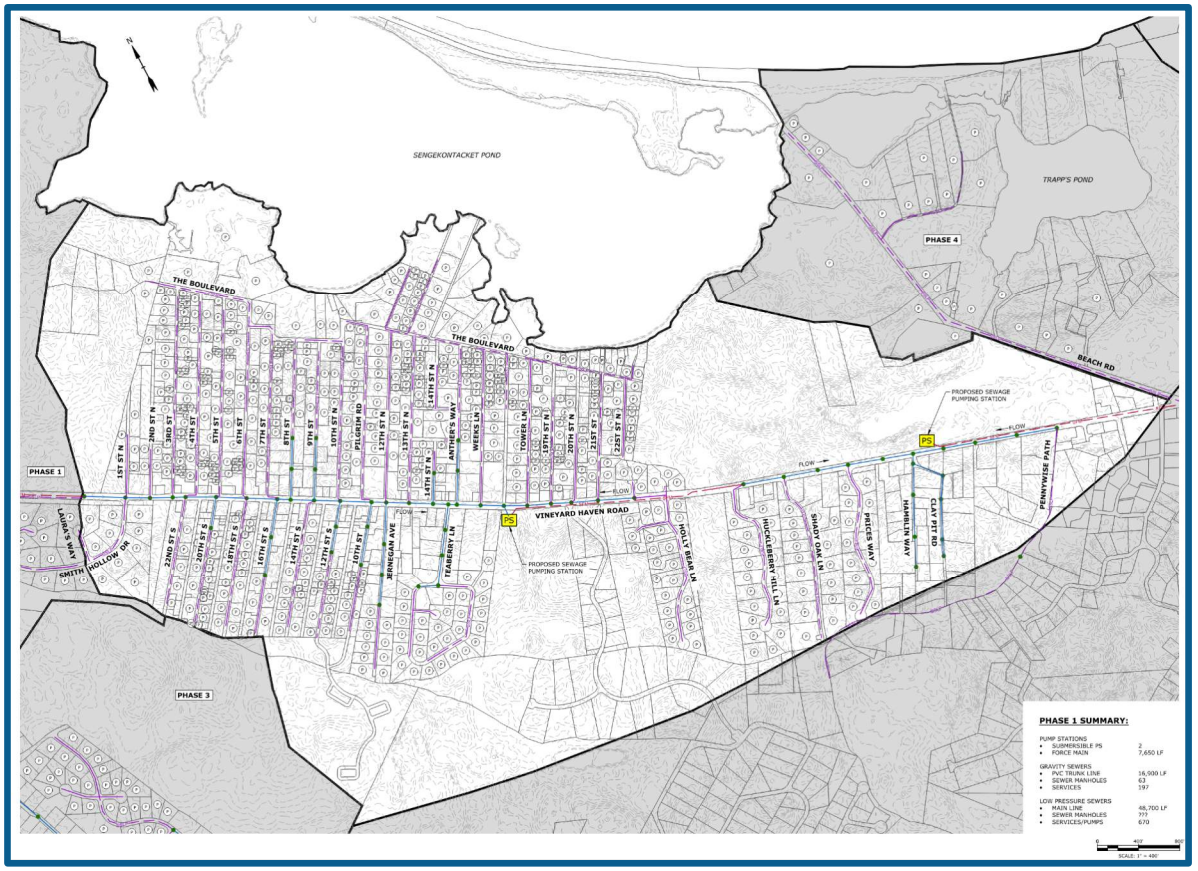
Average 11 DTO Per Connection

Sewer Rate $82/DTO/YR

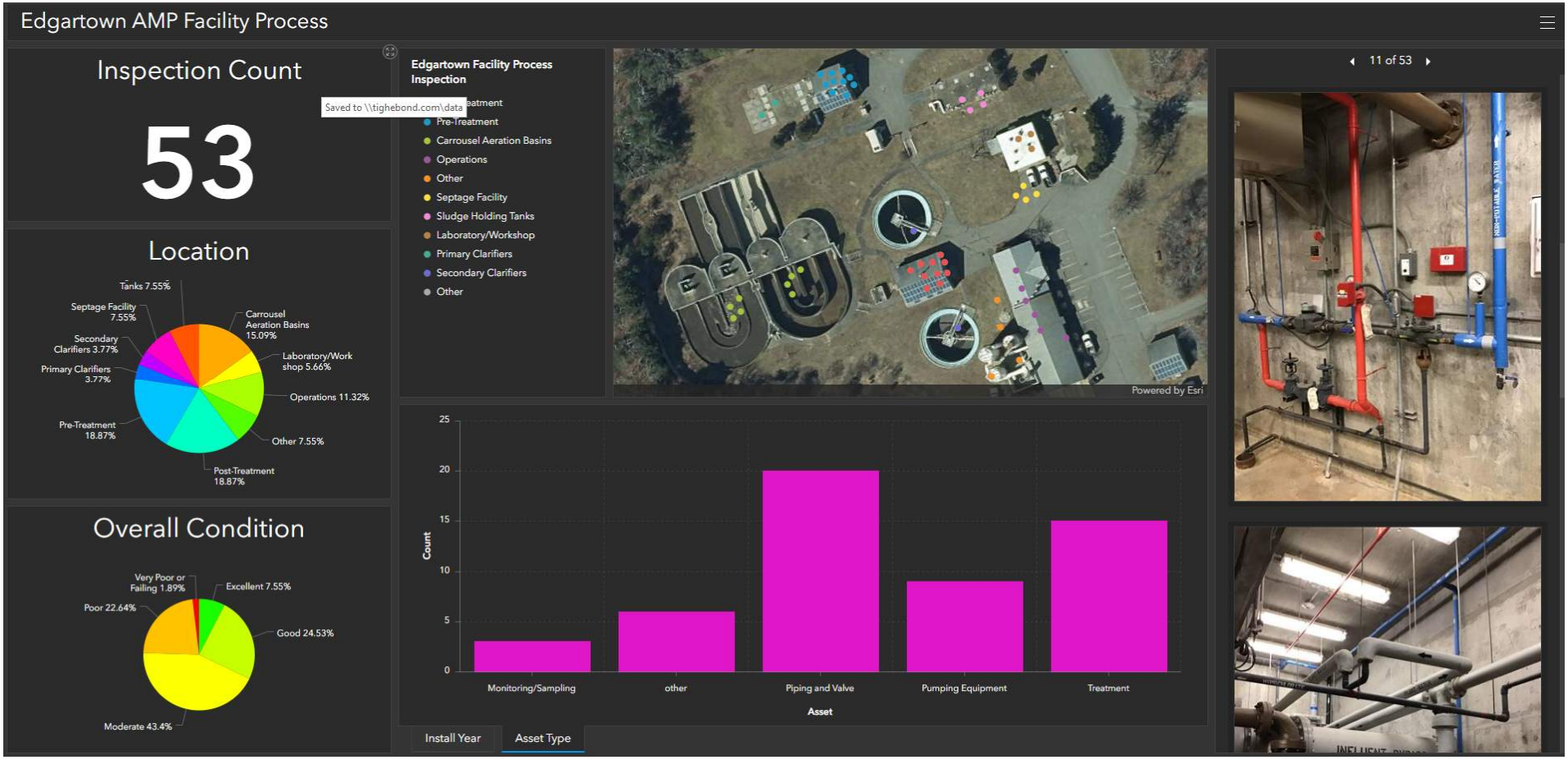
Annual Revenue $556,534

Planning Estimate $40M

- 0% Loan With Approved CWMP
- 25% Grant With Cape/Islands Clean Water Trust Fund
- 30 Year Bond = $1M Per Yr
- Added Revenue Through Local Short-Term Rental Tax Possible



GIS DASHBOARD - WWTF



GIS DASHBOARD – PUMP STATIONS