City of Taunton, MA

Final Environmental Impact Report and Comprehensive Wastewater Management Plan

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Final Environmental Impact Report and Comprehensive Wastewater Management Plan

City of Taunton, MA

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LIST OF ABBREVIATIONS

AC	Asbestos Cement
ACEC	Area of Critical Environmental Concern
ADF	Average Daily Flow
ANRAD	Abbreviated Notice of Resource Area Delineation
APC	Assawompset Ponds Complex
AWWA	American Water Works Association
BOD	Biochemical Oxygen Demand
BVW	Bordering Vegetated Wetlands
CBOD	Carbonaceous Biochemical Oxygen Demand
CCTV	Closed Circuit Television
CDAG	Community Development Action Grant
CFM	Cubic Feet per Minute
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CIPP	Cured In Place Pipe
CMR	Code of Massachusetts Regulations
CSO	Combined Sewer Overflow
CWA	Clean Water Act
CWMP	Comprehensive Wastewater Management Plan
CWSRF	Clean Water State Revolving Fund
DEIR	Draft Environmental Impact Report and Comprehensive Wastewater Management Plan
DO	Dissolved Oxygen
DON	Dissolved Organic Nitrogen
DPW	Department of Public Works
ENF	Environmental Notification Form
ENR	Engineering News Record
EOEA	Executive Office of Environmental Affairs
FEIR	Final Environmental Impact Report and Comprehensive Wastewater Management Plan

FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GIS	Geographic Information System
GPD	Gallons Per Day
GPM	Gallons Per Minute
GPS	Global Positioning System
HCF	Hundred Cubic Feet
HDPE	High Density Polyethylene
HP	Horsepower
HRT	Hydraulic Residence Time
HUC	Hydrologic Unit Code
HVAC	Heating, Ventilation, and Air Conditioning
I&C	Instrumentation and Controls
I/I	Infiltration and Inflow
IMA	Inter-Municipal Agreement
IWPA	Interim Wellhead Protection Area
LB	Pound
LF	Linear Feet
LP	Low Pressure
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MCC	Motor Control Center
MEPA	Massachusetts Environmental Protection Act
MGD	Million Gallons Per Day
mg/L	Milligrams per Liter
MGL	Massachusetts General Laws
MHC	Massachusetts Historical Commission
MHD	Massachusetts Highway Department
MLE	Modified Ludzack-Ettinger Process
MLSS	Mixed Liquor Suspended Solids
NAVD	North American Vertical Datum

NRCS	National Resource Conservation Service
NGVD	National Geodetic Vertical Datum (1929)
NHESP	Natural Heritage and Endangered Species Program
NO_2	Nitrite
NO_3	Nitrate
NPC	Notice of Project Change
NPDES	National Pollutant Discharge Elimination System
O&M	Operations and Maintenance
PEP	Population Estimates Program
PLC	Programmable Logic Controller
PPM	Parts per Million
PVC	Polyvinyl Chloride
RAS	Return Activated Sludge
RCP	Reinforced Concrete Pipe
SAS	Soil Absorption System
SCADA	Supervisory Control and Data Acquisition
SCFM	Standard Cubic Feet per Minute
SMAST	UMass School for Marine Science and Technology
SOR	Surface Overflow Rate
SSO	Sanitary Sewer Overflow
TKN	Total Kjeldahl Nitrogen
TMLP	Taunton Municipal Lighting Plant
TN	Total Nitrogen
TR-16	Technical Report 16 – Guides for the Design of Wastewater Treatment Works
TSL	Taunton Sanitary Landfill
TSS	Total Suspended Solids
TVSS	Total Volatile Suspended Solids
URAM	Utility Related Abatement Measure
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UV	Ultraviolet

VC	Vitrified Clay
VFD	Variable Frequency Drive
WAS	Waste Activated Sludge
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

BACKGROUND

This Final Environmental Impact Report and CWMP (FEIR) for the City of Taunton is being submitted in accordance with Section 11.07 of the Massachusetts Environmental Policy Act (MEPA). This document is an update to the previously submitted Draft Environmental Impact Report (DEIR) (2009) and the Final Draft Comprehensive Wastewater Management Plan (2006). The planning period of this report is through 2037.

Since the DEIR was submitted, considerable work has been done on the existing sewer system to rehabilitate old infrastructure and remove Infiltration and Inflow (I/I) from the system, with the aim of abating the city's single Combined Sewer Overflow (CSO).

This report contains recommendations for additional work on the existing sewer system, as well as an updated evaluation of sewer Needs Areas based on new information and recent construction efforts. Plans for upgrading the City's Wastewater Treatment Facility (WWTF) have likewise been updated, taking into account changes in flows and loads, and the new limits contained in the facility's recently issued discharge permit.

EXISTING SEWER SYSTEM

Taunton's existing sewer system dates to the 1870s, and includes 39 pumping stations and approximately 177 miles of sewer pipes, varying greatly in size, material, and condition. Since 2005, the City has undertaken an extensive program of rehabilitation, costing over $70M and aimed at I/I removal and reinforcing or replacing aging pipes and structures. These projects have removed an estimated 5 million gallons per day of I/I and have reduced the size and frequency of CSO events. However, some work remains to be done, and capital improvements of approximately $3M per year are continuing annually. In addition, recent pump station inspections have indicated that several pump stations require upgrades. These urgent upgrades will be completed within the next few years, with additional evaluation and upgrading scheduled in the future.

EVALUATION OF SEWER NEEDS AREAS

The 2006 CWMP divided the City's unsewered areas into thirty-one study areas. These study areas were then evaluated for suitability of on-site wastewater treatment systems (septic systems) based on factors such as failure records, soil and groundwater conditions, and proximity of sensitive features including drinking water supplies, surface water bodies and wetlands. Based on these criteria, each study area was given a numerical score and ranked. Study areas with a higher score indicate that they were not suitable for continued use of on-site systems. An evaluation of treatment alternatives, including innovative systems, community systems, and satellite treatment systems concluded that for most of the Needs Areas, sewers and central treatment was the most beneficial alternative.

SEWER SYSTEM EXPANSION

The 2009 DEIR identified fourteen Needs Areas where installation of sewers was recommended. Upon further evaluation of septic system records and a reconsideration of the City's priorities for expansion of the sewer system, nine needs areas are identified in this report. They are:

- Needs Area Q – Somerset Ave and Railroad Ave
- Needs Area L – Burt Street, Glebe Street, & Rocky Woods Street

- Needs Area A – Field Street, Dublin Drive, Woodview Drive
- Needs Area X – Caswell Street and Staples Street
- Needs Area C – Prospect Hill Street and Lothrop Street
- Needs Area M – North Walker Street
- Needs Area R – Berkley Street
- Needs Area V – Paul Revere Terrace, Williams Street
- Needs Area E – Norton Ave, Fremont Street, and Davis Street

While all of these areas are considered good candidates for sewer expansion, it is unlikely that all will be serviced by sewers by the planning date of 2037. However, there are two mobile home parks located within Needs Area C that are under a MassDEP consent order to stop using onsite disposal systems. This will make sewering this area a priority within the next few years. Additional Needs areas will be installed with sewers when and if property owners within the areas request sewer installation. Construction of sewers in all identified needs areas would cost approximately $57.3M, mostly reimbursed to the City through betterment assessments. In total, the nine recommended areas would generate an estimated average daily flow of 260,000 gpd of wastewater.

The identification of Needs Areas is intended to identify areas currently experiencing difficulty with on-site septic systems. Extension of sewers into Needs Areas is not intended to encourage development within these areas. The Needs Areas are all nearly fully developed, and additional development is restricted by the City's sewer bank ordinance. This ordinance charges new connections to the system an Infiltration and Inflow fee, and prohibits connection to the system unless I/I removal projects have created sufficient flow capacity to accommodate additional flow.

Impacts of construction within the Needs Areas has been carefully considered. Most sewer construction will occur within paved, City-owned rights of way, minimizing adverse effects to water bodies and other sensitive areas. Within each Needs Area, sensitive areas such as wetlands, drinking water supplies, and endangered species habitat has been identified so that these areas will not be damaged by construction.

PROJECTED FLOWS

The WWTF has a NPDES permit to discharge 8.4 MGD to the Taunton River, on a 12-month rolling average. Current flows experience significant seasonal differences based on rainfall and groundwater level, averaging about 6.6 MGD in the dry season, and 9.8 MGD in the wetter months. Taunton has planned development and expansion of the wastewater collection system which will cause these flows to rise. In addition, Taunton has inter-municipal agreements with the communities of Raynham, Dighton, and Norton which will contribute additional flow. By 2037, it is estimated that average daily flows to the Taunton WWTF may be as high as 8.4 MGD during the dry season, and 11.6 MGD during wetter months.

EVALUATION OF WASTEWATER TREATMENT FACILITY

Taunton's Wastewater Treatment Facility (WWTF) was originally constructed in 1950, and upgraded in 1978 and 2000. The facility was given a new permit in 2015 with more stringent limits, most notably requiring the removal of Total Nitrogen. In 2017, the condition of the existing facilities and their ability to continue to function was evaluated. Significant issues were identified throughout the facility, requiring upgrades in three categories. First, the facility must be upgraded to provide sufficient treatment to meet new permit requirements. Second, additional capacity must be added at the WWTF to accommodate higher peak flows from the new Main Lift pump station being constructed, and the higher average flows anticipated in the future. Capacity upgrades will be critical in continuing to abate

the CSO and avoid overflow events. Third, the WWTF needs a general upgrade due to age and condition. Much of the equipment is beyond its design life and requires replacement. Buildings and building systems (electrical, HVAC, plumbing, etc.) are also aged and require significant upgrades.

RECOMMENDED WASTEWATER TREATMENT FACILITY IMPROVEMENTS

Several alternatives were evaluated for their ability to meet the WWTF's new permit limits for Total Nitrogen. The four alternatives considered were: four-stage Bardenpho using existing tanks, four-stage Bardenpho using a new reactor, separate stage denitrification filters, and Modified Ludzack Ettinger (MLE) process with denitrification filters. After considering the advantages and disadvantages of each alternative, the four-stage Bardenpho process using existing tanks was selected as the preferred alternative. This alternative will involve the construction of additional tanks for the primary anoxic and primary aerobic reactors, as well as the addition of a new secondary anoxic reactor. Several additional improvements are recommended to improve facility performance and increase treatment capacity. Improvements include:

- Renovation of existing primary clarifiers and construction of one additional primary clarifier
- Construction of additional disinfection tankage
- Replacement of the facility headworks
- Replacement and enhancement of the facility's solids handling systems
- Construction of a new blower building and replacement of the facility's aeration system
- General upgrades to the facility's buildings including roofs, doors, windows, bathroom and locker facilities, utility systems.

The City has requested a permit modification that would allow additional flow to the Taunton River during wetter months. As part of the request, the City will be performing an antidegradation analysis aimed at demonstrating that additional flow will not have a deleterious effect on the Taunton River, since higher WWTF flows only occur when river flows are also high. As a contingency, additional improvements have been identified to dispose of flows in excess of the permitted discharge of 8.4 MGD. The City has identified three sites for groundwater disposal – TMLP Cleary Flood, WWTF, and Mt. Hope Farm. The WWTF and TMLP sites would be traditional groundwater disposal sites, utilizing open infiltration beds and subsurface infiltration chambers respectively. The third site, Mt. Hope Farm, would be a water reuse site, where treated effluent would be utilized to irrigate poplar trees or a similar woody crop. It is estimated that between the three sites, an additional 1.8 MGD can be disposed of. No development of these sites is planned until MassDEP and USEPA determine if additional flow to the Taunton River will be permitted.

It is estimated that WWTF upgrades will cost approximately $60M. Establishing groundwater discharge sites would cost an additional approximately $30.5M if all were necessary.

FINANCING AND IMPLEMENTATION

Improvements to several sectors of Taunton's wastewater system are recommended in this report: Improvements to the existing sewer system, expansion of the sewer system into Needs Areas, and upgrading the WWTF.

Existing collection system improvements consist of improvements to pipes, manholes, and pump stations. Pipe and manhole improvements will be funded by a combination of CWSRF loans and retained earnings from sewer user rates when available. Improvements to pump stations will be handled on an individual basis, funded with CWSRF loans or completed through the City's contract operations contract for the collection system.

Existing Sewer System Improvements Cost Estimate: $3.3M per year

Expansion of the sewer system is recommended into the nine identified Needs Areas, although all Needs Areas are unlikely to be serviced by sewers during the planning period. In the short term, sewers will be extended to Needs Area C to satisfy the Administrative Consent Orders issued to two mobile home parks in the Area. After Needs Area C is constructed, additional areas will only be installed with sewers upon request of the property owners in the area. Costs for sewering Needs Areas are anticipated to be loans, with the City being reimbursed for most costs through the assessment of betterments. Costs for pump stations and associated force mains will not be included in betterment assessments, but will be borne by all rate payers.

Sewer System Expansion Cost Estimate: $57.3M

Upgrading the WWTF is anticipated to be financed by CWSRF loans. The City has preliminary approval for a portion of the loan to be financed at 0% as a Nutrient Removal project, lowering the debt service associated with the project.

Construction of the WWTF upgrade is anticipated to begin in 2021 and consist of three contracts as follows:

Solids Handling Improvements:	$6M
Phase I (Capacity and General Improvements):	$22.5M
Phase II (Nutrient Removal:	$31.5M
Total WWTF Cost Estimate:	$60M

These three contracts are aimed at general upgrades and achieving total nitrogen discharge of 5 mg/L, and are anticipated to be complete by the end of 2022.

Construction of the three identified groundwater disposal sites is estimated to cost a total of $30.5M, including pump station and force main costs. Construction of the groundwater sites is contingent on the outcome of the City's permit modification request and antidegradation analysis on additional discharge to the Taunton River.

FINANCIAL IMPACTS

The financial impacts of the recommended plan will be borne by sewer users in Taunton, and in the other communities which contribute wastewater to the Taunton system. In accordance with their Inter-Municipal Agreements (IMAs), the towns of Raynham, Dighton, and Norton will be responsible for a proportionate share of the cost for constructing WWTF upgrades (including potential groundwater discharge sites) and, work on the "common sewer". Based on current permit flow limits and IMAs, Raynham will be responsible for 15.5% of costs, Dighton will contribute 7.1%, and Norton 0.6%, for a total contribution of 23.2% from IMA communities.

A financial impact analysis was performed to determine the increase in sewer rates for users in Taunton. Since the majority of sewer users in Taunton are single-family homes, this was used as a benchmark. The analysis estimated that for a single-family home using a city-average 76 HCF of water per year, the financial impact of all work recommended in this plan would be $386/year. If the groundwater sites identified are necessary, then the impact would be greater.

1.0 INTRODUCTION

1.1 PROJECT OVERVIEW

This *Final Environmental Impact Report and Comprehensive Wastewater Management Plan* (FEIR) for the City of Taunton is being submitted in accordance with Section 11.07 of the Massachusetts Environmental Policy Act (MEPA). This document is herein referred to as the FEIR. The document provides supplemental data and analyses to augment the Draft Environmental Impact Report and Final Comprehensive Wastewater Management Plan (DEIR) that was submitted in July 2009 to the Massachusetts Department of Environmental Protection (MassDEP).

The City of Taunton's existing wastewater collection system consists of approximately 177 miles of sewer ranging in size from 6-inch to 42-inch diameter pipe, dating from as early as the 1870s. The wastewater treatment facility (WWTF) has been in operation since 1950 and currently provides advanced secondary treatment, with treated effluent discharged to the Taunton River. The WWTF is currently designed to treat an average daily wastewater flow of 8.4 million gallons per day (mgd), which includes flow from the City of Taunton, in addition to portions of the Towns of Raynham, Dighton, and Norton. The extent and history of the existing sewer system within Taunton and the location of the WWTF are shown in Figure 1-1.

This report will serve to examine the existing condition of the City's wastewater collection and treatment systems, project future needs in these areas, and recommend a plan of action to address future needs over the next 20 years.

1.2 PROJECT HISTORY

A Wastewater Facilities Plan was developed for Taunton in 1981 to review conditions and recommend wastewater improvements in certain areas of the City. Although the City has implemented significant improvements to its wastewater collection and treatment system since the 1981 Facilities Plan, springtime flows to the WWTF have exceeded the current permitted flow rate of 8.4 million gallons per day (mgd) for extended periods of time. High spring and wet weather flows are directly related to infiltration and inflow into the collection system.

A Draft Comprehensive Wastewater Management Plan (CWMP) was submitted in 2006. This document has been attached to this report as Appendix A. The objective of the CWMP was to update the 1981 Facilities Plan and evaluate Taunton's wastewater collection and treatment needs through the year 2025 to determine the most cost effective and environmentally acceptable approach to meeting these needs. That evaluation focused on three areas: 1) identification of areas/neighborhoods experiencing problems with on-site wastewater systems and areas where future problems are anticipated; 2) identification of areas within the existing collection system where capacity or physical condition issues exist; and 3) development of alternatives and recommendations to address the City's wastewater needs. The recommended improvements identified in the CWMP involved extending sewers to 14 priority needs areas in Taunton that are currently served by on-site wastewater disposal systems.

In 2009, the City drafted and submitted a Draft Environmental Impact Report and Final CWMP (DEIR). The purpose of this report was to outline the environmental impacts of the recommendations in the

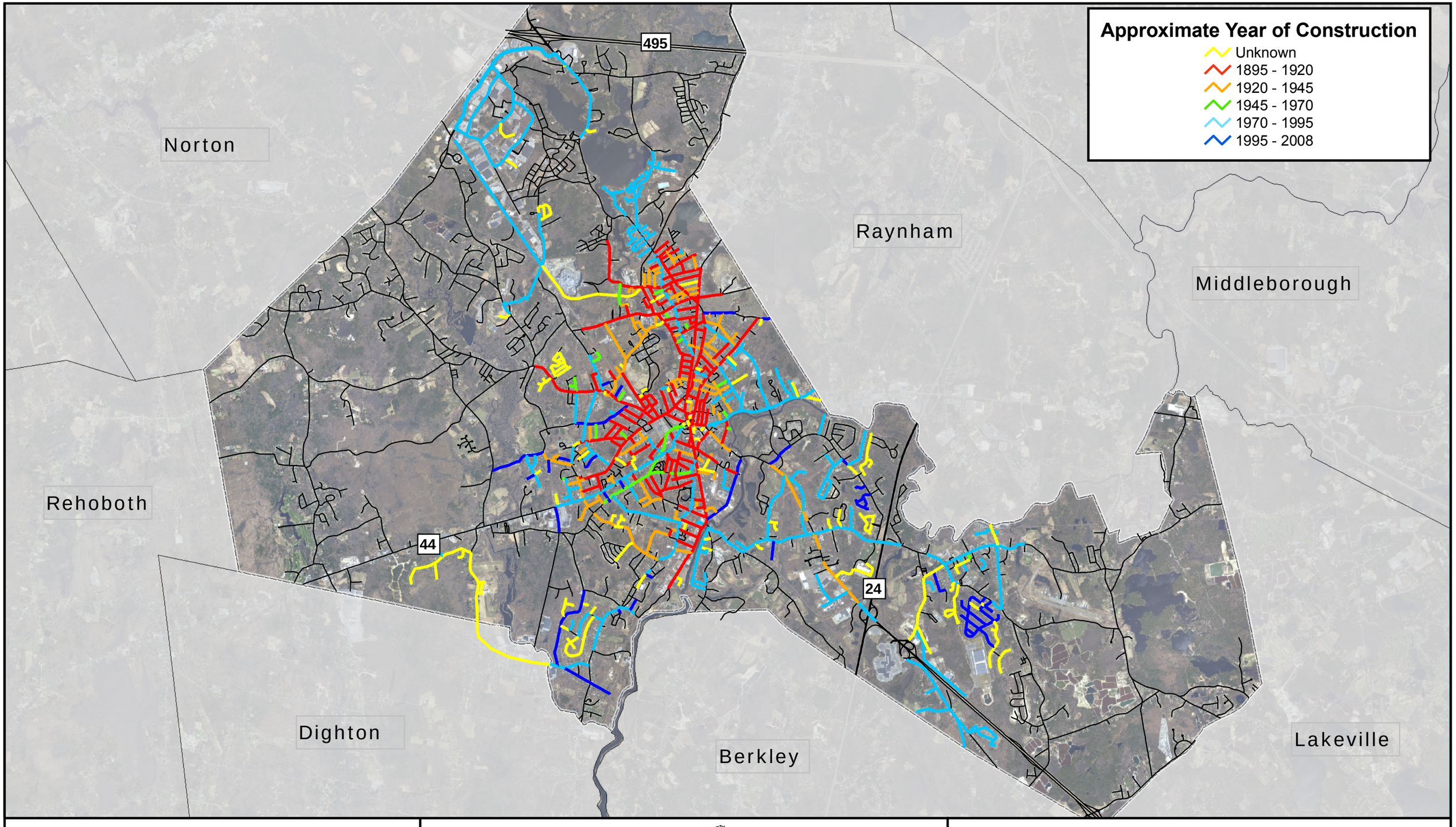
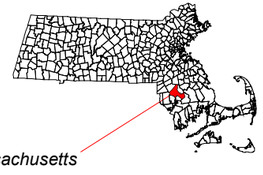


Figure 1-1
History of Sewer Construction

Taunton, Massachusetts



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Scale: 1"= 5,000'

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CWMP, as well as to address comments which had been received on the CWMP. The DEIR also included a discussion of options for removing total nitrogen to an anticipated permit limit of 8 mg/L, although at the time of the CWMP and DEIR, the Taunton WWTF did not have a total nitrogen limit in its permit. By 2009, MassDEP and USEPA were indicating that the upcoming WWTF permit renewal would include a total nitrogen limit.

In 2013, USEPA and MassDEP issued the Taunton WWTF a draft permit which included an ultimate total nitrogen limit of 210 pounds per day, which is equivalent to 3 mg/L at the WWTF design flow of 8.4 MGD. That permit was issued in its final form in 2015, and the City appealed. Appeals were denied, and the final NPDES permit issued in 2015 went into effect. At the time of this report, the City is pursuing a permit modification. Additional discussion of the permit is included in Section 6.1.

In addition to the reduction in nitrogen discharged from the WWTF, this FEIR will evaluate options to dramatically reduce the size and frequency of combined sewer overflow (CSO) events at the overflow pipe located on West Water Street upstream of the Main Lift Pumping Station that feeds the WWTF. The CSO was the discharge location for Taunton wastewater prior to the completion of WWTF construction in 1950.

1.3 Certificates of the Secretary of Environmental Affairs and Phase 1 Waivers

Environmental Notification Form

In August 2006, the City of Taunton filed an Environmental Notification Form (ENF) for the CWMP with the Executive Office of Environmental Affairs. On December 8, 2006, a Certificate of the Secretary of Environmental Affairs on the ENF requiring the completion of the CWMP and the preparation of a DEIR to address the recommended projects was issued. The Certificate and its accompanying Scope are included in Appendix B. This FEIR has been prepared in response to the Scope issued by the Secretary of Environmental Affairs. Given that the FEIR is an update of the previously submitted DEIR and the information provided in the CWMP, relevant information from the prior reports is either summarized or repeated in full when appropriate.

Elizabeth Pole School Phase 1 Waiver

Subsequent to the filing of the ENF, the City of Taunton requested a Phase 1 Waiver to allow construction of the recommended sewers serving the Elizabeth Pole School and ten residences along Harris Street. The project, which consisted of a new sewage pumping station, 4,450 feet of 6-inch force main and approximately 2,750 feet of 8-inch gravity sewer, is expected to generate an average of 14,000 gallons of wastewater per day. On February 22, 2007, the Phase 1 Waiver was granted by the Secretary of Environmental Affairs. The Certificate of the Secretary of Environmental Affairs on the Notice of Project Change for the Phase 1 Waiver is included in Appendix B. Construction of the Harris Street sewer extension was completed in May 2008.

Winthrop St/Duffy Drive Phase 1 Waiver

In 2009, the City submitted a Notice of Project Change (NPC) and requested a Phase 1 waiver for the construction of sewers on Winthrop Street and in the Duffy Drive area. On September 18, 2009, the waiver was granted by the Secretary of Environmental Affairs. The project consisted of approximately 17,000 lf of sewer, and serviced portions of Needs Areas K and U as identified in the CWMP. The Certificate of the Secretary of Environmental Affairs on the Notice of Project Change for the Phase 1

Waiver is included in Appendix B. Construction of the Harris Street sewer extension was completed in May 2008.

Main Lift Pumping Station Phase 1 Waiver

In 2018, the City submitted a Notice of Project Change (NPC) and requested a Phase 1 waiver for the replacement of the Main Lift Pumping Station. On March 9, 2018, the Secretary issued a Final Record of Decision, granting the Phase 1 waiver allowing the project to go forward. The project is anticipated for completion in 2020, and will include a complete replacement and upgrade of the Main Lift Pumping Station, as well as replacement of a force main and influent gravity sewer. A copy of the Phase 1 waiver is included in Appendix B.

1.4 SEWER IMPROVEMENTS AND I/I REMOVAL

In 2008, the USEPA issued an Order for Compliance to the City, mandating that the City take a number of steps to reduce the size and frequency of Combined Sewer Overflows (CSOs). The City undertook an annual program designed to eliminate as much Infiltration and Inflow (I/I) from the sewer system as possible. This entailed separating combined manholes, and rehabilitating and replacing sewer pipes and manholes. Between 2008 and 2017, the City spent over $70 million on I/I removal projects, and removed an estimated 5 MGD of I/I[1]. A discussion of this work is included in the next chapter as Section 2.1.1.

1.5 HISTORY OF SEWER CONSTRUCTION IN TAUNTON

As early as the 1850s, the Mill River, which runs through Taunton, had become totally polluted due to the large volumes of industrial, commercial and residential waste being dumped into its waters. Outbreaks of contagious disease, particularly cholera and malaria, occurred almost annually, and the patterns of both disease and death followed the course of the river. This problem was exacerbated in 1876 with the introduction of the city water system, which required wastewater to be disposed in a more controlled fashion. In 1878, the first professional plan for a sewer system was developed that called for the construction of a trunk line (or sewer receiving sewage from many tributaries serving a large territory) extending the length of Weir Street and emptying into the Taunton River below Weir Village. The plan, however, was never implemented.

In 1886, the City reported that more than 1,000 families were connected to sewers that emptied directly into the Mill River. In the same year, the Board of Health reported that along the course of the river from the Washington Street bridge to the Spring Street bridge (a distance of about a half mile), 800 tons of solid waste and 365,000 cubic feet of liquid waste were being dumped into the river each year.

In 1888, the City endorsed a plan to extend a trunk line along Weir Street and onto Somerset Avenue as far as Fifth Street, where the pipe would descend down to West Water Street. This trunk sewer would carry both stormwater and sewage. Along the course of the trunk line, other laterals would connect. The sewage/stormwater would then be pumped into the Taunton River below Fifth Street. No action was taken on this plan until 1896, when it was submitted to the state for approval. The state mandated that the City make provisions to build a filtration plant to limit the effects of the raw sewage being emptied into the Taunton River. To comply with this mandate, the City purchased land at Peter's Point in

[1] I/I removal value is based on a 1-year storm of 6-hr duration, dropping 1.72" of rain.

Berkley and promised to build the filtration plant. Although the trunk line was installed, the filtration plant was never constructed and raw sewage continued to be dumped directly into the Taunton River.

With the gradual construction of laterals throughout the city, the condition of the Mill River (but not the Taunton River) improved. Records are unclear, but it appears that during the Great Depression the City received monetary grants to improve the status of the river and the Taunton took some action to further clean up the Mill River. A crisis occurred in the summer of 1944, during World War II, when industries along the Taunton River were at full wartime capacity and dumped enormous amounts of chemical wastes, along with raw sewage, into the Taunton River. Large fish kills were reported, which created a critical threat to public health. Until this time, the state only had the authority to request, but not mandate, that cities and towns not pollute rivers and streams. This changed in 1945 when the Legislature passed a law giving the state full regulatory authority.

From 1945 until 1948, the state demanded that the City build a sewage treatment facility. Finally, under threat of enormous fines and other monetary penalties, the City complied and ground was broken for a sewage treatment plant in December 1948. Construction of the treatment plant, which provided primary treatment, was completed in 1950. The treatment facility was upgraded in 1977 to provide advanced secondary treatment, implementing techniques to reduce levels of ammonia-nitrogen in sewage. The WWTF was upgraded once again in the late 1990s. [2]

As discussed above, the Taunton collection system was originally constructed as a combined storm and sanitary sewer. The oldest portions of the system date back to the 1890s, many of which are still in use. Most of the sewers in the center of the City, between the Mill River (west) and the Taunton River (east), were constructed between 1895 and 1945. Between 1945 and 1970, sewers were extended to a few streets within or in close proximity to existing trunk lines. From 1970 to 1995, the sewer system was expanded east of the Taunton River beyond Route 24 and west of Mill River to the western side of Lake Sabbatia. Since 1995, sewers have been extended to Dighton Avenue, the Blackbird Lane neighborhood, Fisher Street, the Ridgewood Drive neighborhood, Harris Street and Railroad Avenue, and to Winthrop St and the Duffy Drive area.

A graphical representation of the historical construction of the collection system is shown in Figure 1-1. This figure was developed from record drawings and other plans provided by the City. Although the accuracy is somewhat limited by the availability of information, a sense of where and when various sections of the collection system were constructed is provided.

1.6 PRIOR MEPA SUBMITTALS

Over the years, numerous projects related to the expansion of the Taunton sewer system have been reviewed by the State's Massachusetts Environmental Policy Act (MEPA) Office. These projects range in scope from specific sewer extensions to system-wide improvements. The following is brief summary of each project that has been reviewed and a discussion of the associated environmental constraints. The projects are discussed in chronological order with the most recent submittal discussed first.

[2] Hanna, William F. A History of Taunton, Massachusetts, 2nd ed, Old Colony Historical Society 2008

THE SETTLEMENT IN TAUNTON EOEA #13328

This project involved the construction of a residential subdivision consisting of 81 single-family homes, 18 duplex units, and associated infrastructure on a 104-acre site located on the east side of Joseph E. Warner Boulevard. The direct alteration of more than 25 acres of land, the creation of more than 5 acres of impervious area, and the construction of 1.54 miles of sewer were all subject to MEPA regulations. The development resulted in an average daily wastewater generation of 21,700 gallons.

The project required a Sewer Connection/Extension Permit from MADEP and an Order of Conditions from the Taunton Conservation Commission. MEPA jurisdiction extended to aspects of the project that may cause significant damage to the environment. This included permitting issues pertaining to wastewater and wetlands drainage. A National Pollutant Discharge Elimination System (NPDES) Storm Water Permit for construction activities was issued by the U.S. EPA.

The installation of the proposed sewer line required a connection from Christine Lane to the proposed development, resulting in the temporary alteration of approximately 1,200 square feet of Bordering Vegetated Wetlands (BVW). Upon completion of the sewer line installation, the BVW was restored through natural re-vegetation and native plantings. The project preserves 67 acres of open space.

Impacts anticipated as a result of the project were determined not to warrant the preparation of an EIR and the ENF was filed on July 24, 2004. Permits obtained for the project included a Comprehensive Permit from the Taunton Zoning Board of Approvals (issued November 5, 2003) and an Order of Resource Area Delineation from the Taunton Conservation Commission (issued December 24, 2001).

WINTHROP HEIGHTS III EOEA #13160

The "Winthrop Heights III" project was initially proposed as a 46-lot single-family residential "cluster" home development on an 81-acre site. An additional 42 acres were added to the project creating a total of 64 residential lots on a 123-acre site. Approximately 64 acres of open space were created under this project. This design maximized open space while minimizing the length of roadway and utilities required and reduced the amount of new impervious surface. The development is serviced by about 4,400 feet of roadway off Winthrop Street.

A 13,500-foot sewer extension was constructed (with 6,300 feet in the development and 7,200 feet outside the development), providing service to about 70 existing homes. The projected average daily wastewater flow from the Winthrop Heights III project was 46,000 gallons.

A Sewer Extension /Connection Permit was required from MassDEP. The project complied with the NPDES General Permit for its stormwater discharges. No wetland alteration or work within 25 feet of a wetland occurred. The Taunton Conservation Commission issued an Order of Conditions for buffer zone work. Impacts anticipated to occur as a result of the project did not warrant the preparation of an EIR. The ENF was filed on December 9, 2003 and the Notice of Project Change was filed on June 23, 2004.

LAKE SABBATIA SEWER EXTENSION PROJECT EOEA #12561

This project was proposed to assist in correcting a serious water quality problem in Lake Sabbatia. Approximately 290 dwellings were using septic systems and cesspools that would likely not have met Title V standards. These systems contributed significant quantities of nutrients and other pollutants to the Lake.

To remedy the situation, approximately 4 miles of sanitary sewers were installed to serve the 290 residences proximate to Lake Sabbatia and the Mill River. The sewers consist of 21,000 linear feet of 8-inch gravity sewer and 4,300 linear feet of force main, nearly all of which is located within existing

streets. Three small pumping stations were also constructed to lift wastewater from low-lying areas to the gravity (or conventional) sewer system.

The project, which was expected to generate an average daily wastewater flow of 122,000 gallons, required a Sewer Extension Permit from the MADEP and an Order of Conditions from the Taunton Conservation Commission even though no direct wetland alteration was proposed. The Massachusetts Historical Commission identified several archaeological sites in the vicinity of the project site. The submission for this project through MEPA was an Environmental Notification Form (ENF) dated July 25, 2001. An EIR was determined not to be necessary.

POWHATTAN ESTATES EOEA #12529

The development involved the construction of a 150-unit residential subdivision on 132 acres. Bordering Vegetated Wetlands (BVW) occur along portions of the eastern, western, and southern boundaries of the site. The wetlands boundaries were approved by the Taunton Conservation Commission through the submission of two Abbreviated Notice of Resource Area Delineation (ANRAD) filings and the issuance of Orders of Resource Area Delineation in February and December 2000.

Permits for the projects included an Order of Conditions from the City of Taunton Conservation Commission for the Stormwater Management System and grading within the 100-foot Buffer Zone to BVW, a MADEP Sewer Connection/Extension Permit, a NPDES Permit for vegetative clearing, and a Mass Highway Department Indirect Access Permit.

The project ties into the existing municipal sewer system through a connection to the neighboring Bird Lane Subdivision. Approximately 2.1 miles of new sewer lines were constructed as well as two wastewater pump stations. Approximately, 60,000 gallons of wastewater were expected to be generated on an average daily basis.

The project ENF was filed on May 23, 2001, while the Notice of Project Change was filed on December 26, 2001, which eliminated some of the residential units in favor of an industrial park complex. Environmental impacts were of concern for the project, consequently triggering the filing of a Draft EIR on May 25, 2002, a Single Draft EIR on September 25, 2002, and a Final EIR on November 23, 2002.

WALKER ELEMENTARY SCHOOL ADDITIONS AND RENOVATIONS UPGRADES EOEA #12515

This project involved the renovation of the Walker Elementary School and the construction of a new 27,600 square foot addition. The renovation allowed the school to expand to 400 students and 40 staff. Site utilities were also upgraded with new drainage facilities, sewer, water, electric, and gas services. The increase in wastewater generated from the project was estimated to be 905 gallons per day. The project did not require state permits related to wastewater and the impacts of the project did not warrant the preparation of an EIR. An ENF was filed on 5/09/01.

TAUNTON SANITARY LANDFILL EOEA #12484

The Taunton Sanitary Landfill (TSL) provides for the disposal of the City of Taunton's curbside municipal solid waste, wastewater sludge generated by the Taunton WWTF, as well as municipal solid waste and construction and demolition debris from outside Taunton. The TSL is permitted by the MADEP to accept an average of 385 tons per day of solid waste with a daily maximum of 685 tons per day. The landfill occupies 40 acres of the 84-acre site. Leachate from the landfill is collected and pumped into the Taunton sewer system.

The project involved four expansion cells, which overlap the original landfill. A Single EIR was required for the project. Also, under a Notice of Project Change, a fifth cell was proposed over 26 acres of previous landfill. The project required Major Modification to Site Assignment, a Risk Evaluation, and an Authorization to Operate from MassDEP. The project also required an Order of Conditions from the Taunton Conservation Commission for work within the wetland buffer zone. The ENF was filed on April 11, 2001 and the Notice of Project Change was filed on August 11, 2004.

MYLES STANDISH INDUSTRIAL EXPANSION, PHASE III EOEA #12292

Originally proposed in a December 2000 Single EIR, this project involved the development of an 82-acre parcel off John Hancock Road. The proposed project included 675,000 square feet of industrial space, 725 parking spaces, 1,600 linear feet of roadway, and relocation of 3,200 linear feet of an existing haul road. The project also required the extension of water and sewer service from John Hancock Road to the project site. The design wastewater flow rate was 30,375 gallons per day.

A certificate was issued for the Single EIR in January 2001 and found that the project adequately and properly complied with MEPA. However, the certificate required the proponent to file a Notice of Project Change for the development of a second parcel, described as a 71.5-acre parcel containing approximately 30 acres of developable uplands. The project required state permitting and resulted in the direct alteration of 25 or more acres of land, the creation of more than five acres of impervious surface, and the generation of 1,000 or more new average daily vehicle trips on roadways. A Sewer Extension Permit from MassDEP and an Order of Conditions from the Taunton Conservation Commission were also required. The ENF was filed on August 9, 2000 and the Notice of Project Change was filed on September 10, 2002.

FACILITY EXPANSION – KOPIN CORPORATION EOEA #12123

The project site is located in the Myles Standish Industrial Park and consisted of a new 19,000 square foot building expansion on a developed lot where two buildings existed. The project is located in the Canoe River Aquifer, which is an Area of Critical Environmental Concern (ACEC) and required a sewer connection permit. The project site consists of paved parking, lawns, other vegetated areas, and an abandoned paved road. Stormwater from the increase in impervious area is directed to an on site detention basin. The project required an Order of Conditions from the Taunton Conservation Commission for work within the buffer zone.

The new building construction required 0.07 miles of new sewer main and added 3,000 gallons per day of wastewater into the Taunton sewer system. An ENF was filed December 22, 1999.

WATER SOLUTIONS GROUP, LLC TREATMENT FACILITY EXPANSION EOEA #11977

Water Solutions Group LLC (WSG) owns and operates a private treatment facility permitted to accept an average of 99,500 gallons per day (gpd) of septage and non-hazardous sanitary wastewater from septage haulers. This project increased capacity of the facility from the aforementioned 99,500 gpd to 200,000 gpd. The expansion was accomplished by adding a second shift to process wastewater. No new construction or additional process equipment was required. Liquid waste from the treatment process is discharged to the Taunton sewer system and the solids are disposed at approved landfills.

The impacts of the project are limited to an increase in the volume of effluent flow to the sewer system and a minor increase in traffic. Neither of these impacts results in negative environmental

consequences. Therefore, no EIR was needed. A sewer connection permit from MassDEP was required and an ENF was filed on July 10, 1999.

WASTEWATER TREATMENT FACILITIES UPGRADES EOEA #11468

This project proposed to upgrade aging facilities to provide consistent performance and reliability with the objective of improving water quality within the Taunton River Basin. The project involved the rehabilitation of Taunton's main pumping station and 10 other remote pumping stations. At the main pumping station, all pumps, drives, controls, and meters were replaced and capacity was increased from 17.4 mgd to 22.4 mgd. Similar rehabilitation occurred at the 10 other remote pumping stations. These improvements significantly reduced the frequency of sewer overflow events at the West Water Street CSO.

The project also involved the upgrade and modification of Taunton's WWTF. The upgrades included: enclosure of the headworks facility, replacement and rehabilitation of sludge collection equipment, conversion of aeration system from pure oxygen to ambient air, a provision for odor control, and the installation of new centrifuges, feed pumps, and cyclone degritting equipment in the sludge handling building.

Flow control in the West Water Street CSO and the removal of inflow sources in portions of Taunton's sewer system were also provided. Eighteen identified sources of inflow, including manhole covers and storm drain connections, were mitigated. A portion of the work related to the removal of inflow sources occurred within the Mill River. The project also extended the sewer system 2,300 feet along Route 138 and along a portion of Williams Street to service 49 existing homes.

Because the project involved work in the Mill River and impacted WWTF discharges to the Taunton River, a Chapter 91 license was required along with minor sewer extension permits and approval under the Wetlands Protection Act. The impacts of the project did not warrant the preparation of an EIR. The ENF was filed January 25, 1998. The project estimated cost was $10,000,000 and financial assistance was sought through the State Revolving Fund.

CITY OF TAUNTON - CDAG EOEA #6341

This project involved the extension of water and sewer lines under a CDAG grant for construction of 224 low and moderate income housing units on a 32-acre project site located off Old County Road in Taunton. Seven acres of the site were developed, 23 acres remained as open space, and two acres were identified as wetlands. It was calculated that 91,220 gallons of wastewater would be generated on a daily basis. Permits for the project included a Funding-Plan Approval permit from the state and a State Road Permit from the Taunton DPW. The ENF for this project was filed in December 1986 and a Final EIR was filed on January 1988.

SEWAGE IMPROVEMENTS EOEA #5014

This project involved the upgrade and expansion of the Princess House facility, a leading national direct sales company specializing in handcrafted crystal, home decorator accessories, china and silver. The company wanted to expand its workforce from 800 to 900 employees. To support this expansion, a large septic system and leaching field were eliminated in favor of a connection into the municipal sewer system.

The Princess House facility is located in the Town of Dighton which abuts the City of Taunton. The City of Taunton and the Town of Dighton worked together in promoting a sewer tie-in from the facility to the Taunton sewer line on Somerset Avenue. Princess House constructed a sewage pumping station on their property and ran approximately 3,300 feet of sewer force main down Somerset Avenue, over the Three Mile Bridge to the City of Taunton. The City further proposed to upgrade and renew water main lines on Somerset Avenue (approximately 1,500 feet of 12" pipe) and Railroad Ave (approximately 1,000 feet 8" pipe).

Both communities were allowed to file for necessary funding under the CDAG program. No EIR was necessary for the project. An ENF was filed on December 8, 1983.

WASTEWATER TREATMENT EOEA #2028

In 1975, the City of Taunton expanded its sewage treatment plant on the west bank of the Taunton River. A new chlorine contact chamber was constructed along with a new effluent outfall. Implementation of this project improved water quality in the Taunton River by disinfecting the effluent through chlorination. The project had a beneficial effect on recreational and other uses of the river, including its use as a habitat for fish and other aquatic life.

This project required a Chapter 91 License that was issued by the Water Pollution Control & Department of Public Health for work on the Taunton River where the bank had been excavated and rip-rapped to allow for the 36-inch outfall pipe. A U.S. Army Corps of Engineers permit was also required for the project, but no EIR was deemed necessary. An ENF was filed on September 5, 1975.

SEWER EXTENSION EOEA #331

The proposed project consisted of the construction of approximately 3.0 miles of interceptor sewers to serve the Paul Dever Industrial Complex in Taunton. The site for the industrial park is located in the northwest part of the city. It occupies higher ground bordering Lake Sabbatia and Watson Pond and is separated from the rest of Taunton by swamp land. The tract of land was originally used as a staging ground for troops in World War II and sewage was collected at a low point to the south west and given partial treatment before being discharged into a brook to eventually find its way into the Oakland Reservoir.

The project, which was completed in July 1976, improved conditions in the Oakland Reservoir by diverting the sewage discharge to the Taunton sewer system. A Permit for Extension of Sewerage System was required through the Division of Water Pollution Control. No EIR was deemed necessary for the project. The ENF was filed on December 3, 1973.

2.0 EVALUATION OF EXISTING COLLECTION SYSTEM

2.1 SEWERS

Currently approximately 50 percent of the City's population is served by the municipal wastewater collection system. Taunton's sewer system consists of approximately 177 miles of pipe, ranging in size from 6" to 42" diameter. The oldest sections of the system date to the 1870s. A map of the existing collection system is shown in Figure 2-1. The system contains many different pipe materials, including brick, vitrified clay (VC), asbestos cement (AC), reinforced concrete (RCP), and polyvinyl chloride (PVC). The collection area is concentrated near the center of the City, with fewer sewers in the less densely populated areas near the eastern and western boundaries of the City. Since 2008, the City has systematically replaced and rehabilitated sewer pipes, focusing on those that are oldest and most deteriorated. As a result, all brick sewer pipes in the city have been either replaced or rehabilitated using Cured-in-place pipe (CIPP) lining. In addition, many older pipes of other materials have also been rehabilitated or replaced. A plan showing the work completed on the sewer system in recent years is included as Figure 2-2. The sewer system is on a program such that 20% of the system is CCTV inspected annually, meaning every pipe in the system should be inspected approximately once every 5 years.

2.1.1 INFILTRATION/INFLOW REDUCTION MEASURES

Since 2005, the City has been involved in an intensive annual program to remove infiltration and inflow from the collection system, with the goal of CSO abatement. As of 2018, the program had completed 13 construction projects at a total cost of over $70 million, entailing:

- Cured In Place Pipe lining or replacing all brick interceptors in the City
- Repair or replacement of over 35 miles of sewer
- Rehabilitation or replacement of over 800 manholes
- Separation of over 100 combined manholes
- Disconnection of 50 catch basins from the sewer system

Each construction project was preceded by an investigation phase, where information was gathered to determine the areas and portions of the system which required the most immediate attention.

The program was instigated by two governmental orders, one from MassDEP and one from USEPA (See Appendix D). Both orders mandated that the City undertake efforts to assess and improve the sewer system. The USEPA order further mandated that the City take steps to abate, and potentially eliminate, its single permitted Combined Sewer Overflow (CSO) on West Water Street. Through the efforts described above, over 5 million gallons per day of I/I has been removed from the sewer system (calculated based on a 1-year storm). This I/I reduction has contributed to a significant decrease in the size and frequency of CSO events.

Figure 2-1
City of Taunton
Sewer System

NORTON

MIDDLEBOROUGH

RAYNHAM

LAKEVILLE

REHOBOTH

DIGHTON

BERKLEY

495

44

24

140

Legend

Force Main or Low Pressure Sewer Pipe

Gravity Sewer Pipe

1.5"- 6"

8" - 10"

12" - 18"

20"+

Sewer Pump Station

N

W

E

S

BETA
IMPROVING COMMUNITIES TOGETHER

Scale: 1" = 1200'

November, 2018

Figure 2-2

Stormwater and Wastewater System Progress Map

Map Legend

Wastewater Project Summary
- 270 New Sewer Manholes
- 573 Rehabilitated Sewer Manholes
- 2 Pump Stations
- 115,000 L.F. of CIPP Lined Sewer Pipes
- 66,000 L.F. of New Sewer Pipes

Stormwater Project Summary
- 76 New Drain Manholes
- 24 New Catch Basins
- 20 Drain Manholes Removed From Wastewater
- 50 Catch Basins Removed From Wastewater
- 14 Drain Culverts Repaired or Replaced
- 7,000 L.F. of CIPP Lined Drain Pipe
- 4,000 L.F. of New Drain Pipe

This Map is Intended For General Planning and Information Purposes Only.

N

Raynham

Berkley

Dighton

Lakeville

Matthews Landing

Scale: 1" = 800'
Issue Date: February, 2016

BETA

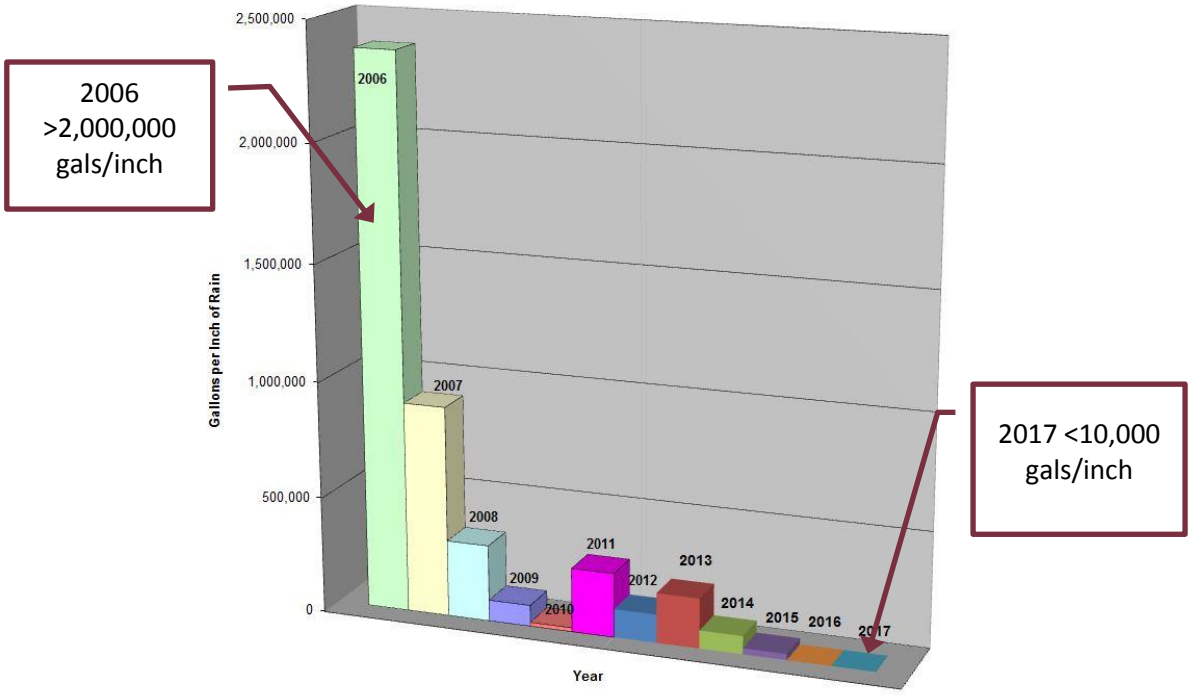
2.1.2 CSO ABATEMENT

Under NPDES Permit No. MA0100897, the City of Taunton is presently allowed to discharge from one Combined Sewer Overflow (CSO) outfall (serial number 004) located approximately 1,000 ft upstream of the Main Lift Station on West Water Street. The CSO becomes active when wet weather flows to the lift station exceed its theoretical pumping capacity of 22.4 mgd. However, based on a review of historical flow and hydraulic conditions, the capacity of the pump station with 3 pumps in operation is likely closer to 17 mgd.

The City of Taunton has implemented an ongoing program to separate its sewer system and remove sources of infiltration and inflow (See Section 2.1.1 above). As of January 2018, 13 SSES projects have been undertaken that have focused on the removal of infiltration and inflow from the collection system through sewer pipe and manhole rehabilitation/replacement and catch basin removal. Based on the one-year storm, it is estimated that 5.3 mgd of peak infiltration and inflow have been removed from the collection system. To document the effectiveness of the I/I removal program, the City submits an annual report to MassDEP and USEPA. These reports are considered part of this FEIR by reference. Figure 2-2 shows the dramatic reduction in the size and frequency of CSO events since 2006. In 2019, the City will be undertaking an I/I analysis program involving flow metering and modeling the collection system to gauge effectiveness of efforts to date, identify remaining problem areas, and target future projects to maximize their effectiveness.

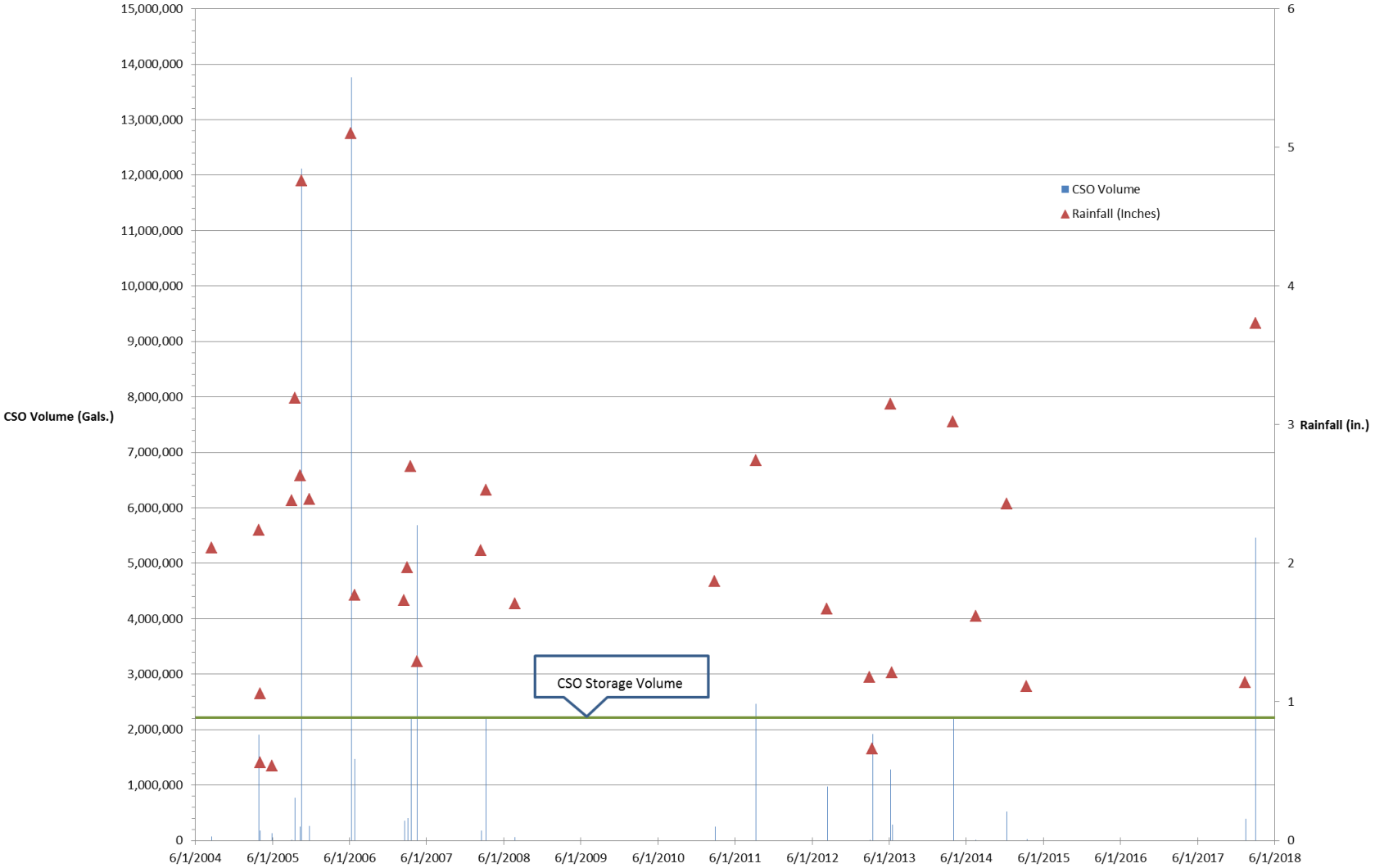
As presented in the draft EIR, from August 2004 through July 2008, 19 overflow events were recorded with reported overflow volume ranging from 2,000 gallons to 13.7 million gallons. Of the 19 overflow events, 16 (84% of events) discharged less than 2.25 million gallons. A similar analysis was conducted for the period from January 2011 through March 2018. Thirteen (13) overflows were reported over this timeframe with volumes ranging from 6,000 gallons to 5.4 million gallons. Eleven of these thirteen overflows had a reported volume that was less than 2.25 million gallons. The storm causing the 5.4 million gallon overflow occurred in March 2018 and generated 3.73 inches of rainfall, exacerbated by snow melt and high groundwater. However, the Taunton River was at flood stage during the overflow event. Due to the extremely high river level, the hydraulics in the overflow pipe are suspected to have over-recorded the volume of the CSO event. It is unlikely that the measured 5.4 million gallon overflow is accurate, and the real discharge is likely to be much less. A graph of rainfall and the associated volume of CSO discharges is provided as Figure 2-3.

FIGURE 2-3
CSO REDUCTION



Using the 1-year, 24-hour storm as the targeted rainfall, a storage capacity of 2,250,000 gallons and adequately sized pumping facilities will eliminate all but the most extreme overflow events. Overflow events such as those recorded on October 15, 2005, June 7, 2006 in which 12.1 and 13.8 million gallons were released, respectively, will be significantly reduced, and possibly eliminated. Both of these events were caused by over 4.6 inches of rain. Since Taunton is still actively pursuing the separation of sanitary and storm sewers as well as other inflow reduction measures, it expected that the overflow volume under the 1-year, 24-hour storm will continue to decrease. Therefore, sizing, design, and construction of CSO abatement facilities should be delayed until all recommendations of the SSES work and the Order are implemented and their impacts assessed. For purposes of preliminary planning, pumping, storage and treatment facilities for the CSO are discussed in Chapter 5 of this report.

FIGURE 2-4
Historic Combined Sewer Overflow Events



2.2 PUMPING STATIONS

The Taunton wastewater collection system has 39 pumping stations, including the Main Lift Station, which is the sole feed to the WWTF. The stations, and their basic information, are listed in Table 2-1. In 2017, a comprehensive inspection was performed on all 40 pump stations in the City. The inspections encompassed the station site conditions, architectural and structural conditions, and examined the mechanical, electrical, and communication/alarm elements of the stations. The inspections found that several of the largest and most critical stations (Red Lane, Industrial Park, South Street, Spring Street) required significant mechanical upgrades, as essential elements such as pumps were well past their design life. In addition, communications and alarms across the City need standardization and upgrading. This inspection program resulted in a report titled 2017 Pump Station Inspection Report, which is attached to this report as Appendix E. The report detailed deficiencies at many of the stations, including 22 that contained pumps and equipment that were beyond their design life. Based on the observations in the report, lists of recommended short-term and long-term repairs and replacements were generated. Short term repairs and replacements were completed in 2017, and the City and its operator Veolia developed a capital improvement plan to systematically perform major repairs and replacements in future years. This plan will systematically upgrade and replace stations throughout the City, and identify future problems through annual inspections.

TABLE 2-1
PUMP STATION INFORMATION

Station Name	Year Built	Pump Year[1]	Station type	HP	Pumps	Design Flow (GPM) Each
Alicia Dr	1991	1991	Submersible	3	2	330
Briggs St	1987	2008	Submersible	1.5	2	150
Burt Street	2012	2012	Submersible	7.5	2	75
Chamberlain School	2000	2010	Submersible			
Christine Ln	2001	2001	Submersible	2	2	100
Colt Circle	2006	2005	Submersible	5	2	80
Davis St	1992 / 2001	2001	Submersible	7.5	2	200
Dean Street	2012	2012	Submersible	60	3	1,650
E. Pole School	2007	2007	Suction Lift	7.5	2	200
Fairview Ave	1986	1986	Dry Pit/Wet Pit	3	2	150
Fisher St	1993	1993	Submersible	4	2	100
Hart Street	1987	2006	Submersible	2	2	100
Industrial Park NW	1991	2006[2]	Dry Pit / Wet Pit	75	2	2,000
King James	1989	2011[2]	Dry Pit/Wet Pit	10	2	250
Lakeview Ave	2003	2003	Submersible	4.5	2	50
Main Lift	1947, 1974, 1998, 2016	2016/	Dry Pit / Wet Pit	130	4	5,200

Mary Drive	1989	1989	Wet pit / Dry Pit	10	2	620
Matthews Landing[5]	2012	2012	Submersible	3	2	290
Myles Standish	1981	1981	Dry Pit/Wet Pit	7.5	2	350
Norton Ave	1990	1990/2016	Submersible	10	2	150
O'Connell Way	2007	2007/2016	Submersible	6.5	2	156
Partridge Circle	1987	2006	Submersible	2	2	100/25
Paul Dever	2015	2015	Submersible	7.5	2	250
Powhattan	2002	2002	Submersible	3	2	80
Red Lane/East Taunton	1965	2006	Dry Pit / Wet Pit	66	2	1,250
Roundtable	1986	1992/2009	Suction Lift	3	2	120
Route 140	1971	2017[3]	Dry Pit / Wet Pit	56	2	1,600
Rowley St	1980s	2016[4]	Suction Lift	4	2	120
Sakonet	2002	2015	Submersible	5	2	115
Scadding St	2003	2003	Submersible	4.5	2	50
School St	1980s	2016	Submersible	2.5	2	25
Shore Drive	2003	2003	Submersible	2	2	26
South Street	1985	1985	Dry Pit / Wet Pit	50	3	775
South Walker	1980s/2000	2014	Submersible	3	2	150
Spring Street	1985 / 1970's	unknown	Dry Pit / Wet Pit	36	2	870
Stevens Street	1990s	1990s	Suction Lift	7.5	2	350
Taunton High School	2010	2010	Submersible	7.5	2	350
Warner Blvd.	1975	2013/2016	Can Dry Pit/wet pit	10	2	550
Wellesley Cir	1994	1994	Suction Lift	2	2	100
Westville	2006	2006	Submersible	17	2	275

[1] Pump age is from Veolia's Standard Operating Procedure, where known.

[2] Age indicates pump motor only, not entire pump assembly

[3] Between pump station inspection and the writing of this report, both pumps at Rte 140 were replaced

[4] Age indicates pump rebuilds (impellers, etc.)

[5] Matthews Landing is categorized as a septic system, not a pump station

2.3 WATER DISTRIBUTION SYSTEM

Taunton's water distribution system consists of 254 miles of pipe. Approximately 20 percent (70 miles) of water mains were installed prior to 1930 and consist of unlined cast iron pipes that are believed to be very tuberculated. A description of other water supply infrastructure can be found in Section 2.6.2 of the Final Draft CWMP.

The city of Taunton receives its public water supply primarily from the Assawompset Ponds Complex (APC), and a small portion from Elders Pond. The APC and Elders Pond are located in the communities

of Lakeville, Freetown, Middleborough, Rochester, Dartmouth, and New Bedford. The rights to the APC waters are shared by New Bedford and Taunton. The Assawompset Pond Pump Station, located on the west side of the Assawompset Pond, diverts approximately 6.8 million gallons per day (mgd) of water on average from the APC to Elders Pond in Lakeville where the Taunton Water Treatment Plant is located. The City of New Bedford Water Treatment Plant, located at the south end of Little Quittacas Pond, diverts a much more significant flow of approximately 15 mgd on average from the APC. The safe yield of the APC is 27.5 mgd with 20.79 mgd permitted for New Bedford and 6.71 mgd permitted for Taunton. Elders Pond provides an estimated safe yield of 0.58 mgd for Taunton. Together the APC and Elders Pond allow Taunton a total permitted withdrawal amount of 7.29 mgd. Total water usage in the past five years in the city of Taunton has been between 6.0 and 6.5 mgd.

According to the City's Water Master Plan, Taunton will provide public water to approximately 99 percent of its residents by the year 2020. Based on domestic water consumption and population served in recent years, the Plan projects a domestic water consumption of 60 gallons per capita per day (gpcd). Using a population growth rate of 0.6 percent, the projected City population for the year 2020 is 60,162. Based on this estimated population with 99 percent residents being served, an estimated domestic water demand of 3.57 mgd was projected for the year 2020. The Master Plan projects an average daily commercial, industrial, and municipal water consumption rate of 1.94 mgd through the year 2020, assuming that the current percentage of total water use for these activities remains fairly constant. The projected water consumption for wholesale to other public water systems is 0.62 mgd through the year 2020.

The Water Master Plan also predicts that total water demand in 2020 is expected to increase to 7.77 mgd. There is also a potential that Lakeville may request an additional 0.15 mgd. As a result of potential shortfalls in water supply, alternatives such as verifying safe yields, negotiating for increase in permitted withdrawals, reducing unaccounted for water, reducing water consumption, and developing additional supply have been considered. The additional supply alternatives reviewed include Paul A. Dever School Well Supply and the Taunton River Desalination Plant in North Dighton. The Dever School is located in the northern section of Taunton near Watson Pond and would require rehabilitation of one of three wells located at the school to make approximately 2 mgd of water available to the city.

The city does have measures in place to control seasonal water use. According to the Municipal Public Water Supply Water Use Restriction List, the City of Taunton has a voluntary restriction status on nonessential water use; and may include limitations on outside water use, such as odd/even days, hours of the day, hand-held hose, no automatic sprinklers, or total bans on outside watering.

2.3.1 Water Demand and Conservation Plan

This section provides a preliminary water demand management and a water conservation plan, as recommended in comments in the Scope provided in the Secretary's Certificate. This plan is based on the *Water Conservation Standards* published by the Commonwealth of Massachusetts Executive Office of Environmental Affairs and Water Resources Commission (July 2006). And generally follows the format of the standards. The intent is to identify established standards, identify measures currently employed by the City of Taunton and make recommendations to comply with the established standards. The City will be developing a formal plan based on these and other relevant recommendations.

Taunton may be able to obtain funding assistance to implement water conservation measures from the MassDEP Annual Water Conservation Grant Program for public water systems. The proponent must match 25 percent of the requested grant amount and in-kind services are eligible as a match. The projects can include public education programs, water audits, leak detection, rebate programs, by-law

implementation, and meter calibration or repair. Consulting services are generally an eligible cost under the grant program.

2.3.1.1 COMPREHENSIVE PLANNING

Standard

Develop a drought management plan that follows American Water Works Association Drought Management Planning guidance (AWWA, 2002). Develop strategies appropriate to the system to reduce daily and seasonal peak demands and develop contingency plans to ameliorate the impacts of drought, seasonal shortages and other non-emergency water supply shortfalls. Develop emergency management plans as per MassDEP requirements (MassDEP Policy 87-05 - Declaration of a State of Water Supply Emergency).

Current Policy

Taunton currently has a simplified drought management plan in which voluntary restrictions on nonessential water use are imposed and may include limitations on outside water use, such as odd/even days, hours of the day, hand-held hose, no automatic sprinklers, or total bans on outside watering.

Recommendation

It is recommended that Taunton develop a more detailed drought management plan that can be integrated into the Water System Master Plan. The plan should follow the following format based on the MassDEP drought management planning guidance:

- Stage I Voluntary Conservation
- Stage II Off-Peak Watering Only and/or Outside water use is limited to between certain hours
- Stage III Outside Water Usage is Limited to 1-Day per Week and/or outside water use restricted to hand held hose for flower or vegetable garden watering only. No lawn watering, car washing (excluding commercial car washing), pool filling allowed.
- Stage IV Mandatory Ban on Outside Water Use

Standard

Conduct infrastructure planning evaluations that include water supply, wastewater and stormwater with greater emphasis on the issue that is most problematic. Planning should either follow: a) the MassDEP guidance for Integrated Plans; or b) the Water Resources Commission guidance for a Local Water Resources Management Plan. The plans should be updated periodically. Specific principles that should be considered include:

- Stormwater
- Wastewater
- Infiltration and Inflow
- Water Supply

Current Action

Taunton is in the final stages of completing a CWMP, which incorporates wastewater management, water supply, and stormwater management aspects.

Recommendation

It is recommended that the Water System Master Plan incorporate water conservations strategies presented within this Water Demand Management and Conservation Plan.

2.3.1.2 System Water Audits and Leak Detection

Standard

Conduct a complete, system-wide leak detection survey every two (2) years unless: a) the results of the Annual Statistical Report (ASR) water audit indicates that leakage constitutes a small portion of the system's unaccounted-for water; or b) the volume of leaks detected through the most current leak detection survey (conducted within the previous two years) indicates insignificant leakage.

Current Action

The Taunton Water Department maintains an annual leak detection program, in which approximately 50 percent of the water system is surveyed for leaks each year. The program was initiated in 2006. Leaks are repaired upon discovery.

Recommendation

It is recommended that Taunton continue to perform leak detection surveys of its distribution system. The surveys should continue to cover half of the water system each year to comply with the standard. Surveys should be completed using the guidelines provided in the 2006 Water Conservation Standards. Available funding assistance should be considered for this work.

Standard

Establish penalties and/or fines for stealing water. Those with authority to set and enforce penalties for theft of public water (including but not limited to municipal Water Commissioners, Town Selectmen and public water suppliers; not including private water suppliers) develop a new bylaw/ordinance or amend existing bylaws/ordinances to establish a penalty by providing authority to levy a significant fine and/or penalty, that may be enforced criminally or non-criminally.

Current Policy

The Taunton Water Department has fines in place for water theft and water ban violations. Water theft is treated in a similar manner to the Taunton Fire Department's handling of tampering with or damaging hydrants. The fire department can issue fines for tampering with a fire hydrant.

Recommendation

Taunton currently has fines in place dealing with water theft.

Standard

Conduct an Annual Statistical Report water audit using the MassDEP Water Audit Guidance Document. (http://www.mass.gov/dep/water/approvals/wmgforms.htm#audit).

Current Standing

The Taunton Water Department has been conducting annual water system audits. The City has acknowledged that there has been water accounting issues due to the existing meter inaccuracies and the billing program problems.

Recommendation

It is recommended that the Taunton continue to conduct annual water audits and work with the largest water users in the City to encourage water conservation through private water audits.

2.3.1.3 METERING

Standard

Ensure 100 percent metering of all water uses, including all indoor water use at all municipal facilities (schools, school athletic fields, etc.).

Current Action

It is believed that 100 percent of the water system is metered, including all municipal buildings. There currently is an on-going meter replacement program in Taunton that replaces existing meters with new, remote-read meters. In 2010, a large scale replacement of older meters within the system will occur. Taunton also provides and operates meters on hydrants for contractors if water is needed during construction projects.

Recommendation

It is recommended that Taunton complete the meter replacement program as planned. Taunton should establish an annual budget line item for the calibration, replacement and repair of all sources of supply and distribution network water metering systems.

2.3.1.4 SIZING

Standard

Water service lines and meters for all water distribution system users shall be properly sized to meet AWWA performance standards.

Current Action

Taunton will replace oversized meters with properly sized meters if requested by a large consumer. The Water Department has acknowledged that some large users may have oversized meters and has begun contacting these users to evaluate the required meter size.

Recommendation

It is recommended that Taunton develop and implement a plan to downsize all oversized meters for large users. In addition, Taunton should transfer ownership of large meters to the users and establish a regulation that requires annual testing of the meters by the owner.

2.3.1.5 PRICING

Standard

Establish a water pricing structure that includes the full cost of operating, maintaining, and protecting the water supply system. Perform a rate evaluation every three to five years to adjust costs as needed.

Current Policy

Taunton has a full cost, increasing block rate structure that is revised annually. Residential customers are billed on a quarterly basis while larger customers are billed monthly. Billing rates are as follows (through FY 2019):

Residential Customers

Consumption (HCF)	Rate ($/HCF)
0 – 30	2.76
31 – 250	4.09
>250	4.89

Larger Customers

Consumption (HCF)	Rate ($/HCF)
0 – 10	2.76
11 – 83	4.09
>83	4.89

Taunton charges the equivalent of 100 percent of the water bill for sewer use, however, reduction meters are allowed to account for water not entering the wastewater collection system. The water department and sewer department share billing costs.

Recommendation

It is recommended that Taunton conduct a rate evaluation to determine if current revenues meet current and projected water expenses. The rate study should consider the recommended sewer expansion plan and the impacts of construction cost and operations and maintenance expenses. It is also recommended that Taunton consider increasing the billing frequency for residential users.

2.3.1.6 Residential Water Use

Standard

Install Water Efficient Plumbing Fixtures to meet the standards set forth in the Federal Energy Policy Act, 1992 and the Massachusetts Plumbing Code. Provide and promote toilet leak detection kits, and educational literature about installation of water saving devices and water conservation savings in retrofit programs.

Current Actions

Taunton currently makes water savings devices available to customers as they are received from MassDEP. These items given away as a courtesy and are not sold.

Recommendation

Taunton should continue to promote a residential water conservation program that makes low flow devices available to residents. The program should evaluate the devices that are expected to provide the most benefit and those most desirable for use by residents. In addition, Taunton should make educational literature available regarding installing water savings devices and their potential savings. Available funding assistance should be considered for this work.

Standard

Communities and water suppliers should consider providing free or low cost residential water audits to customers, targeting the largest users first. A residential water audit should include the following components at a minimum: inspection of toilets, showers, faucets, clothes washers, dishwashers, water filters, water softeners, evaporative coolers, spa/hot tub, etc. for leaks, flow rate, presence of

water saving retrofit devices, and efficient use of fixtures and appliances by residents. Audits should include a payback analysis showing homeowners how reductions in water costs justify the investment in the recommended upgrades.

Current Policy

Taunton does not provide regular water audit services to residential customers. The Water Department indicated that they do review water meter data and use trends for inconsistencies that indicate a potential residential leak. The user is contacted to resolve the problem.

Recommendation

It is recommended that the current practices be expanded with a water audit program available to residents. The program should monitor water use trends and target residents whose water use patterns indicate excessive use or dramatic fluctuations. The program should focus on water losses, conservation, and reduction in overall water costs to the residential customer.

2.3.1.7 PUBLIC SECTOR

Standard

Conduct indoor and outdoor audits and account for full use of water, based on full metering of public buildings, parks, irrigated playing fields, and other facilities.

Current Actions

Taunton does currently meter water use at public buildings or recreational facilities. This includes irrigation facilities. Taunton has not implemented a program of installing low flow fixtures in public buildings.

Recommendation

Water usage at all public facilities should be metered. In addition, low flow devices should be installed in all public buildings. Meters should also be installed at recreational fields with irrigation systems. Irrigation systems for municipal fields should be controlled either manually or by timers. Taunton should consider installing moisture sensors on irrigation systems as an additional means of conserving water.

2.3.1.8 INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL

Standard

Carry out a water audit to determine the location and amount of water used for heating, cooling, processing, sanitary use, and outdoor use. Use the findings from the audit as the basis for actions to conserve water such as:

- Recycling and reusing cooling waters to achieve greatest water use efficiency/closed loop cooling.
- Using non-potable water (in conformance with the plumbing code and MassDEP regulations to assure safe drinking water and to avoid cross-connections).
- Using heat-sensitive valves to control cooling equipment.
- Replacing water cooling with air cooling (where possible within air quality standards).
- Installing or retrofitting efficient sanitary water devices, performing scheduled meter maintenance and calibration, and xeriscaping.

Current Action

Taunton has successfully worked with large users in the past in promoting water conservation. Taunton enforces plumbing codes to new and renovated buildings.

Recommendation

It is recommended that Taunton contact the largest commercial and/or industrial customers to promote water conservation. Large commercial and industrial users should develop their own water policies addressing conservation, leak detection and repair, maintenance, and education. These users should install water savings devices and fixtures and conduct a water audit to determine additional means to reduce consumption.

2.3.1.9 AGRICULTURE

Standard

As part of the management of an agricultural operation, adopt a water conservation approach through which water is used in a planned and efficient manner with appropriate amounts and frequency to meet needs without excessive water loss.

Current Action

There are no substantial agricultural users of the municipal water system.

2.3.1.10 LAWN AND LANDSCAPE

Standard

Develop and implement seasonal demand management plans as part of the drought management plan. These plans must identify water supply and environmental indicators to serve as water use restriction triggers and outline a set of increasingly stringent and effective water use restrictions that are designed to protect public health and the environment. Abide by water restrictions and other conservation measures implemented by the municipality or water supplier. Fully enforce water use restrictions. This will ensure effectiveness of the restrictions so that they will be taken seriously by the public.

Current Action

Taunton currently enforces water use restrictions.

Recommendation

It is recommended that Taunton develop a more detailed drought management plan that can be integrated into the Water System Master Plan. The plan should follow the following format based on the MassDEP drought management planning guidance.

2.3.1.11 PUBLIC EDUCATION AND OUTREACH

Standard

Water suppliers and the state should consider using social marketing to help build public support for water conservation. Social marketing is a valuable technique that can help persuade people to use water and land in an environmentally-responsible manner.

Current Practice

Taunton currently uses bill stuffers as educational material to promote and market water conservation to residential customers. Information regarding water use is also provided through

notices in municipal buildings. The annual consumer confidence report also provides information regarding the water system and conservation tips.

Recommendation

Taunton should continue to use current means and evaluate other methods to target the public.

2.4 RECOMMENDED IMPROVEMENTS TO EXISTING SYSTEM

2.4.1 SEWERS

As described in Section 2.1.1 above, the Taunton sewer system varies in age from recently constructed to over 120 years old. In recent years the City has endeavored to improve its system with several goals in mind:

- Rehabilitate or replace the oldest portions of the system first to avoid structural issues (i.e., pipe collapses)
- Remove infiltration and inflow (I/I) to reduce extraneous flow to the WWTF and abate the West Water Street CSO
- Separate combined elements of the system to reduce the likelihood of stormwater entering the sewer system or vice versa

The City intends to continue investing in its existing infrastructure on an annual basis. As pipes and manholes are identified that are good candidates for rehabilitation or replacement, they will be noted and added to the scope of the next rehabilitation project. The City may decide to accomplish some work through its collection system operations and maintenance contract with a private vendor. Veolia Northeast is the current vendor responsible for operations and maintenance of the WWTF and the collection system.

2.4.2 PUMPING STATIONS

As noted in Section 2.2 above, the City has recently developed a capital improvement plan to address the pump stations in most need of immediate repair. Going forward, the intent will be to identify and plan for additional, less urgent upgrades. Such upgrades will take one of two forms. First, the City may identify a small number (2-3) of stations per year that may need significant work, such as pump replacement or an I&C upgrade. Second, the City may identify a larger number of stations that need a similar upgrade, such as generator replacement, and complete that portion of work all at once.

2.4.3 PROJECTED COSTS

As stated in Section 2.4.1, improvements to the sewer system are anticipated to be accomplished through annual evaluation and rehabilitation/replacement contracts. The City anticipates spending approximately $2M-$3M per year for the indefinite future upgrading its sewer pipes and manholes.

The pump station capital improvement plan has identified approximately $10M in important or critical improvements that need to be made to pump stations over the next 5 years. These improvements include such items as controls upgrades, generator replacements, and replacing and upgrading pumps, piping, and valves. As annual inspections identify additional work, it is anticipated that the capital improvement plan will become a “rolling” plan, where it is updated annually to include additional future projects, always looking 5 years into the future.

3.0 NEEDS ANALYSIS FOR UNSEWERED AREAS

3.1 GENERAL

In Chapter 2 of the DEIR, a comprehensive analysis was performed to evaluate future wastewater management needs within the City through the year 2025. This report will update that analysis to take into account recent work and information, and extend the planning period to 2037. Projections of future needs were made in accordance with the MassDEP *Guide to Comprehensive Wastewater Management Planning* and were determined based on projected City population growth and the evaluation of current wastewater treatment and disposal practices in developed, unsewered areas. This chapter of the FEIR provides a summary of that needs analysis and up-dates the data used in the evaluations and the findings presented, as necessary.

Currently, approximately 65 percent of the City's population is served by the municipal wastewater collection system. In the CWMP, all of the unsewered areas of the City were divided into 31 study areas that were then evaluated based on suitability criteria for on-site wastewater treatment. The study areas were then analyzed, with some designated as "needs areas", indicating that they would be good candidates for service by sewers. Study areas and designated needs areas from the CWMP are shown in Figure 3-1. On-site wastewater treatment systems (septic systems) serving these areas vary considerably in age, size and design. Over the years, many of these systems have lost their ability to function properly and fail to adequately dispose of settled wastewater. Septic system failure can be due to several causes such as seasonal high groundwater levels, inadequate infiltration rates, or plugging of leach fields. Failing systems are typically evidenced by backed up toilets, flooded basements, or break-out of sewage at or above ground level. Strong odors generally accompany this condition, and public health issues and surface water contamination can become major concerns. Evaluation of these systems included a review of data concerning area soils, groundwater, lot sizes, the location of reported system repairs and system pumping frequency.

Sewering the identified needs areas to convey sewage to Taunton's WWTF is the most cost effective and environmentally sound alternative. The objective of this analysis was to provide improved wastewater management to these portions of the City where on-site systems are a major concern and an actual or potential cost burden to property owners. Areas with lower priority rankings have longer range needs and may be candidates for alternative systems. The ability of the City to construct and pay for expansions was also factored into recommendations.

3.2 POPULATION AND BUILD-OUT PROJECTIONS

This section describes anticipated population growth and land use development over the planning period, through 2037. Information used includes the City's historic growth rate based on the U.S. Census and population projections prepared by the University of Massachusetts Donahue Institute Population Estimates Program (PEP), and the Community Buildout Analysis commissioned by Taunton Tomorrow in 2017.

The build-out analysis is a valuable tool in discussing future conditions given the project planning period. The build-out analysis was performed in conjunction with the Massachusetts Executive Office of Environmental Affairs and in compliance with *Assisting Communities in Addressing the Housing Shortage Executive Order* (EO 418) and the *Community Preservation Act*, and has been updated for this report. It should be noted that the build-out analysis projects the future development of the City under current

growth trends, zoning, and other regulations, but does not attempt to predict a date when complete build-out will occur. Given the largely undeveloped nature of portions of Taunton, particularly in the residential districts, it is not expected that Taunton will reach its potential build-out within the planning period of this CWMP and FEIR. However, the build-out analysis is referenced to identify potential long-term future trends.

Within Taunton, population has remained fairly steady since 2010, and is not expected to increase significantly over the planning period of this report. Population projections for the City are presented in Table 3-1.

Based on 1990 and 2000 U.S. Census data, a 1.3 percent historic annual housing unit increase was used to project the City's housing unit total for the planning period. This method results in a projected housing unit total of 31,639 in the year 2025, which is a 38 percent increase from the 2000 U.S. Census total of 22,908 housing units.

Table 3-1
Population Estimates and Projections

Year	Population (U.S. Census)	PEP Projection	Taunton Tomorrow Build-Out Analysis, 2017
2010	55,874		
2015	56,817		
2020		56,764	
2025		56,854	
2030		56,564	
2035		55,966	
Build-Out			122,622

The Build-Out Analysis for Taunton indicates that the City could have a build-out population of approximately 122, 622, or a 120% increase from the City's 2010 U.S. Census population. Using this data, the City's population density would increase to 2,532 people per square mile. This indicates that while Taunton's actual population is not expected to increase significantly over the planning period of this report, it does have significant capacity for expansion. A great deal of this expansion capacity, however, is outside of the existing or planned areas of the wastewater collection system.

3.2.1 Potential Areas of Future Development

It is anticipated that residential development will remain relatively neutral in the future, as the center of Taunton is largely developed and only small amounts of development outside of the center of the City are planned.

3.2.2 Recent and Planned Developments

A number of proposed developments were identified in the CWMP and DEIR. These included a mix of residential, commercial, and industrial use projects. Three residential comprehensive permit (MGL Ch. 40B) developments were identified. The first, Powhattan Estates, located off Staples Street in East Taunton, consisted of 150 single family homes and is complete and connected to the municipal sewer

system. The second comprehensive permit development is still under review. If approved, this proposed development would be located near the intersection of Hart and County Streets and would consist of 90 condominium units. The third comprehensive permit development, consisting of 114 single family homes located east of Joseph E. Warner Boulevard, is also complete and connected to the municipal sewer system. In addition, there have been housing developments completed at Lenox Green (Mason St), which consisted of 72 mixed housing units, and Bristol Commons, which is an 88-town house development that replaced an existing 150 apartment complex. Since the CWMP and DEIR, several other residential developments have been approved:

- Highland Heights subdivision – 33 lots, under construction
- Woodbine Street – 10 lots, under construction
- Pinehurst Street - 6 lots – completed
- Hart's Hills – 8 units (4 duplex style condos), under construction
- Hamlen Street - 10 units, street under construction
- Run Brook Circle - 28 units , under construction

All of these developments except for Run Brook Circle are within the existing sewer service area. Run Brook Circle is located in the far western portion of the town, in Study Area EE, and is not recommended for sewer service.

The most significant commercial development planned in the City is the proposed First Light Casino, which would be constructed on part of the Liberty and Union industrial park. At the time of this report, the Casino is facing legal challenges that could impact its construction. For the purposes of this report, however, it will be assumed that the Casino will be constructed during the first ten years of the planning period, and contribute 225,000 gpd of wastewater at full buildout. This flow estimate is from the Casino's Environmental Impact Report prepared in 2014.

Industrial use developments were also identified. There are two industrial parks in Taunton – the Myles Standish Industrial Park and the Liberty and Union Industrial Park. Both parks are currently expanding, and the primary uses are expected to be light manufacturing, warehousing, and distribution facilities with associated office space. The Liberty and Union Industrial Park Phase III is located on the south side of Stevens Street near the Route 140 interchange. The Myles Standish Industrial Park is currently in Phase V of expansion. Myles Standish Phase V involves expanding the Park onto 72 acres of land formerly occupied by the Dever State School's core campus and includes another 642,000 square feet of building area. The expansion will increase the building area by 33 percent. A flow allowance of 100,000 gallons per day is allocated for Myles Standish Phase V and Liberty and Union through the year 2037.

3.3 ZONING

At the time of preparation of this report, there is no indication of pending zoning changes that would significantly alter the build-out projections discussed in the previous section.

3.4 Evaluation of Existing On-Site Wastewater Treatment Systems

As part of the needs analyses in previous reports, areas of the City that currently rely on on-site wastewater disposal systems were broken down into 31 study areas. Delineations of these areas are shown on Figure 3-1 and are designated as study areas A through EE. The existing sewer area, and those areas designated as Needs Areas in this report are shown in Figure 3-2. Using available information including Taunton Board of Health and Assessor's records, these study areas were evaluated to identify locations experiencing problems with on-site systems and to determine the suitability for continued use of on-site systems under Title 5, 310 CMR of the Massachusetts Environmental Code (Title 5). This report serves to update prior analyses with current information.

Prior to the implementation of Title 5 regulations in 1978, many on-site disposal systems were cesspools or septic systems with tank capacities less than 1,000 gallons. Since 1978, homeowners have been required to install septic systems of increased size and in accordance with Title 5 requirements. As of March 31, 1995, Title 5 requires septic tanks with minimum capacities of 1,500 gallons and does not permit new construction or repair of cesspools. Cesspools are considered sub-standard systems and as such, provide less treatment and are more susceptible to clogging and failure than a compliant Title 5 system. Current Title 5 requirements related to design criteria, siting, construction and inspection are more stringent than the 1978 code. Table 3-2 compares current Title 5 regulations with the 1978 code.

The most important maintenance practices to extend the life of an on-site system are regular inspection and pumping of the septic tank. Removal of the floating scum and settled solids from the septic tank minimizes the possibility of clogging the soil absorption system. In an attempt to educate Taunton residents, the City Board of Health has hosted informational lectures on proper care and maintenance of on-site sewage disposal systems.

Although regular septic tank pumping improves the efficiency and life of the system, pumping of septic tanks does not guarantee the permanent functioning of an on-site system, especially in areas where poor soil conditions and high groundwater levels inhibit system performance. Eventually, even the best maintained systems require replacement.

To further evaluate the designated study areas, information from various sources was compiled and several Geographic Information Systems (GIS) based maps were created. The GIS based maps were compiled with data layers including soil suitability, wetlands and surface water bodies, drinking water protection zones, and locations of system repairs and frequent system pumping. Copies of these maps are included in Appendix A of the CWMP, which can be found in Appendix A of this FEIR. The following is a description of relative information used to evaluate each study area for its ability to sustain on-site septic systems.

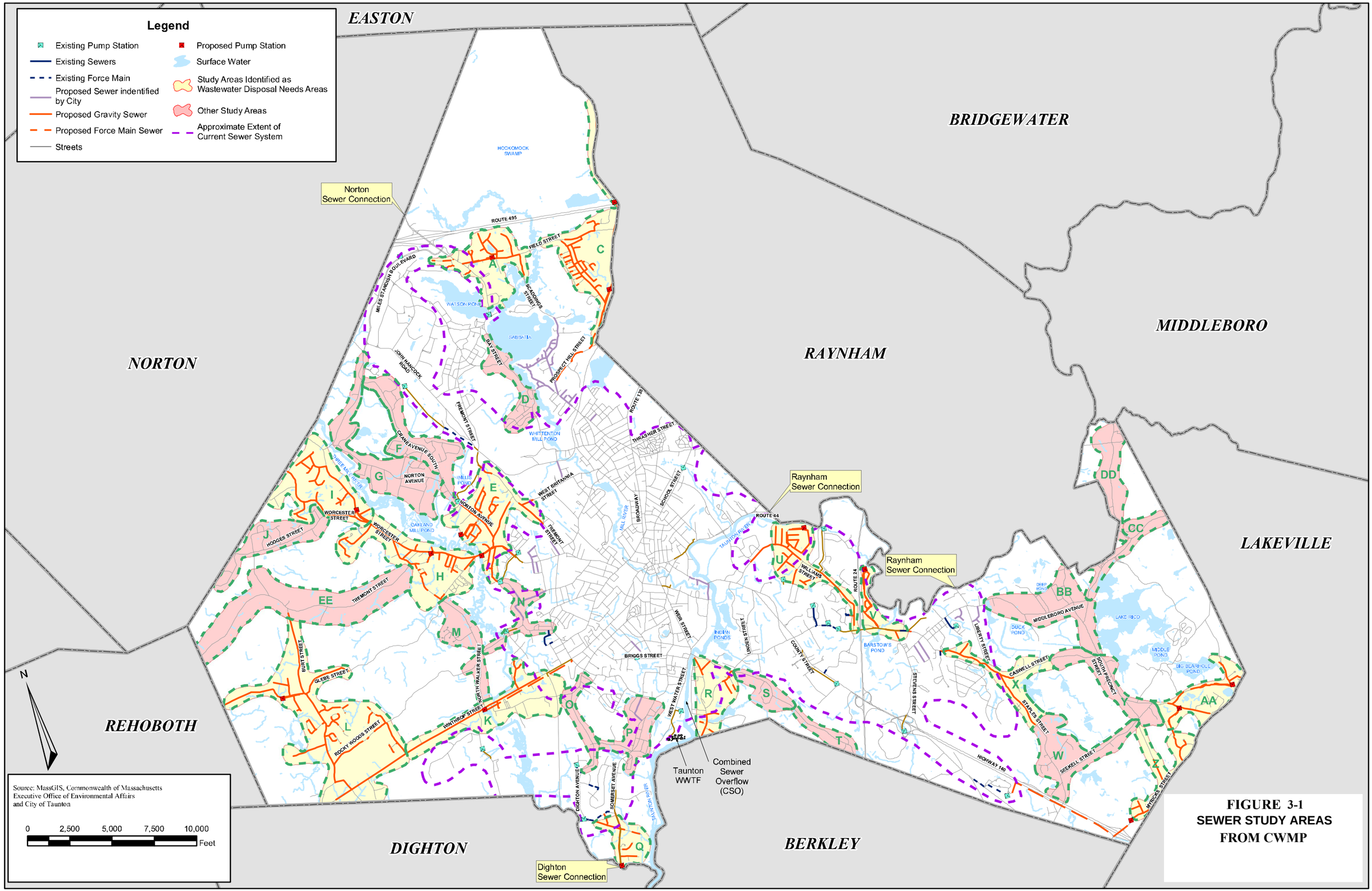


FIGURE 3-1
SEWER STUDY AREAS
FROM CWMP

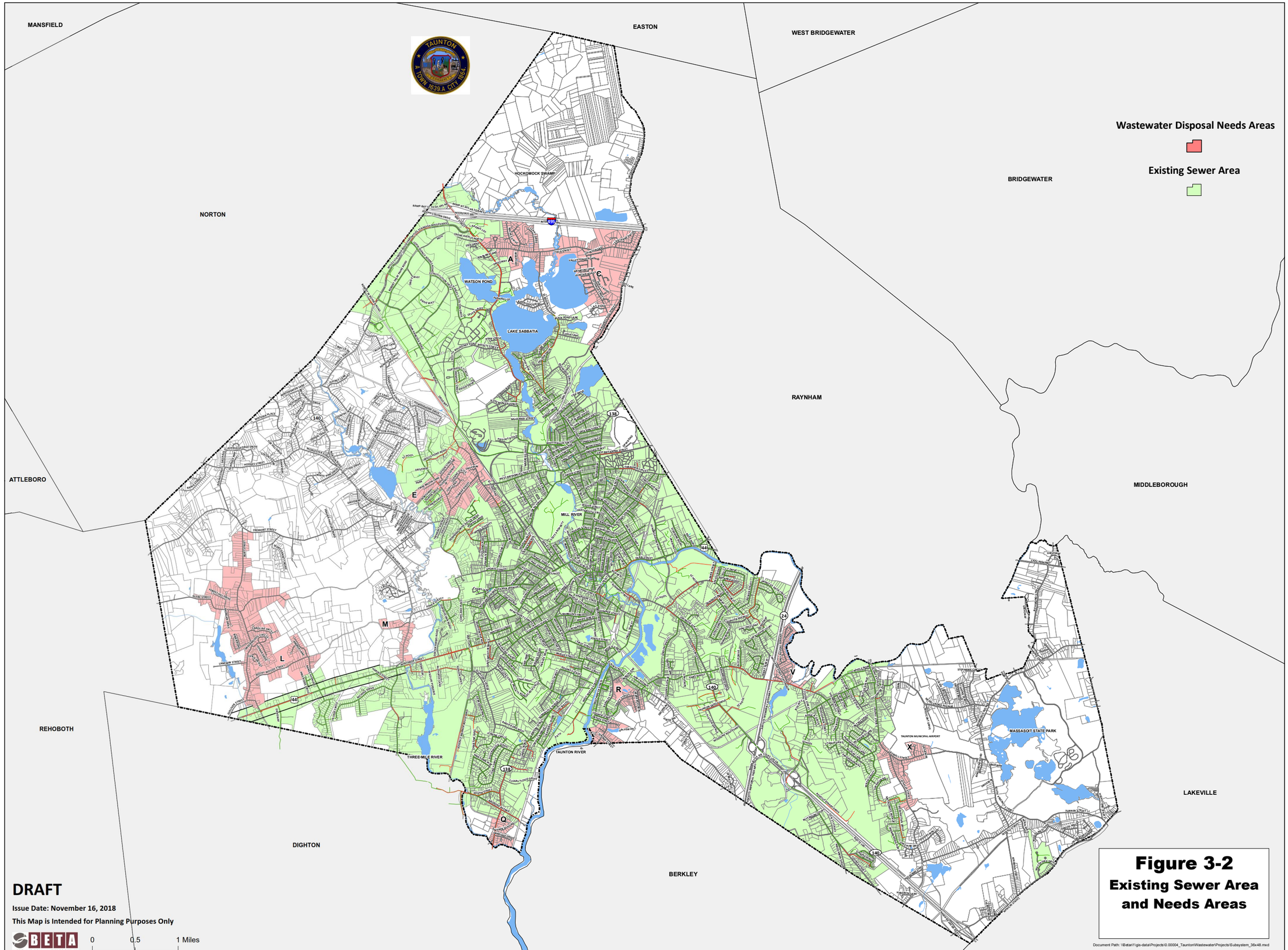

MANSFIELD
EASTON
WEST BRIDGEWATER
BRIDGEWATER
NORTON
RAYNHAM
ATTLEBORO
MIDDLEBOROUGH
REHOBOTH
DIGHTON
BERKLEY
LAKEVILLE
TAUNTON
HOCKOMOCK SWAMP
WATSON POND
LAKE SABBATIA
MILL RIVER
THREE MILE RIVER
TAUNTON RIVER
MASSASOIT STATE PARK
TAUNTON MUNICIPAL AIRPORT
A
C
E
L
M
Q
R
V
X
Wastewater Disposal Needs Areas
Existing Sewer Area
DRAFT
Issue Date: November 16, 2018
This Map is Intended for Planning Purposes Only
BETA
IMPROVING COMMUNITIES TOGETHER
0
0.5
1 Miles
Figure 3-2
Existing Sewer Area
and Needs Areas
Document Path: \\Beta1\gis-data\Projects\0.00004_Taunton\Wastewater\Projects\Subsystem_36x48.mxd

Table 3-2
Title 5 Regulations

Provision	1978 Code	Current Title 5
Water Supply Reservoirs	100 feet	400 feet
Tributaries to Reservoirs	100 feet	200 feet
Certified Vernal Pools	Not Addressed	100 feet (50 feet if vernal pool is upgradient)
Bordering Vegetated Wetland, Salt Marshes, Inland and Coastal Banks	50 feet	50 feet (100 feet if wetlands bordering surface water supply or tributary thereto)
Private Water Supply Well	100 feet	100 feet
Property Line	10 feet	10 feet
Cellar Wall	20 feet	20 feet
Slab Foundation	Not Addressed	10 feet
Reserve Area	Area between leaching pits, galleries, or trenches may be used.	Area between trenches may be used if greater than or equal to 6 feet apart; new systems shall include a reserve area sufficient to replace the primary soil absorption system
Minimum Design Flow	None	330 gpd (220 gpd allowed if 2-bedroom deed restriction)
Leaching Trenches	Minimum width: 1 foot Maximum length: 100 feet	Minimum width: 2 feet Maximum width: 4 feet Maximum length: 100 feet
Minimum Septic Tank Capacity	1,000 gallons	1,500 gallons
Distance from Maximum Groundwater	4 feet to bottom of leaching area; 1 foot from invert of septic tank outlet	4 feet to bottom of stone underlying absorption system if perc rate > 2 min/in. 5 feet if perc rate < 2 min/in.
Inspection of Existing System	Not Addressed	Except as provided in 310 CMR 15.301(2), 15.301(3), 15.301(4), a system shall be inspected at or within two years prior to the time of transfer of title to the facility served by the system.
Upgrade Standard	Required substandard systems be upgraded to meet requirements of code, or get a variance from the Board of Health and MA DEP	Where no expansion or change of use proposed, standard is "maximum feasible upgrade," with Board of Health approval needed if system cannot meet groundwater separation or drinking water supply setback requirements, or construction of a basic three-part system
Nitrogen Loading	Not Addressed	One acre of land required to build 4-bedroom house in: recharge areas of public wells, designated (through Surface Water Quality Standards) nitrogen sensitive areas and coastal embayments, and new developments served by well and septic system on

		same lot; no new system in these areas shall receive greater than 440 gpd per acre.
Large Systems	Defined as systems greater than 15,000 gpd	Defined as systems 10,000 gpd or greater but less than 15,000 gpd, or greater than 2,000 gpd in well recharge areas or within setbacks for water supplies.

3.4.1 Existing Lot Size

Existing lot sizes were evaluated to determine the ability of sites to sustain an existing septic system and support upgrading or installing new on-site treatment systems. Lot size is significant when considering long-term use of on-site wastewater systems due to limited reserve area for leach fields on small lots. With lots less than a half-acre, available space may be insufficient for periodic replacement of leach fields. Larger lot sizes are more suitable for on-site wastewater systems as there is greater likelihood to have available land for reserve areas for upgrades. Using assessor's information average lot sizes were determined for each study area.

For the purposes of evaluating the suitability of lot sizes, study areas with an average lot size less than half an acre were considered to be not favorable for continued use of on-site septic systems. Study areas with average lot sizes greater than a half-acre were considered suitable for continued use of on-site septic systems. However, average lot sizes less than an acre but greater than a half-acre were considered less favorable than lot sizes greater than acre.

3.4.2 Wetlands and Surface Water

The City of Taunton is located in the Taunton River Basin. Several major surface water and wetland features exist within the City. Major surface water features include the Taunton River, which runs through the center of the City and forms part of the southern and northern boundary of the City, and the Three Mile River located in the western portion of the City. Other prominent water bodies in the City include: Mill and Snake Rivers, Lake Sabbatia, Lake Rico, Watson Pond, Oakland Mill Ponds, Black Pond, Thatcher Pond, Kings Pond, Big Bearhole Pond, and Barstow's Pond. The Massachusetts Water Resources Commission Report on stressed basins (2001) indicates that the northern and western portions of the Taunton River Basin are considered moderately stressed. A stressed basin is defined as a basin or sub-basin in which the quantity of stream flow has been significantly reduced, the quality of stream flow has been degraded, or key habitat factors are impaired.

Wetlands and surface water are considered sensitive environmental receptors that can be subject to adverse impacts due to failing septic systems. Using Mass GIS mapping layers to identify areas of wetlands and surface waters, each study area was evaluated based on the percentage of wetlands and surface area contained therein. Study areas with a significant percentage of wetlands and surface water were considered less suitable for the continued use of on-site septic systems. The surface water, wetlands, and other natural resource areas located within the nine Needs Areas are shown in Figures 3-3 through 3-11.

Figure 3-3 - Needs Area Q Natural and Water Resources

Figure 3-3

Figure 3-4 - Needs Area L Natural and Water Resources

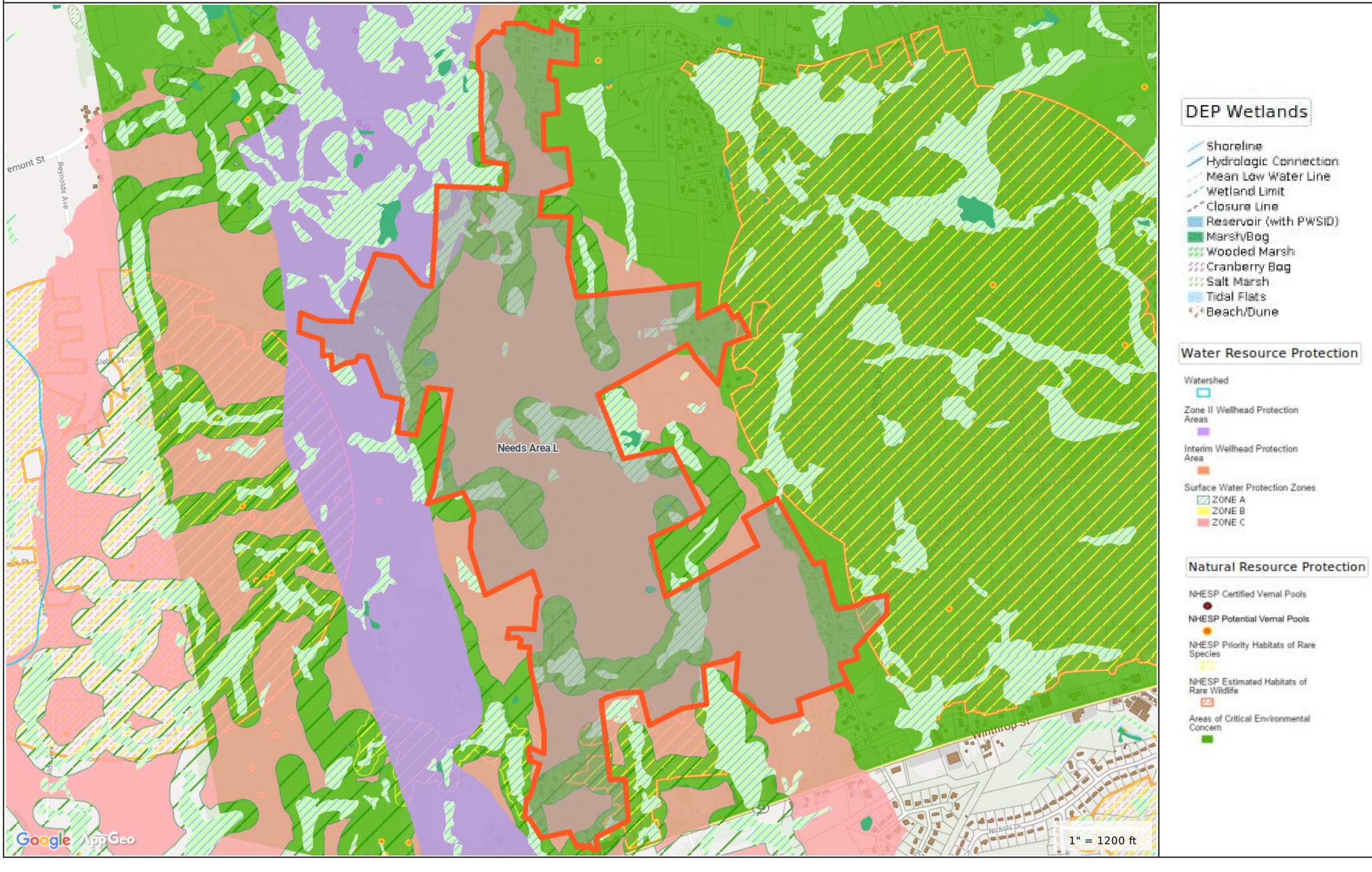


Figure 3-4

Figure 3-5 - Needs Area A Natural and Water Resources

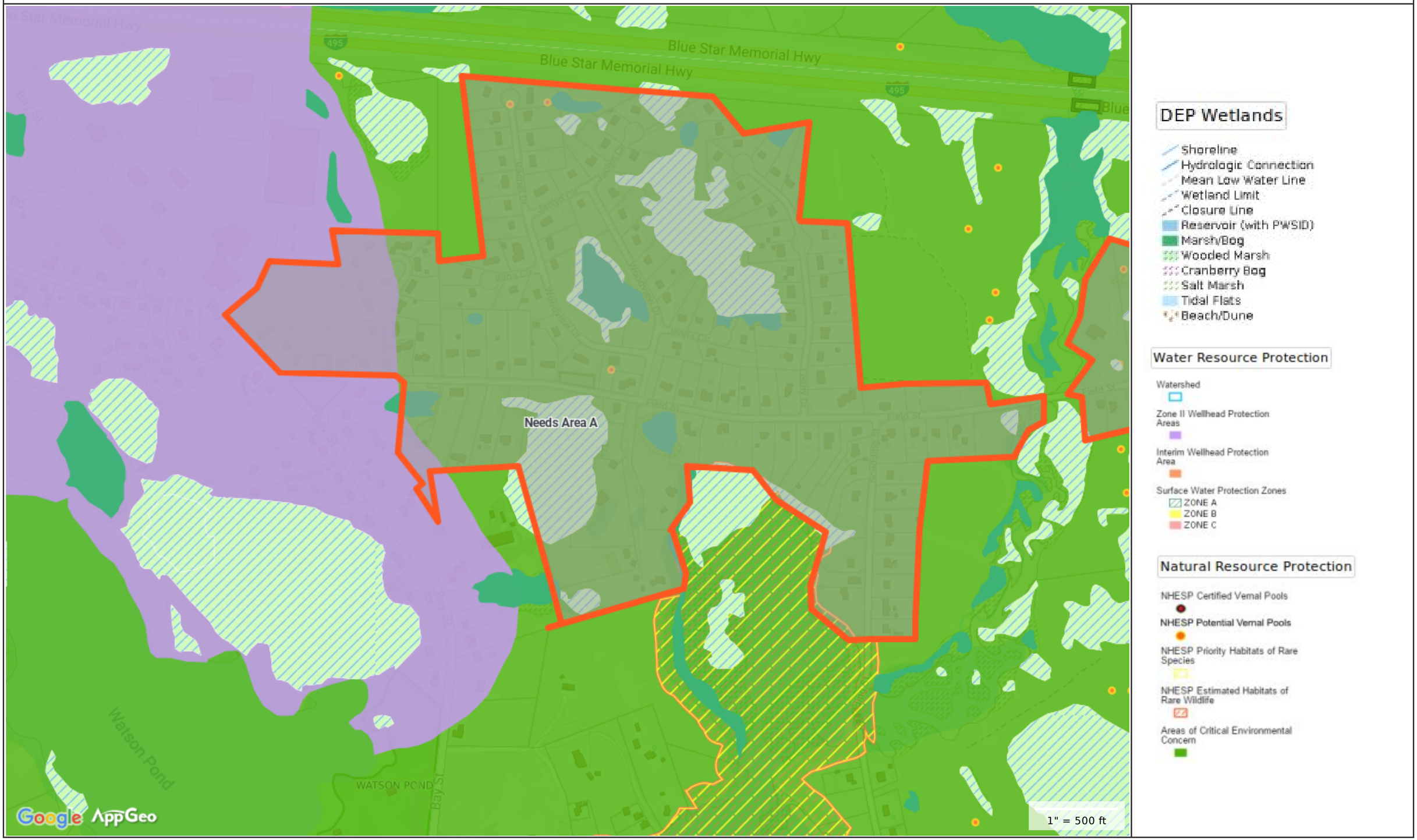


Figure 3-5

Figure 3-6 - Needs Area X Natural and Water Resources

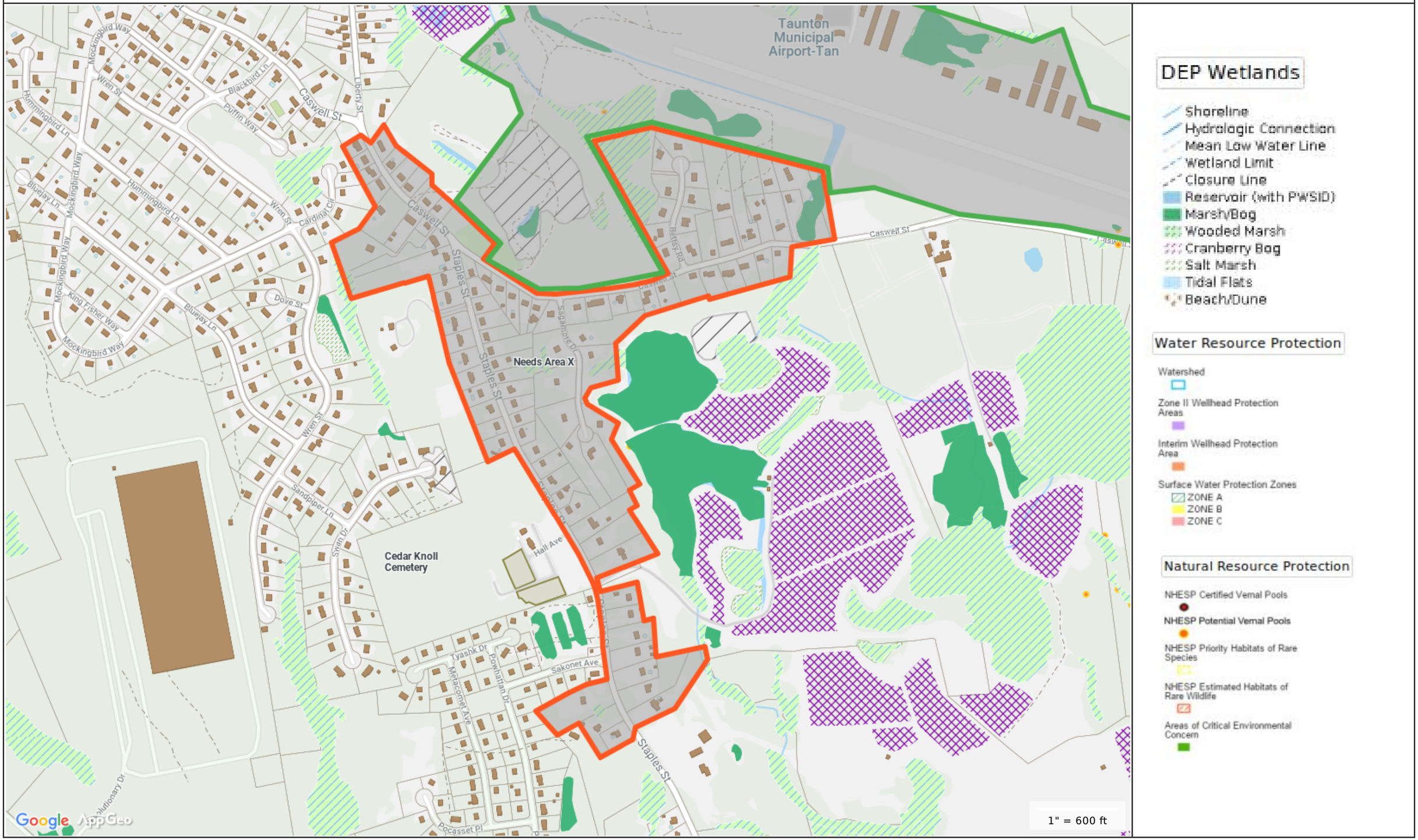


Figure 3-6

Figure 3-7 - Needs Area C Natural and Water Resources

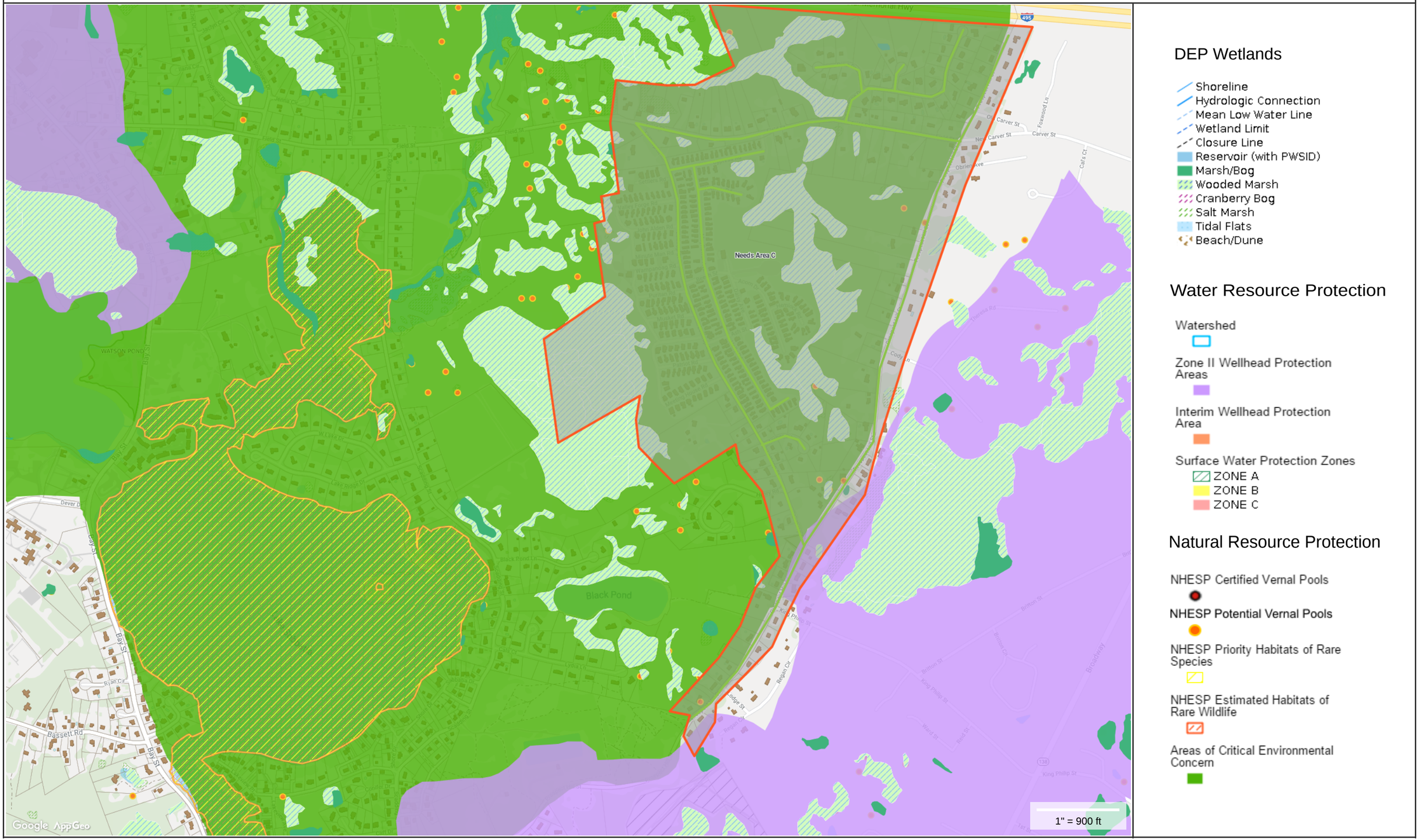


Figure 3-7

Figure 3-8 - Needs Area M Natural and Water Resources

Figure 3-8

Figure 3-9 - Needs Area R Natural and Water Resources

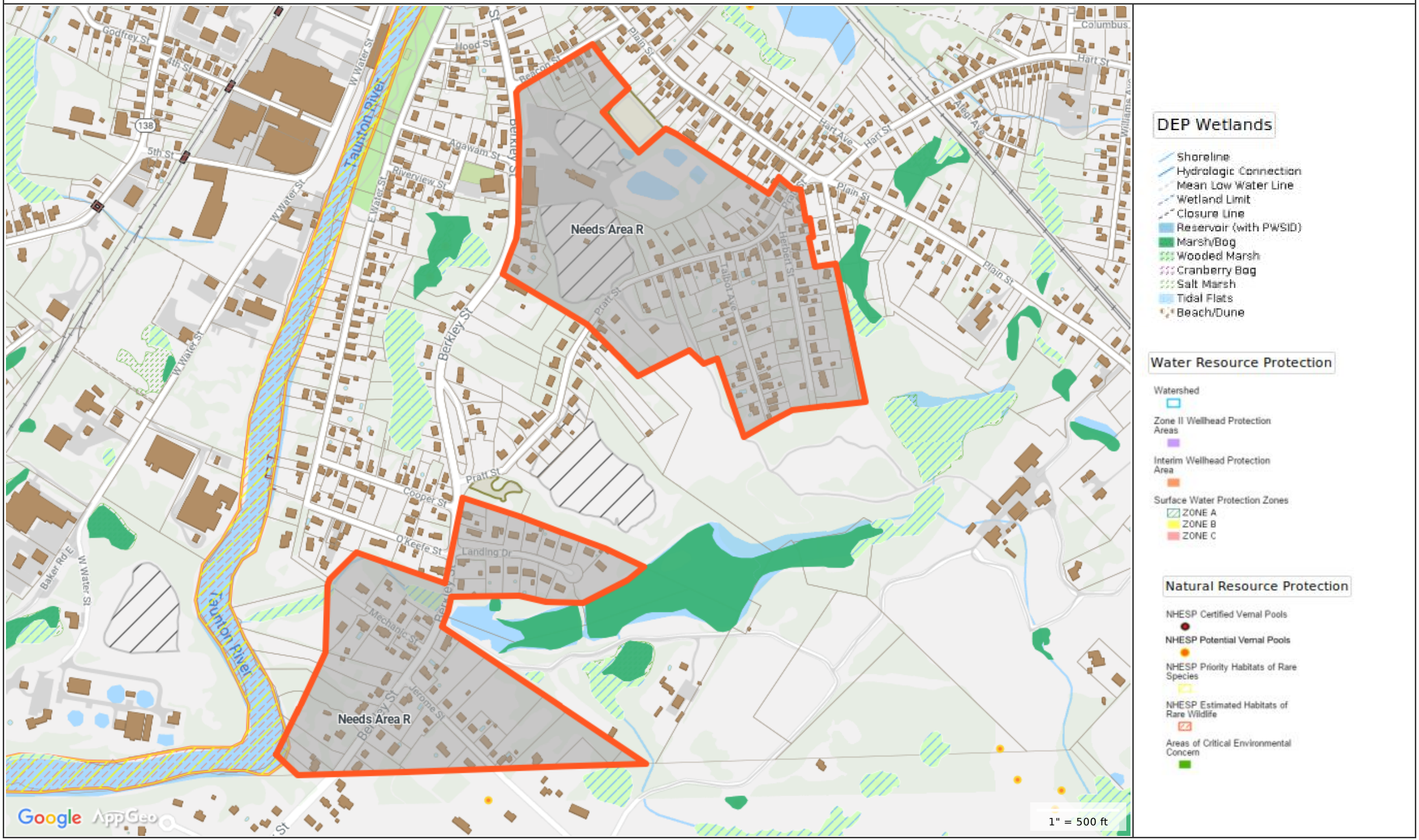
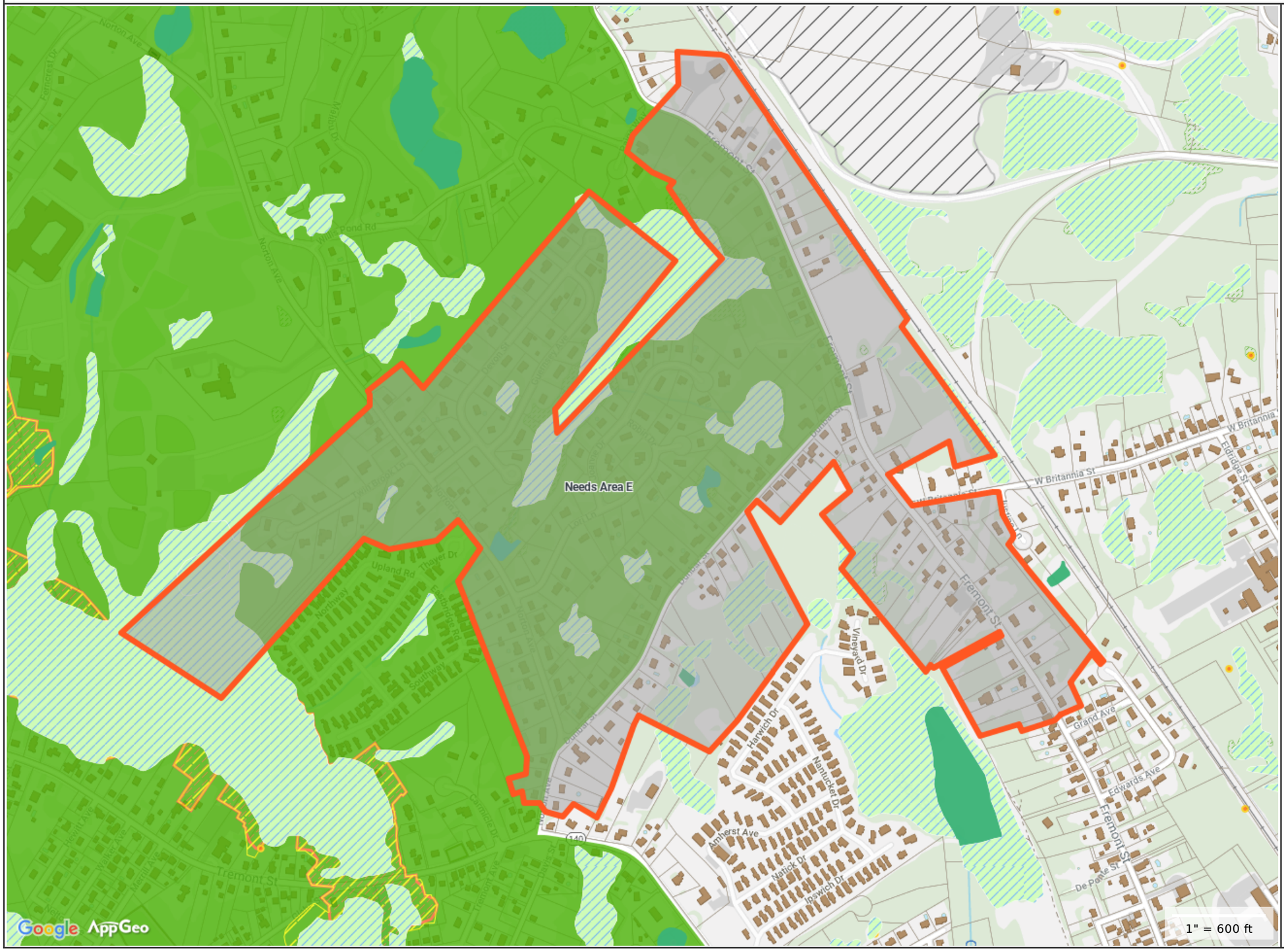


Figure 3-9

Figure 3-10 - Needs Area V Natural and Water Resources

Figure 3-10

Figure 3-11 - Needs Area E Natural and Water Resources



DEP Wetlands

- Shoreline
- Hydrologic Connection
- Mean Low Water Line
- Wetland Limit
- Closure Line
- Reservoir (with PWSID)
- Marsh/Bog
- Wooded Marsh
- Cranberry Bog
- Salt Marsh
- Tidal Flats
- Beach/Dune

Water Resource Protection

- Watershed
- Zone II Wellhead Protection Areas
- Interim Wellhead Protection Area
- Surface Water Protection Zones
  - ZONE A
  - ZONE B
  - ZONE C

Natural Resource Protection

- NHESP Certified Vernal Pools
- NHESP Potential Vernal Pools
- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife
- Areas of Critical Environmental Concern

Figure 3-11

3.4.3 Drinking Water Supply

Interim Wellhead Protection Areas (IWPA) and Zone II groundwater protection areas were evaluated since they are considered nitrogen sensitive areas and regulations for on-site wastewater disposal systems in these areas are more stringent. IWPA and Zone IIs groundwater protection areas for public water supplies have been determined by MassDEP to be particularly sensitive to the discharge of pollutants from on-site sewage disposal systems and are therefore designated nitrogen sensitive areas. On-site systems within these areas require a higher level of treatment that may include nitrogen removal or increased soil absorption system size. Wellhead protection areas are important for protecting the recharge area around public water supply wells. A Zone II wellhead delineation identifies the source area which contributes water to a well as determined though hydrogeologic modeling. An IWPA is a conceptual protective radius around a well in such cases where hydrogeologic modeling has not been performed. The IWPA protective radius is determined based on well pumping rates or default values and is used until a more specific Zone II wellhead delineation is established.

Surface water supplies are classified as Zones A, B, or C. Zone A protection areas represent the land area within a 400-foot lateral distance from the upper boundary of the bank of a Class A surface water source and the land area within a 200-foot lateral distance from the upper boundary of the bank of a tributary or associated surface water body. Zone B represents the land area within one-half mile of the upper boundary of the bank of a Class A surface water source, or the edge of a watershed, whichever is less. Zone B always includes the land area within a 400-foot lateral distance from the upper boundary of the bank of the Class A surface water source. Zone C represents the land area not designated as Zone A or B within the watershed of a Class A surface water source. Class A waters are designated as a source of public water supply. To the extent compatible with this use they provide excellent habitat for fish, other aquatic life and wildlife, and are suitable for primary and secondary contact recreation. These waters have excellent aesthetic value and are designated for protection as outstanding resource waters. To restrict septic systems in close proximity to these protected areas, Title 5 regulations require greater setbacks for system components from such areas.

In the interest of preserving environmental quality, study areas that contained significant water supply protection areas were considered less favorable for continued use of on-site septic systems. Water supply protection areas are shown in Figures 3-3 through 3-11.

3.4.4 Soils

According to the soil survey for Bristol County Massachusetts, Northern Portion (USDA 1978), four main soil associations exist within the City boundaries: Hinkley-Medisaprist-Windsor association, Paxton-Whitman-Ridgebury soils, Paxton-Woodbridge-Ridgebury, and the Raynham-Scio-Birdsall soil association. The Hinkley-Medisaprist-Windsor association lies generally in the northeast and southern regions of the City in the vicinities of the Taunton River, Threemile River and Mill River. This soil association consists of nearly level to steep, excessively drained soils that formed in glacial outwash and very poorly drained organic soils. The Paxton-Whitman-Ridgebury soil association lies generally in the southeastern region of the City in the vicinity of the headwaters of the Segreganset River. The Paxton-Whitman-Ridgebury association contains nearly level to moderately steep, well-drained to very poorly drained soils on glacial uplands. The Paxton-Woodbridge-Ridgebury soil association lies generally in the northeastern and southeastern region of the City in the vicinity of Furnace Brook and south of Massasoit State Park. Paxton-Woodbridge-Ridgebury soil association contains nearly level to moderately steep, well-drained to poorly drained soils on glaciated uplands. The Raynham-Scio-Birdsall soil association lies

in the vicinity of the Taunton River. These soils contain nearly level to gently sloping, moderately well drained to very poorly drained soils that formed on old lakebeds.

Soil map units and soil descriptions from the USDA, as well as data obtained from Title 5 inspections and soil borings performed as part of the 1981 Facilities Plan, were used to evaluate areas of Taunton for the suitability of certain soils to treat wastewater in accordance with the Massachusetts Environmental Code, Title 5. Soil characteristics such as permeability, depth to bedrock, and depths to seasonal high groundwater table were used to determine suitability for on-site septic systems. The soil groupings were based on the capability of soils to receive and pass wastewater. However, highly permeable soil may adequately receive the wastewater, but may not retain it long enough for adequate treatment. Therefore, vertical separation between system leach field and seasonal high groundwater must be considered. Using GIS mapping, soil units were combined into one of two groups; soils considered suitable for continued use of on-site septic systems and soils considered unsuitable for continued use of on-site septic systems.

3.4.5 Groundwater

High groundwater elevations can have a significant effect on the performance of on-site septic systems. There are many low lying areas of Taunton that contain wetlands or surface water bodies that are in close proximity to developed areas. As such, the high groundwater table in these areas makes it difficult for typical on-site septic systems to provide adequate vertical separation to groundwater, meaning that soil may adequately receive the wastewater, but may not retain it long enough for adequate treatment. Data obtained from soil borings and Title 5 tests indicated that although some soils in these areas are suitable for on-site septic systems, high groundwater levels may adversely affect system performance and cause septage overflow, ponding, or partially treated wastewater mixing with groundwater. Based on the significant impact that groundwater can have on the performance of on-site systems, more weight was given to this factor than other categories.

3.4.6 Septic System Repair and Pump-Out Records

A detailed review of Board of Health records was conducted to determine areas of the City where widespread problems with on-site disposal systems have been documented. Board of Health records from 2002-2017 were reviewed to identify specific locations that have system failures. Failures may result in replacement of individual components such as a new septic tank, distribution box, leaching field, or any combination of these components. Information collected from Board of Health data, where available, included street address, date of percolation test, percolation rate, type of repair, general soil type, depth to seasonal high groundwater, and location on assessor's maps. A map of septic system failures between 2002 and 2017 is shown in Figure 3-12.

Individual study areas were evaluated based on the number of septic system failures. A failure rate was determined based on the percentage of houses within the study area that were identified as having had system repairs or frequent system pumping. The higher this percentage within a study area, the more likely this area was not considered favorable for continued use of on-site septic systems.

3.4.7 Availability of Municipal Sewer and Water Service

The study areas were evaluated based on their proximity to existing municipal sewer and water systems. Study areas that did not have municipal sewer readily available were considered to be more likely to continue their reliance on on-site disposal systems. Study areas without municipal water rely on private

2002-2017

Total Failed Inspections: 478

N

W E

S

Issue Date: Januyary, 2018

This Map is Intended for Planning Purposes Only

BETA
www.BETA-Inc.com

0 0.5 1 Miles

Figure 3-12
Title 5 Failure Map

Document Path: Q:\Projects\0.0000-4_Taunton\Title V\Project\ TitleV_Map_36x48.mxd

water wells, which could be affected by improperly functioning septic systems. Where private wells are in use, lot size and soil conditions are important considerations when evaluating the viability of on-site disposal systems.

3.4.8 Criteria Rating System

For each of the above criteria a rating value was assigned based on the ability to support an on-site wastewater disposal system. Ratings for each evaluation category were totaled to determine a total rating for each study area. A higher rating is indicative of less favorable conditions to support on-site systems. A summary of the criteria and rating values is provided in Table 3-3.

3.4.9 Evaluation Results

As described in previous sections, information used to evaluate areas currently served by on-site wastewater disposal systems included lot size, extent of wetlands and surface water, drinking water protection areas, soil suitability based on USDA soil descriptions, groundwater suitability, septic system repair and pump-out frequency and the availability of municipal sewer and water.

Study areas were determined by grouping streets and neighborhoods in a reasonable way such that areas could be evaluated equally for various wastewater alternatives. Study areas B, U, and K have completed sewer extensions and are therefore excluded from further evaluation.

Based on the criteria rating system summarized in Table 3-3, a data matrix was developed for each study area to identify and prioritize wastewater disposal needs. The matrix is provided as Table 3-4. Areas with a total rating of 20 or higher were considered needs areas that are recommended for sewers. A total of eleven study areas (in order of rating); Q, L, A, F, X, C, R, V, EE, E, and M were given a rating of 20 or above. A majority of these study areas are characterized by high seasonal groundwater and relatively high system repair/pumping rates. This list differs somewhat from those presented in the CWMP and DEIR, based primarily on changes to the septic system failure rates. A map showing the current wastewater service area and new wastewater Needs Areas is shown in Figure 3-2.

Each of the needs areas are described briefly in Section 3.4.9.1, and those that have been eliminated from consideration are described in Section 3.4.9.2.

Table 3-3
Rating Criteria for Evaluating Wastewater Needs Areas

Average Lot Size	-	Average lot size for each subarea was determined using lot size information obtained from the
Extent of Wetlands and Surface Water	-	Identified extent of wetlands and surface water in each subarea using the MassGIS wetlands and surface water data layers. Wetland and surface water coverage was evaluated within the study areas. Rating: low - favorable (1), moderate - less favorable (2), significant - not favorable (3)
Drinking Water Protection Areas	-	Drinking water protection areas were identified using Mass GIS data layers for water protection. Rating: no protection area within subarea (1), < 50% of subarea is within protection area (2), > 50% of subarea is within protection area (3)
Soil Suitability-	-	Soil suitability was determined using soil descriptions from Title 5 testing, USDA - NRCS soil classifications, and soil borings performed as part of the 1980 Taunton Facilities Plan. Rating: suitable for on-site wastewater system - favorable (1), limited soil - less favorable (2), unsuitable soil - not favorable (3)
Groundwater Suitability -	-	Groundwater suitability was determined based on groundwater information obtained from Title 5 testing. The percentage of Title 5 testing locations that indicated groundwater conditions unsuitable for on-site sewage disposal systems was used to evaluate subareas. These conditions were also compared to USDA-NRCS soil classifications and soil borings performed as part of the 1980 Taunton Facilities Plan. Rating: < 10% unsuitable - favorable (2), 10% to 20% unsuitable - less favorable (4), > 20% unsuitable - not favorable (6)
Cluster of On-Site System Repairs and Frequent System Pumping	-	The number of system repair locations and frequent pumping locations were combined to determine the percentage of buildings within each subarea that have required septic repairs or frequent pumping. This percentage or cluster rate was then used to evaluate the subarea. Rating: < 10% - favorable (2), 10% to 20% - less favorable (4), > 20% - not favorable (6)
Municipal Sewer in Area	-	Availability of Municipal Sewer Rating: no municipal sewer is in subarea (1), sewered area adjacent to subarea (2), sewer partially located within subarea (3)
Municipal Water in Area	-	Availability of Municipal Water Rating: water service available in subarea (1), water service partially available in subarea (2), no water service available within subarea (3)

TABLE 3-4
RANKING OF WASTEWATER NEEDS AREAS

Study Area	Lot Size		Extent of Wetlands and Surface		Drinking Water Protection Area			Soil Suitability		Groundwater Suitability		On-Site System Failures				Municipal Sewer In Area (4)	Municipal Water In Area (5)	Total Rating (6)
	Average Lot Size	Rating (1)	Surface Water and Wetlands Area	Rating (1)	Protection Area Within Study Area	Type of Protection Area	Rating (2)	Soil Suitability	Rating (1)	Groundwater Suitability	Rating (3)	Failures	Houses within Study Area	Failure Rate	Rating (3)			
Q	>1/2 Acre to 1 Acre	2	significant	3	yes	IWPA	2	Limited	2	Unsuitable	6	13	102	13%	6	3	2	26
L	>1/2 Acre to 1 Acre	2	significant	3	yes	IWPA, Zone C, Zone A	3	Limited	2	Unsuitable	6	41	444	9%	4	3	2	25
A	>1/2 Acre to 1 Acre	2	moderate	2	yes	IWPA	2	Limited	2	Limited	4	23	148	16%	6	2	1	21
F	> 1 Acre	1	significant	3	no	-	1	Suitable	1	Unsuitable	6	29	269	11%	6	2	1	21
X	>1/2 Acre to 1 Acre	2	moderate	2	no	-	1	Suitable	1	Unsuitable	6	25	143	17%	6	2	1	21
C	>1/2 Acre to 1 Acre	2	moderate	2	no	-	1	Limited	2	Unsuitable	6	14	154	9%	4	1	2	20
R	>1/2 Acre to 1 Acre	2	significant	3	no	-	1	Limited	2	Unsuitable	6	8	155	5%	2	3	1	20
V	< 1/2 Acre	3	moderate	2	no	-	1	Suitable	1	Unsuitable	6	8	119	7%	4	2	1	20
EE	> 1 Acre	1	significant	3	no	-	1	Limited	2	Unsuitable	6	10	141	7%	4	1	2	20
E	>1/2 Acre to 1 Acre	2	significant	3	no	-	1	Limited	2	Unsuitable	6	11	220	5%	2	2	2	20
M	>1/2 Acre to 1 Acre	2	moderate	2	no	-	1	Limited	2	Unsuitable	6	3	33	9%	4	2	1	20
H	> 1 Acre	1	significant	3	no	-	1	Suitable	1	Unsuitable	6	21	250	8%	4	1	1	18
J	>1/2 Acre to 1 Acre	2	moderate	2	no	-	1	Unsuitable	3	Unsuitable	6	12	188	6%	2	1	1	18
N	>1/2 Acre to 1 Acre	2	low	1	no	-	1	Limited	2	Unsuitable	6	2	107	2%	2	3	1	18
S	>1/2 Acre to 1 Acre	2	low	1	no	-	1	Unsuitable	3	Unsuitable	6	2	53	4%	2	2	1	18
CC	> 1 Acre	1	low	1	no	-	1	Suitable	1	Unsuitable	6	10	88	11%	6	1	1	18
O	> 1 Acre	1	low	1	no	-	1	Unsuitable	3	Unsuitable	6	4	121	3%	2	2	1	17
W	>1/2 Acre to 1 Acre	2	low	1	no	-	1	Limited	2	Limited	4	14	161	9%	4	1	2	17
Z	>1/2 Acre to 1 Acre	2	low	1	no	-	1	Limited	2	Suitable	2	8	78	10%	6	1	2	17
AA	> 1 Acre	1	significant	3	no	-	1	Suitable	1	Unsuitable	6	9	161	6%	2	1	2	17
BB	> 1 Acre	1	moderate	2	no	-	1	Suitable	1	Unsuitable	6	19	214	9%	4	1	1	17
P	> 1 Acre	1	low	1	no	-	1	Suitable	1	Unsuitable	6	7	89	8%	2	3	1	16
T	> 1 Acre	1	low	1	no	-	1	Unsuitable	3	Unsuitable	6	1	42	2%	2	1	1	16
DD	> 1 Acre	1	low	1	no	-	1	Limited	2	Unsuitable	6	0	78	0%	2	1	2	16
I	> 1 Acre	1	moderate	2	no	-	1	Suitable	1	Unsuitable	6	11	259	4%	2	1	1	15
G	> 1 Acre	1	significant	3	no	-	1	Suitable	1	Limited	4	16	253	6%	2	1	1	14
Y	> 1 Acre	1	moderate	2	no	-	1	Suitable	1	Limited	4	4	85	5%	2	1	1	13
~~K~~	~~>1/2 Acre to 1 Acre~~	~~2~~	~~significant~~	~~3~~	~~no~~	~~-~~	~~1~~	~~Limited~~	~~2~~	~~Limited~~	~~4~~	~~6~~	~~216~~	~~3%~~	~~2~~	~~3~~	~~1~~	~~18~~
~~U~~	~~< 1/2 Acre~~	~~3~~	~~moderate~~	~~2~~	~~no~~	~~-~~	~~1~~	~~Limited~~	~~2~~	~~Unsuitable~~	~~6~~	~~20~~	~~300~~	~~7%~~	~~4~~	~~3~~	~~1~~	~~22~~

(1) Ratings as follows:
1 = Favorable
2 = Less Favorable
3 = Not Favorable

(2) Ratings as follows:
1 = No protection area within study area
2 = Protection area partially located within study area
3 = Significant portion of protection area located within study are

(3) Ratings as follows:
2 = Favorable
4 = Less Favorable
6 = Not Favorable

(4) Ratings as follows:
1 = No municipal sewer within study area
2 = Sewered area adjacent to study area
3 = Sewer partially located within study area

(5) Ratings as follows:
1 = Water service available within study area
2 = Water service partially available within study area
3 = No water service available in study area

(6) Legend:

	Needs Areas
	Areas eliminated from consideration due to difficulty/cost of sewering
	Areas eliminated from consideration due to low score

3.5 EVALUATION OF ALTERNATIVES

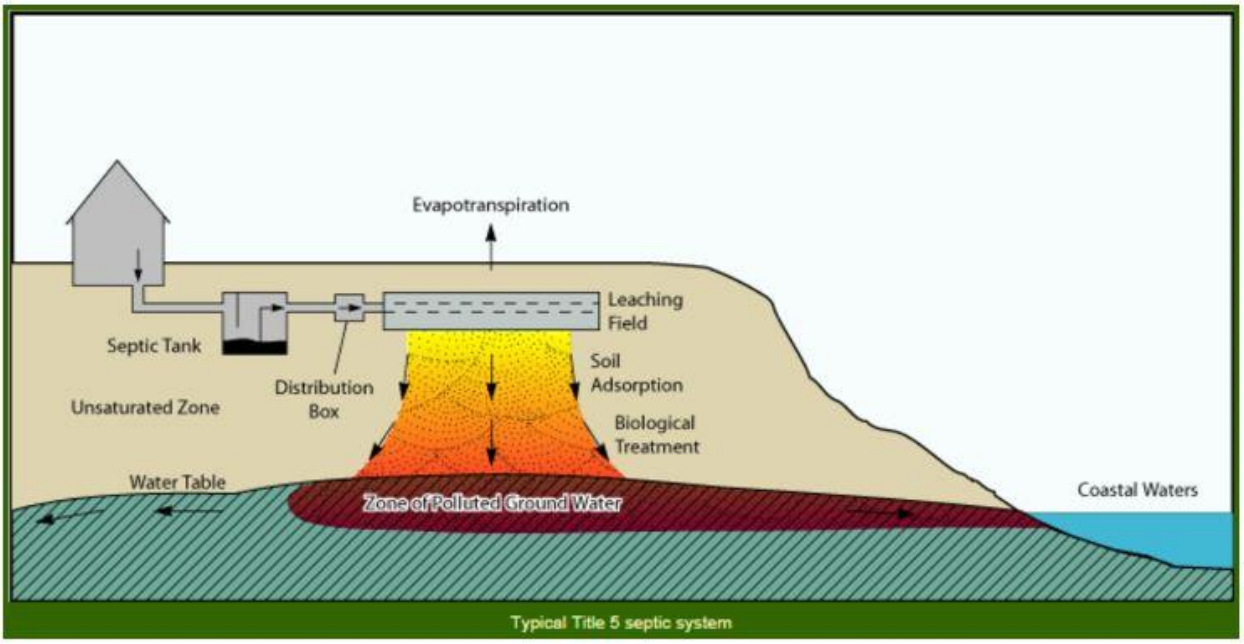
This section discusses a recommended plan and alternatives for wastewater disposal in those areas where traditional on-site treatment systems are not recommended. Alternatives considered are:

1. Continued Use of Traditional On-Site Treatment Systems (No Action)
2. Innovative and Alternative Systems
3. Shared and Community Systems
4. Satellite Wastewater Treatment Facilities
5. Sewers and Centralized Treatment

3.5.1 CONTINUED USE OF TRADITIONAL ON-SITE TREATMENT SYSTEMS (NO ACTION ALTERNATIVE)

This alternative is essentially considered a "no action alternative". Existing on-lot systems in Taunton include a wide variety of designs, flow capacities, ages and efficiencies. Older systems may utilize cesspools which, as they age, require more frequent pumping to prevent backups and overflows. Newer systems typically consist of a septic tank, distribution chamber and leach field however, depending upon when they were installed, these components may be substandard when compared with current regulations (see Figure 3-3).

Figure 3-13
Typical Conventional Septic System



Continued use of existing systems without repairs or upgrades is likely to result in ground and surface water degradation from failing systems which would pose a risk to public health and safety as well as aesthetics. Such conditions are in violation of the Massachusetts Clean Water Act, M.G.L. c.21. Sections 26-53, which is administered by the Massachusetts Department of Environmental Protection (MassDEP) within its various regulations. Briefly, the "no action alternative" is detrimental to public health and the environment and in violation of Massachusetts General Laws. Consequently, this alternative is not a viable choice within the Needs Areas

Currently, individual on-lot treatment systems are regulated under 310 CMR 15.00, commonly referred to as Title 5 of the Massachusetts State Environmental Code. Within the framework of Title 5 are the

requirements for new construction, repair, and upgrade of existing systems. The needs analysis presented in Chapter 3 has concluded that for the nine identified Needs Areas, continued use of traditional on-site treatment systems is not recommended as a long-term solution. Conditions in these areas are not considered to be favorable for use of these systems.

3.5.2 Innovative and Alternative Systems

Conventional Title 5 systems provide minimal treatment of wastewater. Their primary function is removal of solids and grease from the waste stream prior to application to the soils absorption system (SAS). Because of the minimal treatment afforded the wastewater, application rates as established in the Title 5 regulations, are extremely low. To enhance on-site treatment, many alternative systems have been developed, many of which remove pollutants such as biochemical oxygen demand (BOD) and nitrogen. In Massachusetts, MassDEP must approve innovative or alternative systems prior to their use. Alternative systems range widely in technology and effectiveness, depending on what they are intended to remove from the wastewater stream.

Upgrading or replacing failed systems in most cases can be accomplished by installation of a conventional Title 5 on-site system. However, in some areas with high seasonal groundwater, unsuitable soils, lot size restrictions, environmentally sensitive areas, or nitrogen sensitive areas, upgrades and replacements with conventional systems still may not meet Title 5 requirements. In these cases, alternative on-site systems may be utilized. Generally, these systems provide a higher degree of treatment which allows MassDEP to approve higher SAS application rates, reduced separation from high ground water or other deviations to the regulations. Many systems are also capable of reducing effluent nitrogen levels.

As of November 2018, thirty-eight alternative technologies are approved for use in Massachusetts. These technologies are separated into categories:

- **General Use** systems have been determined to provide a level of treatment at least equivalent to a standard Title 5 system. Often they will actually provide better treatment than a Title 5 system, or will operate in a smaller footprint.
- **Alternative Aggregate** systems utilize an engineered synthetic aggregate material instead of traditional sand and crushed stone. These systems are designed to improve percolation over natural materials.
- **Alternative SAS** systems utilize differing systems designed to reduce the size of the leaching field, and sometimes provide higher levels of treatment than a traditional Title 5 system.
- **Secondary Treatment Units** utilize pumps, blowers, and other systems to provide advanced treatment beyond that which would normally be accomplished by a standard Title 5 system.

It should be noted that, under Title 5, these systems are approved for use on system capacities of less than 10,000 gallons per day and therefore can be used on the shared community systems as well as individual systems. The overall objective in utilizing alternative systems is to obtain relief of certain Title 5 requirements in view of their improved effluent quality. In their review of the proposed system, MassDEP will establish the allowable deviations based on level of treatment and other factors.

There are a wide variety of alternative systems available, with varying capabilities and treatment technologies. Costs for these systems also vary, with commonly quoted estimates of $15,000-$25,000 for installation of an alternative system (not including permitting and design), compared to an installation cost of $10,000-$15,000 for a conventional system. In addition, alternative systems, particularly those that use mechanical equipment such as pumps or blowers, require operation and maintenance costs of $500-$1,000 per year.

Innovative and alternative systems will have a role to play in Taunton's future wastewater treatment plans. In neighborhoods where environmental sensitivity is an issue, but property owners do not wish to pay for sewers through betterments, these type of systems may be the best option.

3.5.3 Shared/Community Septic Systems

Where conditions are not favorable for individual on-lot systems due to soil, groundwater, or space constraints, combining the flow from a group of buildings to a single on-site system can be considered as an alternative treatment option for either new construction or systems repair. A good example of this type of system is at Matthews Landing in Taunton. This is a 20+ building condominium complex which utilizes three shared septic systems to meet its wastewater disposal needs. The complex chose to utilize a shared system due to its long distance from any existing collection system, and because of the availability of suitable area and conditions for an on-lot system of this type.

For a community system to be feasible, suitable land must be available in the vicinity of the homes to be served to handle the amount of flow to be treated. In addition, an agreement must be reached on maintenance and replacement costs (such as through a homeowners' association). Title 5 systems are limited to capacities under 10,000 gallons per day which generally equates to a maximum of 20 to 30 homes depending on the number of bedrooms. In general, community or shared systems are subject to the same Title 5 regulations as described previously for individual on-lot systems. Also, for a system of this type to function, a local collection system must be installed to carry wastewater to the shared disposal system.

Shared and community septic systems, whether conventional or alternative, likely have a role to play in Taunton's wastewater management. Due to the space and legal restrictions on their use, however, they will only be applicable in specific locations such as developments and condominium complexes, so they are not considered a widespread solution.

3.5.4 Satellite Wastewater Treatment Facilities

In locations where connection to existing collection systems is impractical, and where flows would exceed 10,000 gallons per day (i.e., in excess of Title 5 flows), a wastewater treatment facility would be required. Such a facility would require either a NPDES surface water discharge permit from USEPA, or a groundwater discharge permit from MassDEP (314 CMR 5.00). Surface water discharge permitting would be very challenging. The entirety of Taunton lies within the Taunton River watershed, meaning any additional surface water discharges would likely be subject to the same strict limits as the Taunton WWTF. Groundwater discharge permitting would likely require less stringent discharge limits, but requires a large area with suitable soil and groundwater conditions to site the SAS. Since nearly all of the needs areas are nearly fully developed, and have soil and groundwater conditions which are considered unfavorable for wastewater disposal via conventional Title 5 systems, it would be very difficult to find a location to site a satellite treatment facility with a groundwater discharge. An additional issue to be considered is operations. A satellite wastewater treatment facility would require daily operation and maintenance by a licensed operator. In addition to operations labor, annual operational expenses would include power, chemicals, maintenance and supplies, laboratory testing,

and sludge disposal. While many of these costs would also exist if Needs Areas are connected to the central WWTF, economy of scale indicates that the net cost of each of these items would be smaller at a larger WWTF. In addition, a satellite WWTF would also require that a collection system be constructed.

Satellite wastewater treatment facilities would provide the highest level of treatment of all of the local options. However, these facilities would have significant challenges in permitting, siting, and cost. They are not considered a viable alternative for the Needs Areas.

3.5.5 Sewers and Centralized Treatment

The Taunton WWTF is located on West Water St., with its outfall located on the Taunton River approximately 1.6 miles downstream from the confluence with the Mill River and 1.7 miles upstream from the Three Mile River.

Originally constructed in 1947 to provide primary treatment for wastewater and storm water from the City's combined sewer system, the WWTF has since gone through a series of upgrades. In 1978 the facility was upgraded and expanded to provide advanced secondary treatment utilizing a two stage, pure oxygen nitrification process. The WWTF was upgraded again in 2000 to replace the two stage nitrification process with two independent treatment trains capable of nitrifying the wastewater. A program to separate the sanitary sewer system from the storm drain system was initiated in the early 1970's to eliminate a number of combined sewer overflows (CSO). Currently, there is one permitted CSO remaining in the City. As discussed in later chapters, the WWTF is planned for a major upgrade in the near future, in part to comply with new permit discharge requirements.

There are multiple alternatives that can be considered to convey wastewater flow to the existing municipal sewer system or to one of the alternative treatment systems discussed above. Alternatives for wastewater conveyance included conventional gravity and force main sewers, and low pressure sewers. Alternatives have been considered based on anticipated flows, topography, operation and maintenance, and cost effectiveness.

Gravity sewers are the preferred method of transporting wastewater. A majority of the existing city's system is comprised of gravity sewers in conjunction with pump stations and force mains. Pumping stations with force mains designed to handle peak flows are used to convey flow from a low point to the desired location within the gravity system. Several of the Needs Areas are good candidates for the use of gravity sewer systems since they are higher in elevation than existing sewers and pump stations.

The costs of constructing conventional collection systems can be significant. In Taunton, the cost of extending sewers to a new neighborhood is borne by the property owners in the area serviced by the new sewer in the form of betterment assessment. As such, sewer extensions are primarily only done when property owners in an area request them.

3.6 Designated Needs Areas

Based on the ranking system shown in Table 3-4, nine areas have been designated as Needs Areas, which makes them eligible for sewer expansion if the property owners in these areas petition the City Council and agree to pay for the construction through betterments. These Needs Areas are: Q, L, A, X, C, M, R, V, and E. Descriptions of the areas are below

3.6.1 Needs Area Q – Somerset Avenue, Railroad Avenue

Needs Area Q is located in the southern point of Taunton where the Three Mile River meets the Taunton River. This area is partially sewered, following a 2007 project on Railroad Ave. The Needs area is

partially serviced by municipal water and is zoned as suburban residential with average lot sizes of one-half to one acre.

Soils and Groundwater: Area soils and groundwater in this area are rated as limited and unsuitable for use of on-site sewage disposal, respectively. According to the USDA soil classifications and Title 5 testing, portions of this Needs area contain restrictive soils and a high seasonal groundwater.

Drinking Water Protection Zone: Approximately 50 percent of Needs Area Q is located within an IWPA. IWPA and Zone II of public water supplies have been determined by the MA DEP to be sensitive to the discharge of pollutants from on-site sewage disposal systems and are therefore designated as nitrogen sensitive areas.

Surface Water and Wetlands: Due to its location just north of the confluence of the Three Mile River and the Taunton River, the amount of surface water and wetlands in the vicinity of the Needs area is considered significant for the purpose of this analysis. No water quality sampling was performed in the vicinity of the Needs area.

On-Site Septic Systems: Assessment of area on-site septic systems indicated that multiple system repairs and frequent system pumping locations were concentrated on Railroad Avenue and Riverfield Road. Approximately seven percent of Needs Area Q has experienced system repairs or frequent system pumping. However, this percentage is somewhat artificially low due to the presence of sewers in a portion of the area. Taking that into account, approximately ten percent of the un-sewered properties had septic system failures.

Conclusions: Based on the above information, Needs Area Q was given an on-site sewage disposal system suitability rating of 26, and is recommended for sewers.

3.6.2 Needs Area L – Burt Street, Glebe Street, Rocky Woods Street

Study Area L is located on the east side of Taunton and includes Burt Street, Glebe Street, Range Avenue, and Rocky Woods Street. The area is not serviced by the municipal wastewater collection system but is partially serviced by the municipal water system. A majority of the area is zoned as rural residential with some highway business district along Winthrop Street. Average lot sizes are between one-half and one acre.

Soils and Groundwater: Area soil and groundwater are rated as limited and unsuitable for on-site sewage disposal systems due to saturated soils with slow permeability and high seasonal groundwater. Rock outcrops are also prevalent throughout the study area, which could limit the effectiveness of on-site wastewater treatment and disposal.

Drinking Water Protection Zone: Nearly all of Study Area L is located within a Zone C surface water supply protection area and approximately ten percent of this study area is located within a Zone A surface water supply protection area and an IWPA.

Surface Water and Wetlands: The Segreganset River flows along the west edge of study area L. The amount of surface water and wetlands in the vicinity of the study area is considered significant for the purpose of this analysis. Segreganset River Pond is listed on the Massachusetts 303d list of impaired water bodies, which is an indicator list for the water quality of streams, ponds, and riverways in the state. Water quality samples were obtained from this location that exhibited fecal coliform counts of less than 9 and 11 col/100 ml, respectively

On-Site Septic Systems: Assessment of the on-site septic systems indicated that multiple system repairs and frequent system pumping locations were concentrated in the areas of Glebe Street, Rocky Woods

Street, and Range Avenue, as well as several locations on Burt Street. Approximately 14 percent of Study Area L has experienced system repairs or frequent system pumping.

Conclusions: Based on the above information, Study Area L was given an on-site sewage disposal system suitability rating of 25, and is recommended for sewers.

3.6.3 Needs Area A – Field Street, Dublin Drive, Woodview Drive

Study Area A is located in the northern section of Taunton along Field Street and Bay Street. The area is not currently served by the Taunton wastewater collection system but is fully served by the City's water distribution system. There is a sewer forcemain that runs through Needs Area A in Bay Street; however, the forcemain serves a condominium/apartment complex that is outside the boundaries of Needs Area A. Zoning is suburban residential with average lot sizes between one-half and one acre.

Soils and Groundwater: A majority of the soil types in this area are suitable for on-site sewage disposal. However, there are locations of high seasonal groundwater and saturated soils, which limit the effectiveness of on-site septic systems.

Drinking Water Protection Zone: Approximately 50 percent of Study Area A is located within an IWPA. Title 5 requires that no system serving new construction in nitrogen sensitive areas be designed to discharge more than 400 gallons per acre. This would require a new four bedroom home within an IWPA to have a minimum one acre lot to limit the amount of nitrogen that is introduced to groundwater within the protection area.

Surface Water and Wetlands: Study Area A is in the vicinity of Watson Pond, Snake River, and northern section of Lake Sabbatia. The amount of surface waters and wetlands in the vicinity of the study area was considered moderate for the purpose of this analysis. Watson Pond is listed on the Massachusetts 303d list. Water quality samples were collected from the northeast corner of Watson Pond on September 26, 2003 and October 22, 2003 as part of the CWMP. Results indicated fecal coliform counts of 45 and 13 col/100ml, which are below the limits of a Class B water body.

On-Site Septic Systems: Assessment of area on-site septic systems indicated that multiple system repairs were located in the areas of Woodview Drive, Jaclyn Circle, Rachel Drive, and Dublin Drive. Other isolated repairs and frequent system pumping were identified on Bayberry Lane, Leahy Drive and areas of Bay Street. Approximately 14 percent of Study Area A has experienced system repair or frequent system pumping.

Conclusions: Based on the above information, Study Area A was given an on-site sewage disposal system suitability rating of 21, and is recommended for sewers.

3.6.4 Needs Area X – Staples Street, Caswell Street

Study Area X is located in eastern Taunton along Staples Street and Caswell Street. The area is not currently served by the Taunton wastewater collection system but is fully served by the City's water distribution system. Zoning is rural residential with average lot sizes between one-half and one acre.

Soils and Groundwater: A majority of the area soils are generally well suited for on-site sewage disposal. However, there are some areas that experience high seasonal groundwater.

Surface Water and Wetlands: Surface water and wetlands in the vicinity of the study area are considered moderate for the purpose of this analysis. No water quality sampling was performed in the vicinity of the study area.

On-Site Septic Systems: Assessment of area on-site septic systems indicated that multiple system repairs and frequent system pumping were concentrated on Caswell Street, but not in one specific area. Approximately 13 percent of the systems have been repaired or required frequent pumping.

Conclusions: Based on the above information, Study Area X was given an on-site sewage disposal system suitability rating of 21, and is recommended for sewers.

3.6.5 Needs Area C – Field Street, Lothrop Street, Prospect Hill Street

Study Area C is located in the northern section of Taunton, south of Route 495 and east of the Snake River along Field Street, Lothrop Street, and Prospect Street. The area is not currently served by the Taunton wastewater collection system but is partially served by the City's water distribution system. Zoning is suburban residential with average lot sizes between one-half and one acre. Study Area C also contains the Oak Hill Mobile Home Park and the Colonial Estates Manufactured Housing Park, both of which are under MassDEP Administrative Consent Orders for septic system violations.

Soils and Groundwater: A majority of soil types in this area are suitable to accept on-site sewage. However, NRCS classification and Title 5 inspections indicate that several locations have experience high seasonal groundwater and saturated soils, which limit the effectiveness of on-site septic systems.

On-Site Septic Systems: Assessment of on-site septic systems indicated that multiple system repairs and frequent system pumping locations were concentrated in the areas of Cypress Road, Hickory Road, Musket Road, Betsy Ross Road and Patriot Road, as well as some sections of Prospect Hill Road. Approximately 19 percent of study area C has experienced system repairs or frequent system pumping. A consent order has recently been issued by USEPA ordering that sewers be installed in portions of Study Area C.

Conclusions: Based on the above information, Study Area C was given an on-site sewage disposal system suitability rating of 20, and is recommended for sewers.

3.6.6 Needs Area M – North Walker Street

Study Area M is located in the Western portion of Taunton, and consists primarily of North Walker Street between Winthrop Street and Glebe Street. The area is not currently served by the Taunton sewer system, but the south end of the area terminates on Winthrop St, which recently had sewer installed on it. Average lot size is above one acre.

Soils and Groundwater: Soil types in this area show limited suitability, and groundwater conditions are not suitable to on-site sewage disposal.

On-Site Septic Systems: Assessment of on-site septic systems in the area indicates that the area has a relatively high failure rate.

Conclusions: Based on the above information, Study Area M was given an on-site sewage disposal system suitability rating of 21, and is recommended for sewers.

3.6.7 Needs Area R – Berkley Street

Study Area R is located on the Taunton/Berkley border along Berkley Street. Currently this area is partially serviced by the municipal wastewater collection system and is serviced by the municipal water system. Zoning is urban residential with average lot sizes between one-half and one acre.

Soils and Groundwater: Most area soils and groundwater are rated as limited and unsuitable for on-site sewage disposal in this area due to restrictive layers and high seasonal groundwater. However, there are some areas with soils that are generally well suited for on-site sewage disposal systems.

Surface Water and Wetlands: A portion of Silva's Pond is located within the study area and the Taunton River flows along its western border. The amount of surface water and wetlands in the vicinity of the study area is considered moderate for the purpose of this analysis.

On-Site Septic Systems: Assessment of area on-site septic systems indicated that multiple system repairs and frequent system pumping had occurred along Berkley Street. Approximately 16 percent of Study Area R has experienced system repairs or frequent system pumping.

Conclusions: Based on the above information, Study Area R was given an on-site sewage disposal system suitability rating of 20, and is recommended for sewers.

3.6.8 Needs Area V – Paul Revere Terrace, Williams Street

Study Area V is located in east Taunton and includes Paul Revere Terrace and Williams Street, just east of Route 24. The area is not currently served by the Taunton wastewater collection system but is immediately adjacent to existing sewer on Williams Street. In addition, it is fully served by the City's water distribution system. Zoning is suburban residential with average lot sizes less than half acre.

Soils and Groundwater: Soils are generally well suited for on-site sewage disposal. However, high seasonal groundwater in the area makes groundwater conditions unfavorable.

Surface Water and Wetlands: The Taunton River is located to the east of the study area and portions of Barstow's Pond are located within the southern portion of the study area. The amount of surface water and wetlands in the vicinity of the study area is considered moderate for the purpose of this analysis.

On-Site Septic Systems: Assessment of area on-site septic systems indicated that multiple system repairs and frequent system pumping locations occurred in the Paul Revere Terrace area. Approximately 7 percent of the systems had failed during the past 15 years.

Conclusions: Based on the above information, Study Area V was given an on-site sewage disposal system suitability rating of 20 and is recommended for sewers.

3.6.9 Needs Area E – Norton Avenue, Fremont Street, Davis Street

Study area E is located east of the Three Mile River along Norton Avenue and Fremont Street with associated side streets. Currently on-site sewage disposal systems are used in this study area as this area is not serviced by a municipal wastewater collection system. The study area is partially serviced by municipal water and is zoned as rural residential with average lot size between one half and one acre.

Soils and Groundwater: Area soils and groundwater are rated as moderately limited and unsuitable for on-site sewage disposal, respectively. According to NRCS soil classifications and Title 5 field testing, slightly more than half of this area contains soils suitable for on-site sewage disposal systems. Other areas within the study area contain saturated soils with slow permeability and high seasonal groundwater.

Surface Water and Wetlands: Study area E is located in proximity to Willis Pond, Oakland Mill Pond and Three Mile River. The amount of surface waters and wetlands in the vicinity of the study area is significant. The Three Mile River is listed on the Massachusetts 303d stream list. The area is also mostly within an Area of Critical Environmental Concern.

On-Site Septic Systems: Assessment of the area on-site septic systems indicated that system repairs and system pumping locations were concentrated near the intersection of Norton Avenue, Tremont Street, and Davis Street. Other smaller clusters are located on Joanne Drive and Devon Street. Approximately 6% of study area E has experienced system repairs or frequent system pumping.

Conclusions: Based on the above information study area E was given an on-site sewage disposal system suitability rating of 20 and was considered a wastewater needs area.

3.7 STUDY AREAS NOT DESIGNATED AS NEEDS AREAS

As previously noted, sewers have been extended into Needs Areas K and U since the DEIR was submitted in 2009. Therefore, these areas have been eliminated from further discussion. Although sewer is available in these areas, the current connection rate is below twenty-five percent.

Study Areas H, J, N, S, CC, D, O, W, Z, AA, BB, P, T, DD, I, G, and Y did not rate high enough to warrant consideration for sewers. Study Areas H, I, Z, and AA were marginally recommended for sewers in the DEIR; however, based on the re-evaluation conducted for the FEIR, these recommendations were rescinded. This is due primarily to updated septic system failure data and slight alterations to the rating system.

Study Areas F and EE rated high enough to warrant consideration for sewer service, but were eliminated for the reasons explained below. Since these areas are not being considered further for connection to the City's collection system and centralized treatment, they may be good candidates for alternative solutions such as innovative and alternative septic systems.

3.7.1 STUDY AREA F – CRANE AVENUE SOUTH

Study Area F is located in northwest Taunton and includes Crane Avenue South, as well as the area of Flintlock Road and Powderhorn Drive. The area is not currently served by the Taunton Sewer system. Its high rating was a result of the significant amount of surface water and groundwater in its vicinity. The primary reason for not recommending Study Area F for sewers is that the average lot size in the subarea is greater than 1 acre. This will make it prohibitively expensive to sewer this area. The large lot size also makes the consideration of replacement of on-site treatment and disposal systems more plausible.

3.7.2 STUDY AREA EE – TREMONT STREET WEST

Study Area EE is located in West Taunton and includes the section of Tremont Street near the City line with Rehoboth. The area is not currently served by the Taunton Sewer system. Its high rating for sewers is primarily a result of the significant amount of surface water and groundwater in the area. However, its septic system failure rate is not excessive, its predominantly large lot sizes (>1 acre) and the distance from existing sewers will make it extremely difficult and expensive to sewer. Therefore, this area is not recommended for sewering during this planning period.

4.0 RECOMMENDED PLAN FOR SEWER NEEDS AREAS

Chapter 3 identified the Needs Areas for the City, or those which would benefit from installation of sewers. This chapter provides a rough outline of the proposed solutions for the Needs Areas.

4.1 UPDATE AND RECOMMENDED PLAN

4.1.1 NEEDS AREAS UPDATE

Several changes have been made from the recommended plan in the CWMP and DEIR. These changes largely come from a reevaluation of septic system failures, and shifts in the City's priorities for expansion of the sewer system. In addition, two Needs Areas have had sewers installed in recent years. As a result, this FEIR identified 9 Needs Areas in Chapter 3 instead of the 14 identified in the CWMP.

The recommended sewering plan involves construction of approximately 24 miles of sewers (gravity and low-pressure), and 1 new pumping station. Sewers would primarily be installed within existing roads or rights-of-way and overland routes would largely be avoided. Due to topographical influences, a number of Needs Areas are anticipated to be serviced by low-pressure sewer systems, and in one case a small pump station is required to lift the wastewater to interceptor sewers that in turn would convey wastewater to the WWTF by gravity. Conceptual designs of the proposed collection systems for each of the needs areas are presented in Figures 4-1 through 4-9. Expansion of the main lift pumping station and the Taunton WWTF are also required to accommodate sewer system expansion.

Since pumping stations are located in low lying areas frequently in close proximity to wetlands and their structures represent a permanent "disturbance" to the environment, siting to minimize these disturbances is a primary consideration during design. Although exact locations of pumping stations will be determined during the preparation of construction plans, the following is the best approximation for the locations of the proposed facilities based on available information.

4.1.2 NEEDS AREA DESCRIPTIONS

<u>Needs Area Q – Somerset Avenue & Railroad Avenue</u>

Needs Area Q is located in the southern portion of Taunton, and abuts the Dighton town line. It primarily consists of Somerset Ave (Route 138), Railroad Ave, and their tributary streets. Railroad Avenue was sewered in 2008 as a minor extension. Needs Area Q would be entirely serviced by low-pressure sewers, which would connect to an existing low-pressure line on Railroad Ave. The sewering plan for Needs Area Q is shown in Figure 4-1.

<u>Needs Area L – Burt Street, Glebe Street, Rocky Woods Street</u>

Needs Area L is in the southwest portion of Taunton, and abuts the Dighton town line. It encompasses Winthrop Street from Range Avenue to the City line, as well as tributary areas including Range Avenue and Burt Street. The Winthrop St portion of this Needs Area was sewered in 2012 at the same time as Needs Area K. This work also included the construction of the Burt St pump station, located at the intersection of Winthrop St and Burt St. It is anticipated that if sewers are extended to Needs Area L, all flow will be conveyed to the existing Burt St pump station. The sewering plan for Needs Area L entails gravity sewers on Burt St (south of Glebe Street), as well as the east portion of Glebe Street and Rocky Woods Street. All other streets would be serviced with low-pressure lines, connected at various points to the gravity line on Burt St. The sewering plan for Needs Area L is shown in Figure 4-2.

Needs Area A – Field Street, Dublin Drive, Woodview Drive

Needs Area A is located in the north section of Taunton and abuts multiple water bodies, including the northern section of Lake Sabbatia. Due to topography and presence of water bodies, this needs area would be sewered with a low-pressure sewer system, which would discharge to the existing Scadding St pump station to the South. The sewering plan for Needs Area A is shown in Figure 4-3.

Needs Area X – Caswell Street and Staples Street

Needs Area X is located in East Taunton and is in close proximity to several water bodies. This Needs Area could connect to existing sewers which flow to the Red Lane pumping station. As such, the construction of a new pumping station is not anticipated to be necessary. The sewering plan for Needs Area X is shown in Figure 4-4.

Needs Area C – Prospect Hill Street and Lothrop Street

Needs Area C is in the north part of Taunton, and abuts the Raynham town line. It primarily consists of Prospect Hill Street and Lothrop Street. Note that two mobile home parks located within this Needs Area have recently been issued Administrative Consent Orders from USEPA, making this a high priority area to receive sewers. A proposed Prospect Hill pump station would collect flow from Needs Area C. The pumping station would be located on Prospect Hill Street just north of the intersection with Lothrop Street. As with Prospect Hill North, the location of wetlands in the area must be addressed. The sewering plan for Needs Area C is shown in Figure 4-5. A potential alternative plan would be to direct sewers from this Needs Area into Raynham, which has an inter-municipal agreement with Taunton. This would need to be done through an agreement.

Needs Area M – North Walker Street

Needs Area M is located in the southwest portion of Taunton, and consists of North Walker Street and its associated side streets from Winthrop Street (former Needs Area K) to Glebe Street. Due to its close proximity to existing sewer on Winthrop Street, it is not anticipated that this area would require the construction of a pumping station. The sewering plan for Needs Area M is shown in Figure 4-6.

Needs Area R – Berkley Street

Needs Area R is located in the south central part of Taunton, immediately east of the Taunton River. It extends south from existing sewers on Plain Street. Flow from Needs Area R will likely connect to the existing interceptor on East Water Street, and will not need a pump station. The sewering plan for Needs Area R is shown in Figure 4-7.

Needs Area V – Paul Revere Terrace, Williams Street

Needs Area V is located in the east portion of Taunton, and abuts the Raynham town line. It includes William Street and its associated streets, between Route 24 and the Taunton River. Topography indicates that the area would require a pump station at the end of Paul Revere Terrace, which would deliver all flow from Needs Area V to Hart Street. The sewering plan for Needs Area V is shown in Figure 4-8.

Needs Area E – Norton Ave, Fremont Street and Davis Street

Needs area E is located in the North section of Taunton, east of the Three Mile River. Due to the close proximity of existing sewer, it is not anticipated that this area would require the construction of a pump station. The sewering plan for Needs Area E is shown in Figure 4-9.

Table 4-1

Needs Area Pipe Estimates

Study Area	Gravity Pipe Length (LF)	LP Pipe Length (LF)	Pump Stations	Force Main Length (LF)
Q	0	4,800	0	0
L	18,600	21,050	0	0
A	0	15,000	0	0
X	11,800	0	0	0
C	24,500	6,700	1	6,000
M	4,300	0	0	0
R	4,800	4,600	0	0
V	3,100	2,800	0	0
E	16,200	1,600	0	0
Total	83,300	56,550	1	6,000

Figure 4-1 - Needs Area Q

Legend:

Low-Pressure Sewer

Gravity Sewer

Needs Area Q – Somerset Avenue

Surface water and wetlands – Taunton River, Three Mile River

Area of Critical Environmental Concern (ACEC) – Three Mile River

High groundwater

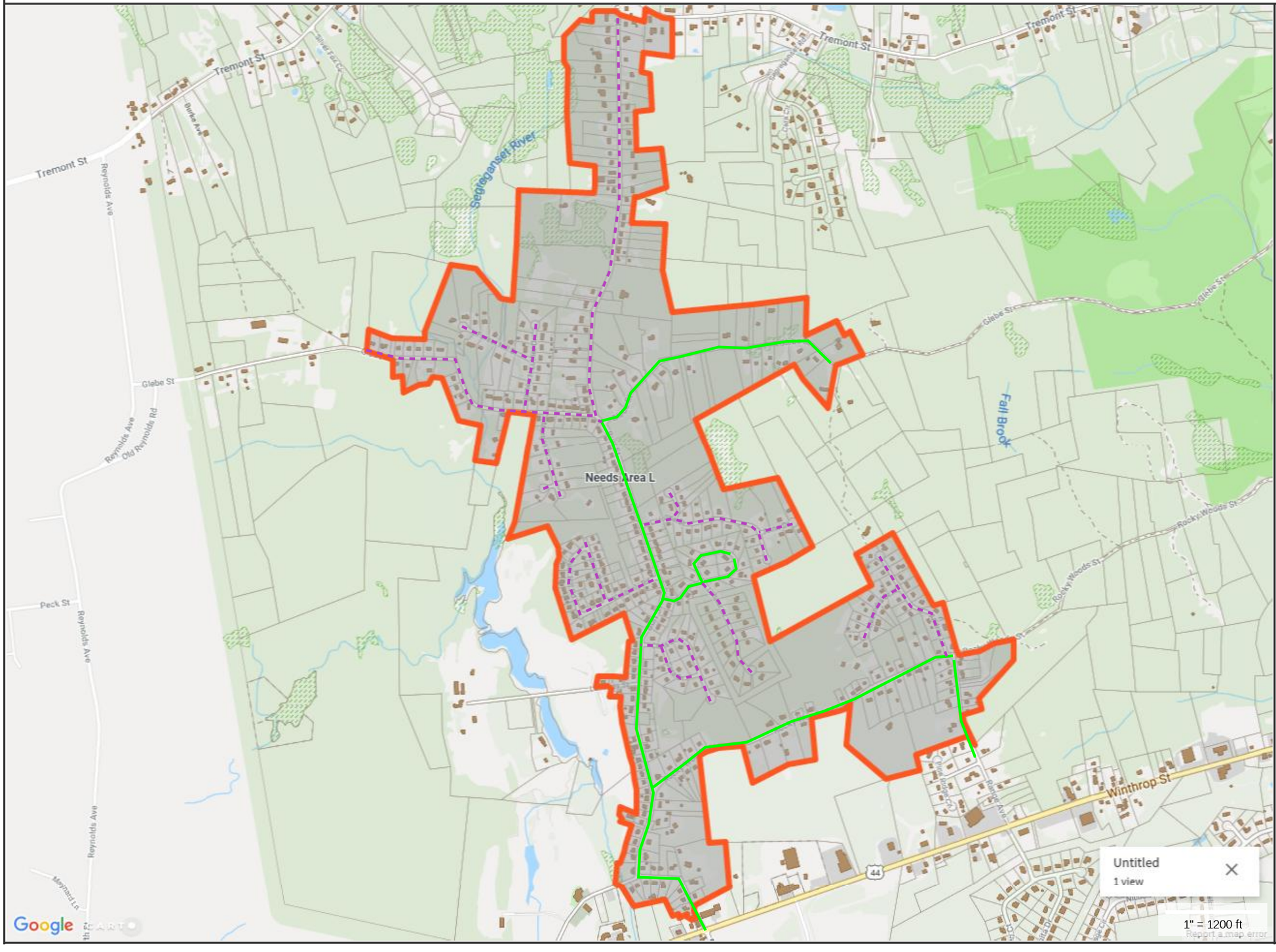
High Septic System Failure Rate

Already partially sewered

Estimated Flow: 15,000 gpd

Figure 4-1

Figure 4-2 - Needs Area L



Legend:

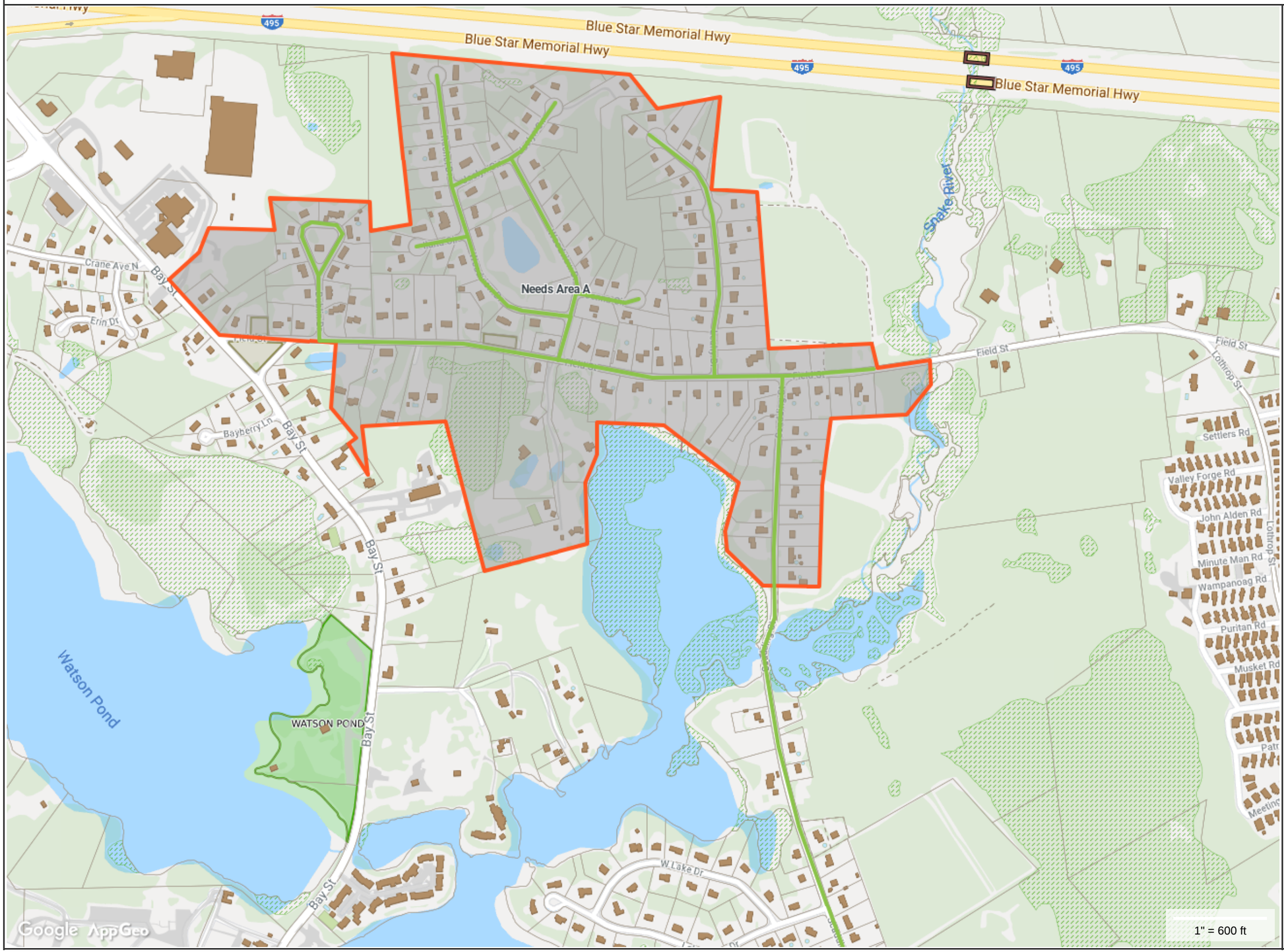
- Low-Pressure Sewer
- Gravity Sewer

Needs Area L – Burt Street, Glebe Street, Rocky Woods Street

- Surface water – Segreganset River
- Drinking water protection areas
  - Zone A – Segreganset River
  - Zone II – Walker Street wells (Dighton Water District)
- Poorly draining soils
- High groundwater
- High Septic System Failure Rate
- **Estimated Flow: 135,000 gpd**

Figure 4-2

Figure 4-3 - Needs Area A



Legend:

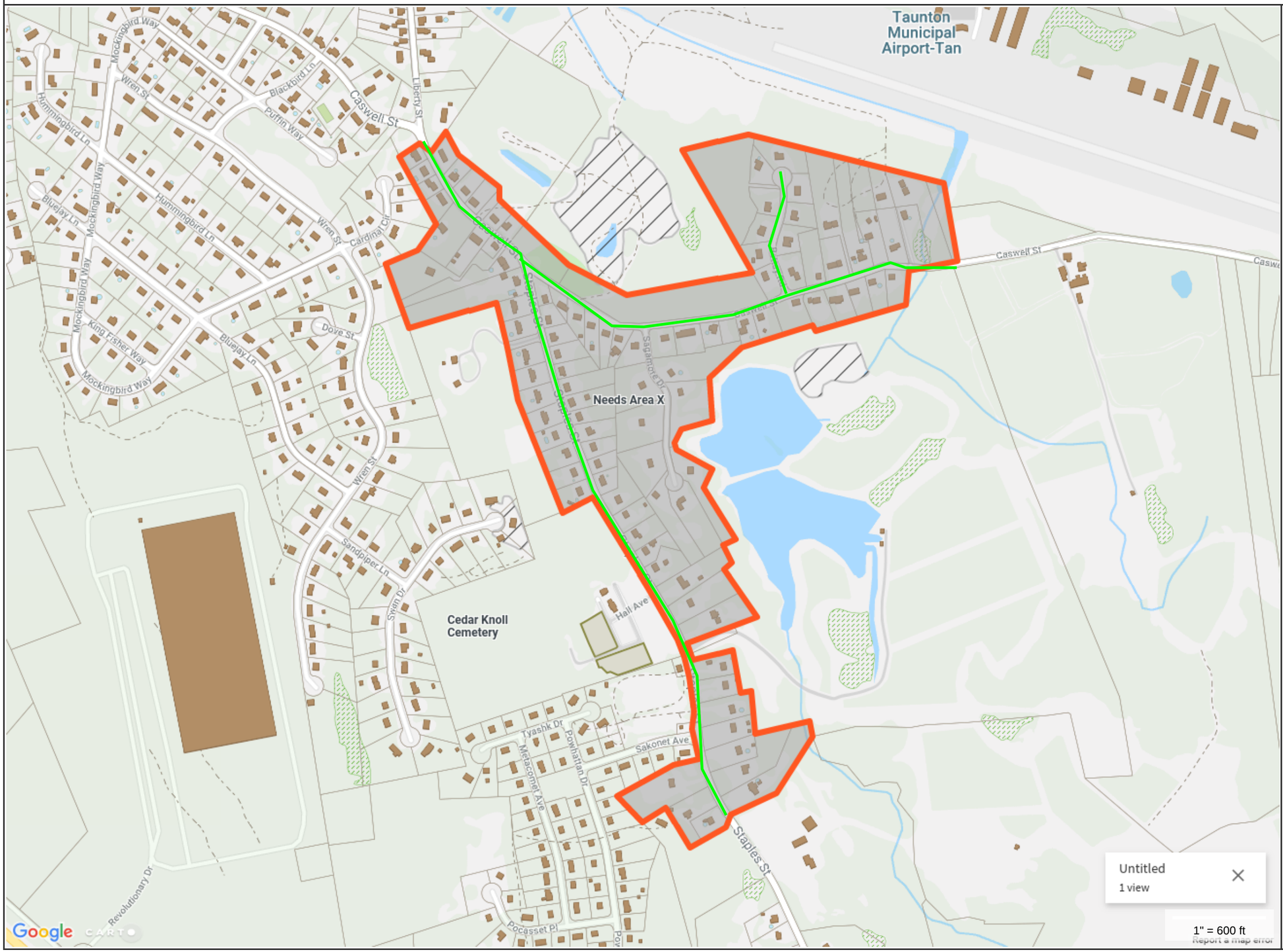
- Low-Pressure Sewer
- Gravity Sewer

Needs Area A – Field Street, Dublin Drive, Woodview Drive

Surface water – Lake Sabbatia, Snake River
Drinking water protection area
Zone II – Dever Wells
Poorly Draining Soils
High groundwater
High septic system failure rate
Estimated Flow: 37,000 gpd

Figure 4-3

Figure 4-4 - Needs Area X



Legend:

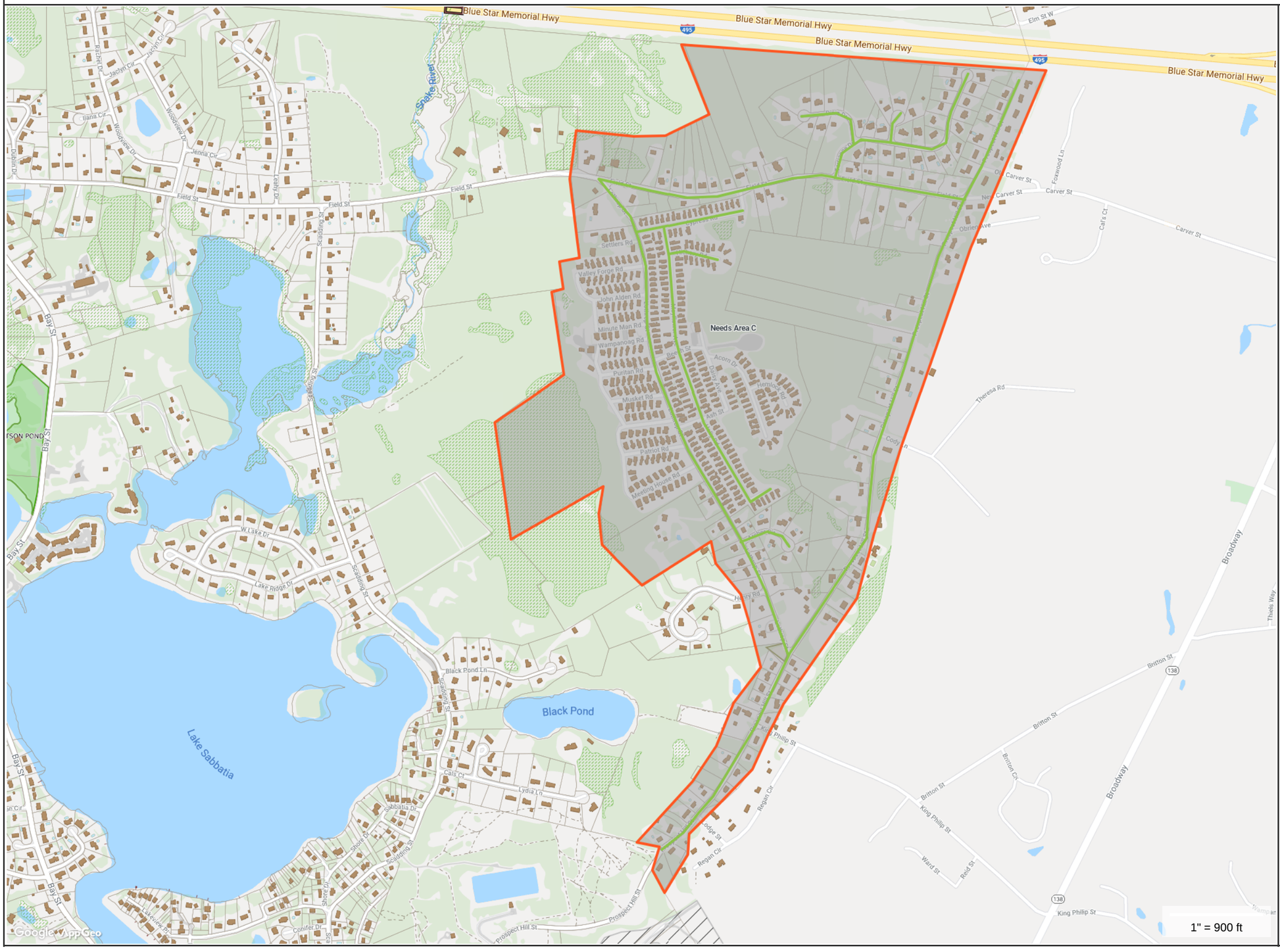
- Low-Pressure Sewer
- Gravity Sewer

Needs Area X – Caswell Street and Staples Street

Surface water – Barstow Pond, Staples St Pond, bogs
High Groundwater
High septic system failure rate
Already partially sewered
Estimated Flow: 27,000 gpd

Figure 4-4

Figure 4-5 - Needs Area C



Legend:

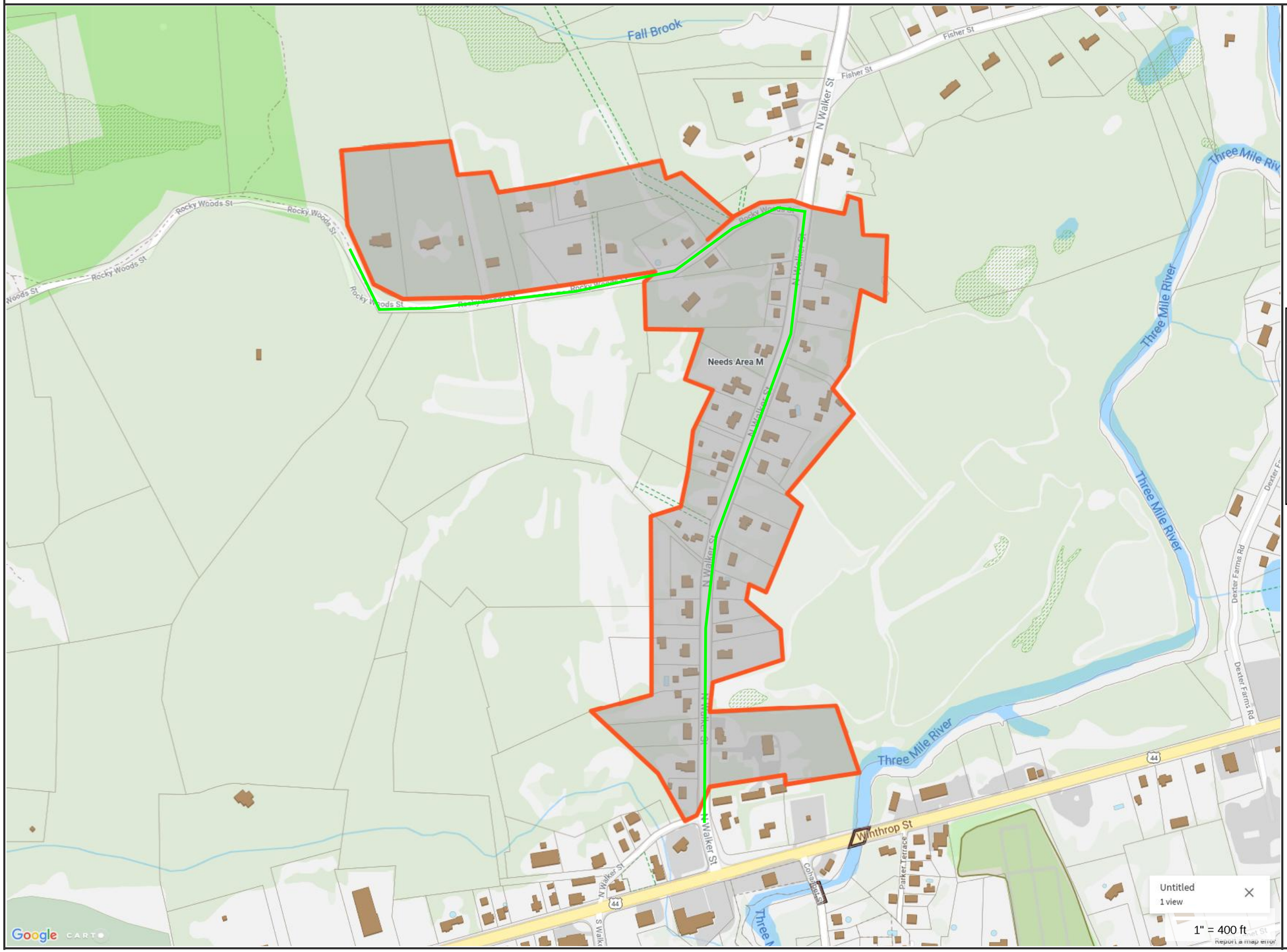
- Low-Pressure Sewer
- Gravity Sewer

Needs Area C – Prospect Hill Street and Lothrop Street

Colonial Estates and Oak Hill are required to connect by Consent Order
Drinking water protection area
Zone II - Raynham
Poorly Draining Soils
High Groundwater
Moderate septic system failure rate
Estimated Flow: 130,000 gpd

Figure 4-5

Figure 4-6 - Needs Area M



Legend:

Low-Pressure Sewer

Gravity Sewer

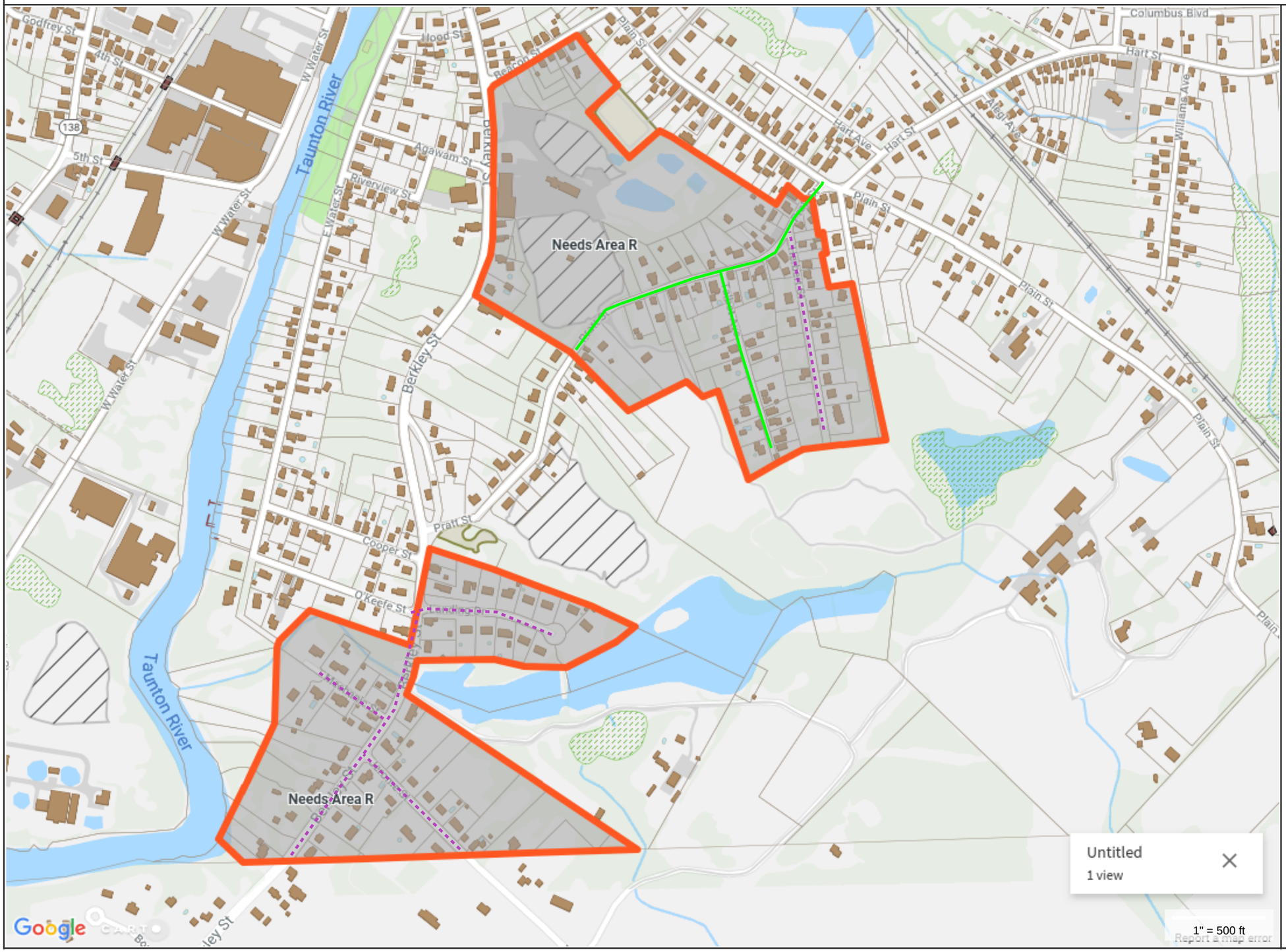
Needs Area M – North Walker Street

Surface water - Three Mile River
Soils and groundwater unsuitable for septic systems
High septic system failure rate
Adjacent to existing sewer on Winthrop Street

Estimated Flow: 19,000 gpd

Figure 4-6

Figure 4-7 - Needs Area R



Legend:

- Low-Pressure Sewer
- Gravity Sewer

Needs Area R – Berkley Street

Surface water - Taunton River
Poorly Draining Soils
High Groundwater
High septic system failure rate
Adjacent to existing sewer on Plain St, E. Water St

Estimated Flow: 26,000 gpd

Figure 4-7

Figure 4-8 - Needs Area V

Legend:

Low-Pressure Sewer

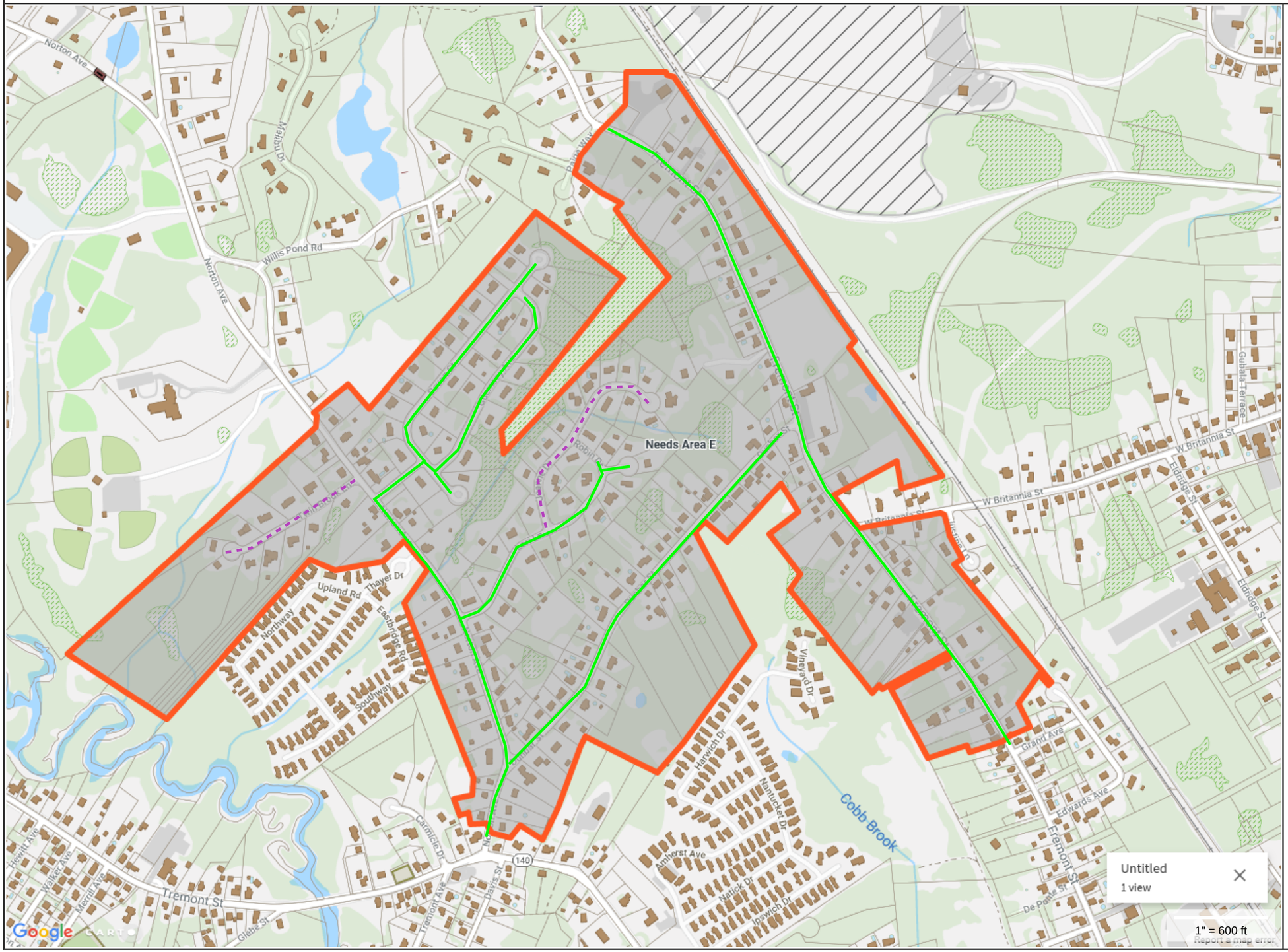
Gravity Sewer

Needs Area V – Paul Revere Terrace, Williams Street

- Surface water - Taunton River
- Small lot size (<1/2 acre)
- Poorly Draining Soils
- High Groundwater
- Moderate septic system failure rate
- **Estimated Flow: 24,000 gpd**

Figure 4-8

Figure 4-9 - Needs Area E



Legend:

Low-Pressure Sewer

Gravity Sewer

Needs Area E – Fremont Street, Norton Ave

Surface water - Cobb Brook, Three Mile River
ACEC – Three Mile River
Poorly Draining Soils
High Groundwater
Moderate septic system failure rate
Estimated Flow: 54,000 gpd

Figure 4-9

4.2 CONSTRUCTION METHODS

Nearly all recommended gravity sewer and force main work will occur within existing paved roadway rights-of-way. Minor easements may be necessary to connect certain areas.

The sewer projects consist of typical gravity sewers and manholes, pump stations with sewer force mains, and low pressure sewers with grinder pumps. The pump stations are mainly below grade, with small above grade structures. Therefore, conventional construction methods will be utilized in most cases, such as trench excavation and backfill for pipe installations and open excavation for structures and pump stations. The following provisions will also be made during construction:

- All projects will include placement of erosion control devices prior to excavation. The locations, types of devices, and maintenance needs will be coordinated with the local Conservation Commission.
- Wetland resource areas and buffer zones thereto will be clearly marked as off-limits to construction equipment and materials storage.
- Given the dense nature of some of the project areas, equipment selection and excavation methods will focus on minimizing size and disturbance.
- Conventional construction methods involve the use of an excavator to open trenches at the depth necessary for sewers, which can range from four to ten feet under typical conditions. After sewer installation, the trench will be backfilled with suitable material and compacted. The site will be cleaned and adjacent areas that are disturbed as a result of construction shall be restored.
- Surface restoration will closely follow excavation activities to maintain access to residences and local businesses. Construction will be sequenced to avoid recreational areas during the summer months.
- Paved areas will be resurfaced weekly or more frequently depending on the type of road, and stockpiled materials that remain on site for more than a day will be covered to prevent erosion.
- Construction dewatering, where necessary, will be discharged to sediment capture areas and infiltrated to the maximum extent feasible.
- Construction equipment will include an excavator, a backhoe, a soil transport vehicles, hand tools, compactors, rollers, and equipment trucks.
- Maintenance, repair, and fueling of equipment shall be confined to areas specifically designed for that purpose. These areas will have adequate waste disposal receptacles for liquid and solid waste. Waste oil shall be removed to designated waste oil collection areas for recycling. No potential pollutants shall be allowed to drain into catch basins, streams, or other water bodies.

4.2.1 CONSTRUCTION PERIOD IMPACTS

Using the general descriptions of construction methods previously provided within this section, a general summary of impacts is provided below, including impacts from earth moving, impacts to vegetation, potential impacts from erosion and sedimentation, traffic impacts, and impacts to adjacent land uses. More specific environmental impacts are discussed in Section 4.4.1.

Earth Excavation

Assuming typical trench depth for each type of sewer pipe proposed, the sewer expansion plan will require approximately 100,000 cubic yards of trench excavation. It is expected that most of the excavated soil will be suitable for reuse within the trench. It can be assumed that 25 percent of the soil excavated may have to be disposed due to displacement by the sewer pipe, soil removed to add proper pipe bedding and cover, and the soil removed to add road sub-base. The excess excavated soil should be easily useable as backfill for other projects, or could even be sold. There should be minor amounts of unsuitable soils, such as organic material, that must be disposed at a proper location or used for landscaping applications.

Potential impacts from earth excavation include roadway and site disturbance, erosion, and sedimentation from runoff across these areas.

Earth Moving

Excavated soils that must be removed and/or disposed of will require transportation off-site. The contractor will utilize trucks of various sizes to accomplish this. The impacts from earth moving include dust and soil deposits within the project area and along access roads. Soil will likely be moved within project sites for backfilling and stockpiling. Stockpiling for extended durations will only be allowed at a site approved by the City.

Impacts to Vegetation

There will be impacts to vegetation at locations where construction occurs outside the existing roadways. For the most part, this will include individual house service connections that will be installed from the roadway to the property line, installation of grinder pumps at the property line and installation of pump stations. Service connections and grinder pumps will disturb the vegetation that typically occurs between the roadway and property line, which is a distance typically between five to ten feet from the edge of pavement. Vegetation is typically in the form of grass, mulch, stone, or bare soil. Pump stations will be located as close to the roadway as possible and only in suitable areas. Some removal of substantial vegetation such as trees and brush may be required for the pump station installations. The impacts from removal of vegetation include removal of native plants and trees, increased erosion, and sedimentation, and loss of natural buffer between properties.

Erosion and Sedimentation

Since there is very little work proposed outside of roadways, much of the sedimentation will occur from runoff from rainfall passing over unpaved or unstabilized trenches, collecting sediment, and transporting it to receiving waters. These waters include nearby wetlands, streams, or surface waters. Sedimentation sources may also include soil stockpiles that are not adequately covered. Erosion may occur from pump station sites that have been disturbed and have not yet been stabilized or restored to the original conditions.

The impacts from erosion and sedimentation include water quality impacts to nearby wetlands, streams, or surface waters from sediment, sediment accumulation in receiving waters and drain systems, and alteration to existing land forms.

Traffic Impacts

There will be impacts to traffic in all areas of the sewer expansion plan. The traffic impacts will occur from construction activities occurring in the roadway and truck traffic to and from the construction site. The impacts will mainly occur in local roads within a project area and will be minimal. These roads are subject to very few vehicle trips that primarily occur for commuting purposes in the morning and

evening, prior to and after daily construction. The impacts will include slight to moderate traffic back-ups, increased traffic on alternate routes, and restricted access to certain areas.

Impacts to Adjacent Land Uses

The sewer expansion plan is targeted to virtually all residential areas. The main impact to developed land uses within the project areas is a limited restriction of access to properties during construction. Sewer expansion outside the areas proposed for sewer will be restricted by the City. Potential growth and growth management strategies are discussed further in Section 3.5.

4.3 SPECIFIC IMPACTS IN THE NEEDS AREAS

The following sections assess environmental impacts in each of the needs areas that were recommended for sewer system expansion. It supplements information presented in Chapters 5 and 6 of the CWMP. Wetland resource areas in each of the Needs Areas were identified and the significance of the resource areas related to the interests of the Massachusetts Wetlands Protection Act was determined. These interests include public and private water supply, ground water supply, storm damage prevention, prevention of pollution, flood control, protection of fisheries, shellfish and wildlife habitat. A detailed evaluation of wetlands and natural resources, previously prepared by Wetland Strategies, Inc. for the Draft EIR is provided in Appendix F.

General observations of conditions in Taunton and definitions of some of the features identified are discussed below.

Bordering Vegetated Wetlands

Bordering vegetated wetlands (BVW) are defined as freshwater wetlands that border on creeks, rivers, streams, ponds and lakes. Types of freshwater wetlands include wet meadows, marshes, swamps, and bogs. BVW are areas where the soils are saturated and/or inundated such that they support a predominance of wetland indictor plants. The boundary of the BVW is the line within which 50 percent or more of the vegetative community consists of wetland indicator plants and saturated or inundated conditions exist. BVW are presumed significant to the interests of the MA Wetlands Protection Act including public water supply, private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, protection of fisheries, and wildlife habitat.

Land Under Water Bodies and Waterways

Land Under Water Bodies and Waterways are defined as the land beneath any creek, river, stream, pond or lake. This type of land is generally composed of organic muck or peat, fine sediments, rocks, or bedrock. The boundary of land under water bodies and waterways is the mean annual low water level. Land under water bodies and waterways are presumed significant to public and private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, fisheries, and wildlife habitat. For work in areas that are significant to the protection of fisheries, the issuing authority may impose a time of year restriction to prevent adverse impacts to the fisheries habitat during spawning season. The time of year restriction is generally limited to the period from March 15th and June 15th in any one year. Imposing the time of year restriction would be likely if the proposed work will result in dredging, disposal of dredged fill material, or filling in a fish run. Areas of the Taunton River south of Route 140 have been designated as Living Waters Core Habitat by the Natural Heritage and Endangered Species Program. The purpose of the designation is to identify critical sites for maintaining freshwater biodiversity.

Bordering Land Subject to Flooding

Bordering Land Subject to Flooding is any area which floods from a rise in a bordering waterway or water body. It is defined as an area with low, flat topography adjacent to and inundated by flood waters rising from creeks, rivers, streams, ponds, or lakes. It extends from the banks of these water bodies and waterways. Where a BVW occurs, it extends from the wetland. The boundary of bordering land subject to flooding is the estimated maximum lateral extent of flooding which will theoretically result from the statistical 100-year frequency event. Said boundary shall be that determined by reference to the most recently available flood profile data prepared for Taunton under the National Flood Insurance Program (NFIP), currently administered by the Federal Emergency Management Agency (FEMA). This resource area is significant to the interests of flood control and storm damage prevention. Certain portions of bordering land subject to flooding are also significant to wildlife habitat including those areas within the ten year flood plain and areas within 100 feet of a bank or BVW (whichever is further from the water body or waterway, so long as such area is contained within the 100-year flood plain, except for those areas so heavily altered by human activity that their important wildlife habitat functions have been effectively eliminated).

Water Body Banks

A bank is defined as the portion of land surface which normally abuts and confines a water body. It occurs between a water body and BVW and adjacent flood plain, or in the absence of these, it occurs between a water body and an upland. A bank may be partially or totally vegetated or it may be comprised of exposed soil, gravel or stone. The upper boundary of a bank is the first observable break in slope or the mean annual flood level, whichever is lower. The lower boundary of a bank is the mean annual low flow level. Banks are significant to public water supply, private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, fisheries, and wildlife habitat.

Riverfront area

Riverfront areas are defined as areas of land between a river's mean annual high water line and a parallel line measured horizontally outward from the river and a parallel line measured 200 feet away. It may overlap other wetland resource areas or their buffer zones. Only perennial rivers, streams and creeks have an associated riverfront area. In Taunton, certain areas of the Taunton River have been designated as Densely Developed. Densely Developed areas in Taunton include the Weir Village on West Water Street and areas within downtown Taunton. Neither of these Densely Developed areas is within any of the Needs Areas addressed within this evaluation. The riverfront area within these Densely Developed areas extends horizontally outward from the river for 25 feet. Riverfront areas are significant to public water supply, private water supply, ground water supply, flood control, storm damage prevention, prevention of pollution, fisheries, and wildlife habitat.

MA Wetlands Protection Act regulations at 310 CMR 10.58 specifically address the riverfront area. In these regulations, there are activities that are grandfathered or exempted from the requirements for riverfront areas, including the "construction, expansion, repair, ….of public or private wastewater treatment plants and their related structures." As such, the work proposed within the Plan is exempt from the riverfront area requirements of the MA Wetlands Protection Act.

Rare and Endangered Species Habitat

Designations of rare and endangered species habitats are determined by the Natural Heritage and Endangered Species Program of the MA Division of Fisheries and Wildlife. These habitats are protected

under the MA Wetlands Protection Act and under the MA Endangered Species Act. Work within an Estimated Habitat triggers the requirement to submit a copy of the Notice of Intent to the Natural Heritage Program. Work in a Priority Habitat requires the proponent to provide site specific information to the Natural Heritage Program, including site location and project plans. However, certain projects are exempt from review in priority habitats including the "construction, repair, replacement, or maintenance of septic systems, utility lines, sewer lines, wastewater treatment systems, or residential water supply wells within existing paved areas and lawfully developed and maintained lawns or landscaped areas." Therefore, to the extent that implementation of the Plan will occur within paved areas, the work is exempt from the requirements for review in a priority habitat. Also, areas designated as priority habitats are co-terminus with areas designated as estimated habitats within the City of Taunton according to the Natural Heritage Program's maps. A listing of rare species in Taunton as developed by the MA Division of Fisheries and Wildlife is presented in Table 4-2.

4.3.1 Needs Area Q – Somerset Avenue, Railroad Avenue

Wetlands

Area Q includes a small area at the southern end of Taunton, at the confluence of the Taunton River and the Three Mile River. It includes areas of Somerset Ave. (Route 138) and Railroad Ave. It is characterized by small, single-family home sites. This needs area was partially sewered in 2007, and the recommendation is to complete sewer service to the area.

BVW were observed at the end of Riverfield Street and Oakridge Lane, within 100 feet of the roadway. Additional wetlands were observed on Route 138 between Railroad Ave and Oakridge Lane. On the east side of Railroad Avenue, significant areas of BVW were observed on both sides of the road and continued to the eastern end of Railroad Ave. These wetlands are associated with an intermittent stream that flows east into the Taunton River. DEP File No SE 73- 2242 was posted at the end of Railroad Avenue and it is therefore likely that the Taunton Conservation Commission has identified the extent of the wetland in this area.

To protect the above noted wetland resource areas, a siltation barrier is recommended. Staking a row of hay bales, end to end, along the edge of the wetland should provide adequate protection from silt and sediment. The barrier should remain in place until all construction activities have ended and any accumulated sediment is removed and disposed of in an upland location. Any excavated or stockpiled materials should be kept away from the resource areas to the extent practical. Stock piled soil should be protected against erosion by establishing an erosion control barrier between the stockpile and any wetland areas.

Floodplain

Area Q includes an area of flooding, associated with both the Taunton River and the Three Mile River.

Endangered Species

A habitat for rare and endangered species habitat is also situated in Area Q. As a result of this designation, the Program must receive a copy of any filings made with the Taunton Conservation Commission for review. The findings of the Program will be incorporated into the permits issued by the Conservation Commission.

Historic and Archaeological Sites

Area Q lies in the most southerly section of the City and contains two archaeological sites and a cemetery. Site 19-BR-93 is a village of six acres bordered on the west and south by the Three Mile River

and on the east by Somerset Avenue. Site 19-BR-275 exists east of Elm Street and on the north side of the Three Mile River. Also to the immediate north of the 19-BR-275 site is the Hathaway Burying Ground which exists off of Somerset Street.

4.3.2 Needs Area L – Burt Street, Glebe Street, Rocky Woods Street

Wetlands

Study Area L includes an area in the south west portion of Taunton, from Route 44 north along Burt Street. Smaller side roads and cul-de-sacs off of Burt Street are also included. The area is zoned rural residential with some commercial business along Winthrop Street (Route 44).

Numerous wetland areas were observed throughout area L. The Segreganset River is located on the west side of the study area. Burt Street crosses an area of BVW just to the north of its intersection with Route 44 and at 1059 Burt Street. BVW exists along Rocky Woods Street at 1002 Rocky Woods and from 865 to 916 Rocky Woods Street. Further north on Burt Street, wetlands were observed at house number 892. At the intersection of Burt Street and Chris Drive, an area of BVW. Laneway Street is a dead end off Burt Street that crosses over the Segreganset River. A narrow band of BVW was observed at the crossing.

On Caroline Drive, areas of BVW were observed at house number 135 and at the intersection with Anne Drive. Glebe Street E. includes wetlands along most of its length on both the north and south sides. Glebe Street W. crosses over the Segreganset River and there is a BVW associated with the crossing. Morgan Street off of Glebe Street W. includes an area of BVW at its terminus. Continuing north on Burt Street, WSI observed other areas of BVW at house number 1391, number 920 and from 367 to 463 Burt Street. At 1260 Burt Street, the BVW is associated with an intermittent stream. DEP File number SE 73-2271 was posted at a wetland area just south of the Burt Street and Tremont Street intersection indicating that the wetlands have been identified and that the Taunton Conservation Commission has reviewed the wetland boundary.

The work proposed in Area L includes installing a gravity sewer on Burt Street, Rocky Woods Street, Laneway Street, and Glebe Street E. and W. Force mains are to be installed within some of the secondary side roads and cul-de-sacs off Burt Street. Since work will occur within the layout of the roadways, no direct impacts to the wetland resource along the roadways in expected. To protect the wetland from any indirect impacts, a hay bale barrier is recommended between the wetland and the edge of the roadway. Any excavated or stockpiled materials should be kept away from the resource areas to the extent practical. Stockpiled soil should be protected against erosion by establishing an erosion control barrier between the stockpile and any wetland areas.

Endangered Species

Several certified vernal pools are located within the wetland areas of Area L. These pools will not be disturbed by the proposed activity as they are embedded into the wetland areas far to the west of Burt Street.

Floodplain

A flood zone associated with the Segreganset River has been identified by FEMA at the north end of Burt Street. Work on Burt Street to install the gravity sewer is not expected to result in any fill in the flood zone and the work therefore meets the performance standards in the Wetlands Protection Act.

Historic and Archaeological Sites

Area L contains a cemetery, the Walker Burying Ground, which exists at the end of Laneway Street.

4.3.3 Needs Area A - Field Street, Dublin Drive, Woodview Drive

Wetlands

Study Area A is located in the northern section of Taunton along Field Street and Bay Street. It is characterized as a residential area with average lot sizes between a half-acre and an acre in size. Observed major wetland resource areas include parts of Watson Pond, the Snake River, and Lake Sabbatia. On the south side of Field Street a BVW is present within 100 feet of Field Street that is associated with Lake Sabbatia. It appears the Taunton Conservation Commission has identified some of these wetland areas, as evidenced by the DEP file number posted for file number SE 73-1707 and SE 73-2269 along Field Street. On Leahy Drive, BVW was observed to the rear of the dwellings on the west side of Leahy Drive and appeared to be within 100 feet of Leahy Drive. On the west side of Woodview Drive, there is an area of BVW associated with an un-named pond and is within 100 feet of Woodview Drive. BVW also exists on Jaclyn Road to the southwest and at the end of Rachel Drive adjacent to Interstate 495. BVW associated with Watson's Pond exists at the end of Erin Drive, at the end of Bayberry and at the end of Crane Avenue North. Along Bay Street, a small BVW exists opposite the entrance to Watson Pond State Park. Scadding Road crosses over an area of open water, bisecting Lake Sabbatia.

Needs Area A includes the installation of low pressure sewer lines within portions of the above mentioned roadways. Work in the roadway will not result in any direct impacts to the wetland identified above, as the pressure sewer will be installed within the roadway layouts. The proposed work will require the approval of the Conservation Commission, as the work is proposed to occur within the regulatory 100-foot buffer zone of the wetland areas identified above. To protect the wetland resource areas from any indirect impacts, it is recommended that a row of hay bales, staked end to end, be installed at the edge of the roadway. Installing the hay bales will serve to trap any sediment prior to reaching the wetland. Any accumulated sediment should be removed and disposed of in an upland area prior to the removal of the hay bale barrier. In any areas where the slope exceeds 3:1, it is also recommended that a silt curtain (an impermeable device used for control of suspended solids and turbidity) be installed on the down-gradient side of the hay bale line to provide additional protection. Any excavated or stockpiled materials should be kept away from the resource areas to the extent practical. Stockpiled soil should be protected from erosion by establishing an erosion control barrier between the stockpile and any wetland areas.

Construction of the project will not directly alter wetland resource areas and therefore the wellhead area will not be adversely affected by the project. Area A is also within the Hockomock Swamp Area of Critical Environmental Concern (ACEC). Altering wetlands within an ACEC requires a filing with the Secretary of the Executive Office of Environmental and Energy Affairs (EOEEA).

Area A contains three archaeological sites, three historic cemeteries, and an historic area. Archaeological sites 19-BR-615, 19-BR-257 and 19-BR-304 are all pre-historic sites which contain quartz flake findings. They are located off Field Street. Area A also contains the Bassett Burying Ground off Field Street and the Center Historical Area that includes North Taunton Cemetery, the North Taunton Baptist Church and two residences which date to the late 1700's.

4.3.4 Needs Area X – Staples Street, Caswell Street

Wetlands

Needs Area X includes areas of Caswell Street and Staples Street in eastern Taunton. It is a relatively rural area of Taunton and includes lot sizes varying between one-half acre and an acre.

The Taunton municipal airport is located to the north of Caswell Street and an area of BVW was observed between the airport and Caswell Street. At the intersection of Caswell Street and Liberty Street, wetland resource areas include an intermittent stream and associated bordering vegetated wetlands. There were no wetland resource areas observed along Staple Street until the cemetery which is beyond the boundary of Needs Area X.

To protect the above identified wetland resource areas during installation of the gravity sewer main, the use of a siltation barrier is recommended. The barrier is to consist of a row of hay bales, staked end to end. It is to be installed between the roadways and wetland resource areas noted above. By installing the barrier, the wetland resource areas will be protected against any silt or sediment generated during the installation of the sewer main. The stream crossing at the intersection of Caswell Street and Liberty should have additional sediment controls installed. A silt fence in addition to the row of hay bales installed on the down gradient side of the hay bale row with the base of the fence toed into the slope is recommended

Historic and Archaeological Sites

Area X contains an archaeological site and a cemetery. Pre-historic site 19-BR-369 exists further east off Caswell Street and contains quartz flakes. The Caswell Street Burying Ground exists near the junction with Staples Street and contains remains from the 1700s.

TABLE 4-2
RARE SPECIES LIST FOR THE CITY OF TAUNTON

Taxonomic Group	Common Name	Scientific Name	State Rank
Fish	Atlantic Sturgeon	*Acipenser oxyrhynchus*	E
Fish	Bridle Shiner	*Notropis bifrenatus*	SC
Amphibian	Eastern Spadefoot	*Scaphiopus holbrookii*	T
Amphibian	Marbled Salamander	*Ambystoma opacum*	T
Amphibian	Blue-spotted Salamander	*Ambystoma laterale*	SC
Reptile	Wood Turtle	*Clemmys insculpta*	SC
Reptile	Blanding's Turtle	*Emydoidea blandingii*	T
Reptile	Eastern Box Turtle	*Terrapene carolina*	SC
Mussel	Triangle Floater	*Alasmidonta undulata*	SC
Mussel	Tidewater Mucket	*Leptodea ochracea*	SC
Mussel	Eastern Pondmussel	*Ligumia nasuta*	SC
Dragonfly/Damselfly	Comet Darner	*Anax longipes*	SC
Dragonfly/Damselfly	Pine Barrens Bluet	*Enallagma recurvatum*	T
Butterfly/Moth	Chain Dot Geometer	*Cingilia catenaria*	SC
Butterfly/Moth	Barrens Buckmoth	*Hemileuca maia*	SC
Bird	Sharp-shinned Hawk	*Accipiter striatus*	SC
Bird	American Bittern	*Botaurus lentiginosus*	E
Bird	Northern Parula	*Parula americana*	T
Vascular Plant	Swamp Oats	*Sphenopholis pensylvanica*	T
Vascular Plant	Climbing Fern	*Lygodium palmatum*	SC
Vascular Plant	Eaton's Beggar-Ticks	*Bidens eatonii*	E
Vascular Plant	Cat-Tail Sedge	*Carex typhina*	T
Vascular Plant	Three-Angled Spike-Sedge	*Eleocharis tricostata*	E
Vascular Plant	Philadelphia Panic-Grass	*Panicum philadelphicum*	SC
Vascular Plant	Pale Green Orchid	*Platanthera flava var herbiola*	T
Vascular Plant	Plymouth Gentian	*Sabatia kennedyana*	SC
Vascular Plant	Long's Bulrush	*Scirpus longii*	T

State rank category SC = Special Concern, T = Threatened, E = Endangered

Source: MA NHESP, 2006

Historic and Archaeological Sites

4.3.5 Needs Area C – Prospect Hill Street and Lothrop Street

Wetlands

Needs Area C includes Lothrop Street, and Prospect Hill Street in north Taunton (including the Oak Hill and Colonial Estates mobile home parks), abutting the Raynham town line. It is characterized as residential with most lot sizes between one half and one acre. Wetland resource areas in area C include small un-named ponds and streams and associated BVW as further defined herein. The following resource areas were observed. On Field Street, BVW exists east and west of Lothrop Street. At the intersection of Field Street and Terrianne Drive, a BVW extends north and continues to the rear of the dwellings on Diniz Street. These wetlands are associated with an intermittent stream that crosses Field St. at Terrianne Drive. Wetlands associated with the stream continue to the south as well.

Two multi-unit mobile home parks exist on Lothrop Street and include mobile homes on accessory, dead end roads. BVW observed in the mobile home park include an area to the west of Meetinghouse Road, and at the end of Hemlock Road, Acorn Drive and Daisy Ave. On Prospect Hill Street, BVW exists near house number 122, 174, and 201. More BVW exists at the intersection of Prospect Hill Street and Cody Street and is associated with an intermittent stream.

Work in Area C includes installation of both gravity sewer lines and force mains. A pump station is also proposed on Prospect Hill Street. Installation of the mains will not result in any direct alteration to any wetland resource areas as work will occur with the roadway layouts. A hay bale barrier, with bales staked to end, must be installed along the edge of the roadway in areas noted above. Any excavated or stockpiled materials should be kept away from the resource areas to the extent practical. Stock piled soil should be protected against erosion by establishing an erosion control barrier between the stockpile and any wetland areas.

Installation of the pump station on Prospect Hill Street is to occur within close proximity to the BVW. To protect the wetland, it is recommended that a hay bale barrier be installed between the wetland and the location of the pump station. Should de-watering be necessary, the use of a temporary settling basin in an adjacent upland area is recommended to reduce the introduction of suspended solids into the wetland. Alternatively, any discharge waters should be allowed to flow over upland areas prior to reaching any wetland areas. Work should be scheduled to occur during the late summer and early autumn to the extent practical to minimize the need for de-watering and prevent excess run-off.

Area C is also within the Hockomock Swamp Area of Critical Environmental Concern (ACEC). Altering wetlands within an ACEC requires a filing with the Secretary of the Executive Office of Environmental and Energy Affairs (EOEEA).

Endangered Species

The Natural Heritage and Endangered Species Program has identified an area in the western portion of Area C as within a Priority Habitat for rare and endangered species. As a result of this designation, the Natural Heritage Program must receive a copy of any filings made with the Taunton Conservation Commission. The findings of the Program will be incorporated into the permits issued by the Conservation Commission.

Historic and Archaeological Sites

Area C contains two archaeological sites and an historic cemetery. The Wilbore Historic Site (TAU-HA-4) contains remnants of a family farmstead from the 1700's including a dwelling house cellar, outbuildings, a well, the grave of a five-week-old baby and a barn, as well as personal and domestic artifacts. Area C

also contains archaeological site 19-BR-487. It is a pre-historic site of quartz flakes presumed to be used for tool making. This site falls in the neighboring town of Raynham on the Taunton border just off Prospect Hill Road. Also, the Wetherell Cemetery exists in the southern section of Area C at the corner of Prospect Hill and Lothrop Streets.

4.3.6 Needs Area M – North Walker Street

Wetlands

Needs Area M contains some small areas of Bordering Vegetated Wetlands. An Order of Conditions from the Taunton Conservation Commission will be needed prior to any construction in the area.

Endangered Species

The Natural Heritage and Endangered Species Program has identified two areas within Needs area M as Priority Habitat for rare and endangered species. As a result of this designation, the Natural Heritage Program must receive a copy of any filings made with the Taunton Conservation Commission. The findings of the Program will be incorporated into the permits issued by the Conservation Commission.

4.3.7 Needs Area R – Berkley Street

Wetlands

Needs Area R is located along the Taunton/Berkley boundary and includes Berkley Street, Beacon Street, Pratt Street, and Jerome Street to the municipal boundary. Small, residential lots characterize the area and the Taunton River flows along its western portion. Other wetland resource areas that were observed include bordering vegetated wetlands at the end of Landing Road, and on the south side of O'Keefe Street. Berkley Street crosses the outflow of Silva's Pond between O'Keefe and Mechanic Street and wetlands associated with this perennial stream are within 100 feet of Berkley Street. Mechanic Street includes a limited area of BVW at its terminus.

Prior to commencing any work on the installation of the sewer lines, it is recommended that all wetland areas identified above be protected by a siltation barrier. A row of hay bales, staked end to end, is to be installed along the up-gradient side of the wetland resource areas. Any silt or sediment that accumulates on the up-gradient side of the barrier will need to be removed and disposed of prior to removal of the barrier. Any excavated or stockpiled materials should be kept away from the resource areas to the extent practical. Stockpiled soil should be protected against erosion by establishing an erosion control barrier between the stockpile and any wetland areas.

Endangered Species

The Natural Heritage and Endangered Species Program identified a Priority Habitat for rare and/or endangered species along the Taunton River. Accordingly, the City of Taunton will need to send a copy of the Notice of Intent to the Program. The findings of the Program will be incorporated into the permits issued by the Conservation Commission. Any rare or endangered species habitat will be protected by incorporating the comments of the Natural Heritage Program into the Order of Conditions.

Historic and Archaeological Sites

Area R contains the Weir Village Historic Area. The village is a loosely organized area of 19th and 20th century residences, factories, and commercial buildings along the Taunton River by Ingell and West Water Streets. Weir Village is of major importance on both the local and regional levels as the seat of

Taunton's 19th century shipping and coastal trade industries, and as the center of the City's production of iron, copper, brick and stoves.

4.3.8 Needs Area V – Paul Revere Terrace, Williams Street

Wetlands

Needs Area V is located in east Taunton along Paul Revere Terrace and Williams Avenue, just east of Route 24. Residential dwellings occur throughout the area with lots sizes generally less than one acre.

A BVW associated with a small pond area at the south end of Williams Avenue was observed. Additional wetland areas associated with the Taunton River were observed to the west of Paul Revere Terrace but appear to be further than 100 feet from the roadway. The Cotley River flows under Hart Street from Barstow's Pond north to its confluence with the Taunton River.

Work in Area V includes the installation of a gravity sewer and low pressure main along Williams Avenue and Paul Revere Terrace. None of the activity in this area is expected to directly alter any wetland resource areas. To protect the small wetland area on Williams Avenue, the installation of a hay bale barrier at the edge of the roadway to prevent silt or sediment from entering the wetlands is recommended.

Historic and Archaeological Sites

The Coor Manufacturing Area, which is an industrial village consisting of a grouping of one-story brick factories, storehouses, machine shops, and offices is located just south of the Middleboro Railroad right-of-way and Caswell Street. This site, which is actually located just to the east of Needs Area V, dates back to the late 1890s.

4.3.9 Needs Area E – Norton Ave, Fremont Street, Davis Street

Wetlands

Needs Area E contains some areas of wooded marsh and wetlands, and the majority of the area lies within an Area of Critical Environmental Concern (Three Mile River). An Order of Conditions from the Taunton Conservation Commission will likely be needed prior to any construction in the area.

Endangered Species

Needs Area E does not contain any habitat for rare or endangered species. However, the Three Mile River lies immediately west of the Area, which does contain some habitat.

4.4 Growth Management

This section provides an analysis of potential growth resulting from the proposed sewer expansion plan and the impact of existing and proposed regulations on growth.

The CWMP provided a detailed Wastewater Needs Analysis that considered build-out projections (and therefore wastewater capacity requirements) for the existing and proposed sewer service areas based on existing zoning. This build out analysis identified the total number of parcels within the proposed sewer area as well as the existing service area, identified them as developed or undeveloped, and established the potential for in-filling and sub-dividing parcels on the basis of parcel area and frontage (according to existing zoning requirements). That analysis was updated in Chapter 3 of this report. The analysis, therefore, has already fully quantified the maximum potential for growth within existing and

proposed sewer service areas under existing zoning regulations in the City. Full details of the analysis can be reviewed in Sections 3.1 and 3.5 of the CWMP.

The intent of the proposed sewer expansion program is to extend sewer service to existing developed areas that have been identified as problematic for on-site wastewater management. Most of the needs areas are largely developed, therefore access to sewer is considered an insignificant contributor or growth catalyst. Access to sewer is a much more significant issue for new development subject to the City's subdivision rules and regulations, and this has been addressed in the build-out analysis described above.

Taunton's existing regulations, including sub-division rules and regulations, site plan review, Board of Health requirements, low impact development/stormwater management by-laws, and open space and recreation plans contain most of the growth management strategies currently employed by the City. It is the intent of these regulations to allow development in the community to coincide with the City's goals as expressed through their Comprehensive Master Plan. Specifically, new business and residential development should be focused in the village centers as a means to discourage sprawl and loss of historic identity in Taunton. In most of these areas, infrastructure already exists to serve both water and sewer needs.

4.4.1 Sewer Bank

A City ordinance was passed in 2008 establishing a Sewer Bank and an infiltration/inflow removal fee. This ordinance, which applies to sewer extensions or connections in both Taunton and the communities with Intermunicipal Agreements with Taunton, will ensure that groundwater and rainfall, or Infiltration/Inflow (I/I), will be removed in sufficient amounts to allow additional sanitary sewage to be discharged to the system. When I/I is removed from the system, the bank is credited proportionally in gallons of maximum daily wastewater flow. One gallon of wastewater flow is credited to the bank for every five gallons of I/I removed. When connections are made to the sewer system, the flows are deducted from the Sewer Bank. This program has proved beneficial to the financing of I/I removal projects, and the Sewer Bank is anticipated to stay in effect for the indefinite future.

All construction activities resulting in additional wastewater flow to the City sewer system are subject to the requirements of the Sewer Bank. This includes, but is not limited to, new connections to the sewer system, expansion/renovation of existing buildings, and construction of additional buildings on existing lots.

The Sewer Bank applies only to lots located inside the existing sewer area and for those lots existing within the prioritized "needs areas" as established in the CWMP and updated by this FEIR. All properties located outside the sewer area or needs areas are not eligible to be connected to the City's sewer system. The owner of a lot located outside of the sewer area wishing to connect to the City sewer system may petition the City Council and file a "Notice of Project Change" with MEPA per 301 CMR 11.10 (1).

Sewer connections may only be made when the Sewer Bank has a positive balance, indicating that there is available capacity in the system. If there is insufficient capacity available to accommodate the flows generated by the new connection, the connection cannot be made until sufficient capacity is achieved. If the Sewer Bank has insufficient capacity to accommodate a new connection, the owner may petition the Taunton DPW for a project that will satisfy the requirements of a 5 to 1 ratio of I/I removed to maximum daily wastewater added. In this case, the City identifies a project of sufficient scope to satisfy the Sewer Bank balance, and contracts the required work with an independent contractor. Applicants

are not allowed to connect to the sewer system until the sewer bank has been properly replenished to accommodate the applicant's new connection.

Any existing building within the existing sewer area or needs area with an on-site wastewater system that is deemed by the Taunton Board of Health to be a threat to public health shall be allowed to connect to the sewer system immediately, regardless of the balance of the Sewer Bank. I/I removal fees still apply.

The Standard I/I Removal Fee is $5 per gpd of wastewater flow removed from the Sewer Bank. The I/I fee shall be deposited in a revolving account to be used only for improvements to the City's sewer and stormwater systems.

The complete sewer bank ordinance is included in Appendix C.

4.5 WATER BALANCE

In December 2008, Horsley Witten Group, Inc developed a water balance for the Taunton River watershed, which was included in the Taunton River Watershed Management Plan. The water balance is a planning level assessment designed to evaluate the hydrologic impacts associated with water supply withdrawals, wastewater discharges, and stormwater run-off associated with various land uses. The method used was a mass balance approach that accounted for net changes in groundwater recharge as it relates to base flow to streams and wetlands. Water balance calculations were conducted on the Hydrologic Unit Code (HUC) 14 subwatershed scale. HUC 14 subwatersheds are the smallest subwatersheds delineated in MassGIS. There are 108 subwatersheds in the Taunton River Watershed, of which all or parts of 15 watersheds are located in the City of Taunton.

The results of the water balance analysis by sub-watersheds, excluding surface water withdrawals, and NPDES permit information shows that of the 108 sub-watersheds, 29 have surplus water compared to natural conditions and 79 show water deficits. Overall, the analysis showed a total existing net recharge of 122,900 million gallons per year (mgy) compared to an estimated natural recharge rate of 131,000 mgy. This represents a 6.2 percent water deficit throughout the entire Taunton watershed. However, the results of the water balance analysis by sub-watersheds, including surface water withdrawals and NPDES permit information shows that of the 108 sub-watersheds, 34 have surplus water compared to natural conditions and 74 show water deficits. This analysis showed a total existing net recharge of 132,983 mgy compared to an estimated natural recharge rate of 130,962 mgy. This represents a 1.5 percent water surplus throughout the entire Taunton watershed.

Including surface water withdrawals and NPDES information, the water balance for the 15 subwatersheds in Taunton range from a surplus of 259 percent to a deficit of 13 percent. Each of the Needs Areas can be assigned to a specific subwatershed. Accordingly, current water balance information for each of the Needs Areas is presented in Table 3-2. Generally speaking, areas east of the Taunton River have water deficits, while areas west of the river have water surpluses. The one exception is the watershed containing Needs Area A, which has a slight three percent deficit. This watershed is in the Canoe River ACEC. The watershed containing Needs Area L is presently balanced so sewer construction will create a slight deficit. However, Needs Area L ranked the highest in terms of the need for sewers. It should be noted that Needs Areas west of the Taunton River ranked highest in terms of the need for sewers.

The 9 Needs Areas proposed for sewering are expected to generate 1.02 million gallons of wastewater per day, including infiltration. The volume of wastewater and infiltration entering the central sewer system will therefore be diverted from existing groundwater resources. Currently, septic systems in the needs areas dispose of wastewater through leaching fields. The wastewater from the leaching fields percolates through the ground eventually making its way to the neighboring wetlands, streams, rivers, and lakes. Infiltration is groundwater entering broken or otherwise defective sewer pipes and manholes.

The needs areas encompass over 4,500 acres of land. The amount of water that will be diverted from groundwater resources is estimated at 225 gallons per acre per day or 0.008 inches of water per day. The actual impact from the loss of groundwater recharge on groundwater levels will be offset to some extent by infiltration currently being removed from the wastewater collection system. Due to the low wastewater flow rates from the Needs Areas, no significant impact to groundwater tables and water levels in streams and wetlands is anticipated. The environmental benefit of preventing wastewater pollutants derived from failed or deficient septic systems from entering waterways, ponds, and wetlands far outweighs any recharge losses resulting from sewer extensions.

Table 4-3

Current Water Balance in the Vicinity of the Needs Areas

Needs Area	Water Balance
A	**-3 %**
C	**+2 %**
E	**+18 %**
H	**+18 %**
I	**+2 %**
K	**-8 % to +18%**
L	**0 %**
Q	**+259 %**
R	**+259 %**
U	**-10 %**
V	**-1 %**
X	**-5 %**
Z	**-6 %**
AA	**-5 %**

Note: Water Balance is the existing net recharge rate compared to the natural recharge rate.

4.6 PERMITTING REQUIREMENTS

This section provides updates on the status of each state permit or agency action potentially required for the sewer system expansion projects, as required by the Scope outlined in the Secretary's Certificate. The section expands upon the regulatory plan included in Section 6.3 of the CWMP.

Agency actions required for the project consist of approval of the Final CWMP/EIR from MEPA and MassDEP. Approval of the CWMP and the FEIR will allow application for funding under the Massachusetts SRF program, if desired by the City.

4.6.1 STATE AND LOCAL PERMITS

The state and local permits required for the project are outlined in the following summary and will be prepared during project design when an adequate level of detail is available for preparing the permits.

1. MassDEP sewer extension permit where required by 314 CMR 7.00.
2. Notice of Intent under the Wetlands Protection Act (310 CMR 10.00) and the Rivers Protection Act, submitted to the Taunton Conservation Commission. No work within the FEMA 100-year flood plain is anticipated based on the proposed sewer plans. If it is determined during project design that proposed pump station structures are within the 100-year flood plain, the design will adhere to applicable flood plain management policies, including storage volume replication.
3. MassDOT Access Permit where work may infringe on a state highway
4. City of Taunton road opening permit will be required for any work requiring excavation within a City right of way.
5. City of Taunton trench permit, as required by Jackie's Law (520 CMR 14.00).
6. When contaminated soils are encountered, a Utility-Related Abatement Measure (URAM) will be filed with MassDEP under 310 CMR 40.0460.
7. Building Codes – The proposed new and upgraded pump stations may consist of above-ground structures. For any proposed building structure, the project design will adhere to applicable state and local building codes
8. Stormwater Management – A NPDES Construction General Permit will likely be required since the proposed projects will disturb greater than one-acre of land and discharge site stormwater to the City's drainage system. This permit requires the preparation of a Stormwater Pollution Prevention Plan, which will be the obligation of the project contractor to prepare, and submittal of a Notice of Intent to EPA.
9. Dewatering – A NPDES General Permit for Construction Dewatering will likely be required and will be coordinated with the MassDEP and the Taunton Conservation Commission during preparation of the sewer extension permit and the Notice of Intent, respectively.
10. Contaminated soil – since Taunton is a city with an industrial history, it is likely that contaminated soils will be encountered during construction activities in several areas. In these cases, a Utility Related Abatement Measure (URAM) will be filed with MassDEP, as has happened in previous cases.

The project does not propose permanent wetland impacts or alteration to resource areas. There are no proposed discharges that include dredging, filling, and other activities that cause the loss of wetlands; therefore, it is expected that a 401 Water Quality Certification is not necessary. The assumed approval by the Taunton Conservation Commission under the Wetlands Protection Act should not necessitate further state review under the 401 Program.

The proposed installation of sewer mains, sewer services, and pump stations are within existing roadways or within close proximity of the edges of roadway and are not expected to potentially impact rare species. The project design phase will include coordination with the NHESP to review the proposed work and identify any potential impacts to rare species. The NHESP will be involved during preliminary and final design and development of construction plans will be coordinated with their findings.

With regard to potential historical and archeological resources within the sewer expansion project areas, Taunton will consult with the Massachusetts Historical Commission (MHC) during the design phase of any project and utilize the "Inventory of Historic and Archeological Assets of the Commonwealth" to more accurately identify resources. Once adequate construction plans and details have been generated for each sewer expansion project, Taunton will provide this information to the MHC to determine what effect the project will have on identified resources. The design will include preparation of a Project Notification Form for submittal to the MHC as necessary, and will coordinate with the determination made by the MHC on the project.

4.7 MITIGATION

Mitigation measures in the form of Section 61 Findings have been developed to comply with the requirements of Massachusetts General Laws, Chapter 30, Section 61. Under M.G.L c.30, s. 61, state agencies and authorities are required to review, evaluate, and determine the impacts on the natural environment of all works, projects, or activities conducted by them and to undertake all feasible means and measures to minimize and prevent damage to the environment. As part of any determination made, this law requires that state agencies and authorities issue a "finding" describing any impacts to the environment and certifying that all feasible measures have been undertaken to either avoid or minimize these impacts.

4.7.1 PROPOSED SECTION 61 FINDINGS

The proposed sewer expansion consists of extending sewer to nine well-defined areas in Taunton that contain mainly residential development in need of improved wastewater management. The nine Needs Areas contain approximately 1,900 lots to be sewered. To sewer these areas approximately 31 miles of sewer and 1 pumping station are anticipated. Sewer rehabilitation and upgrades to remove infiltration and inflow from the municipal system and to increase the capacity of the Taunton WWTF (see Chapter 2) are ongoing and will continue into the future.

These findings serve to describe any impacts of the project and certify that all feasible measures have been undertaken to either avoid or minimize these impacts.

4.7.2 MITIGATION MEASURES

The following summarizes proposed mitigation measures for the expected construction impacts. The City and its contractors will be responsible for implementing the proposed mitigation measures for the projects. Contractors will coordinate with the City of Taunton and other authorities such as MassDEP and MHD as necessary for implementation of the measures. It will be the responsibility of the City to ensure that contractors are carrying out the proposed mitigation measures. The construction projects

will include the services of an engineering consultant and a resident engineer at the project sites, who will act on behalf of the City to make sure that contractors adhere to the project design and specifications. The resident engineer will monitor the mitigation measures implemented by the contractor and advise the City if they are not adequate.

4.7.2.1 AIR POLLUTION

Impacts to air quality during construction will be mitigated to the maximum extent through various measures incorporated into the project design. To reduce dust during construction activities, open cuts and exposed areas shall be backfilled and stabilized as soon as each segment of pipe is installed, and at the same time, non-backfill material shall be removed from the site and transported to an appropriate disposal location; any stockpiled material that must remain on-site for more than 24 hours shall be covered. Exposed surfaces will be wetted and stabilized to minimize dust generation. All trucks for transportation of construction material will be fully covered and street sweeping will occur as needed.

All motor vehicles and construction equipment shall comply with all pertinent local, state, and federal regulations regarding exhaust emissions. Construction equipment not in use and trucks that are idling while waiting to load or unload material will be turned off.

4.7.2.2 WATER POLLUTION

Impacts to water bodies will be mitigated through the use of Best Management Practices (BMPs) for construction projects. Activities will also be coordinated with the City's local NPDES Phase II Stormwater Management Plan and the Conservation Commission. Erosion and sedimentation control measures shall be installed and functional before excavation operations begin and shall be properly maintained throughout the construction period. Staked and entrenched straw bales and/or silt fence shall be installed along wetland resource areas to prevent erosion into streams and wetlands. All control measures shall be checked weekly and after each rainfall.

Excavated material shall be placed on the upslope side of the trench to permit any erosion from the material to be captured by the trench. Grading activities shall be avoided during periods of high rainfall. Construction shall be staged in sections. Areas disturbed for each section shall be stabilized immediately upon completion of the section. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and run-off and/or repaving cuts in roadways or sidewalks.

Construction dewatering from open cuts and trenches shall be routed through appropriately designed sediment basins or traps and discharged through a pipe or lined channel to a stream or other surface water body (under an applicable construction dewatering permit), unless such dewatering can be handled in another manner not requiring discharge to a water body.

Maintenance, repair, and fueling of equipment shall be confined to areas specifically designed for that purpose. These areas will have adequate waste disposal receptacles for liquid and solid waste. Waste oil shall be removed to designated waste oil collection areas for recycling. No potential pollutants shall be allowed to drain into catch basins, streams, or other water bodies.

When using fertilizer to establish areas of new vegetation for soil stabilization, mulches shall be used to prevent fertilizer nutrients from washing off the vegetated areas. Fertilizer shall not be applied if there is likelihood of a significant rainstorm. Fertilizer shall not be applied unless there is adequate protection of surface water, groundwater, and pipeline systems.

4.7.2.3 Excessive Noise

Measures to minimize noise from construction activities will be incorporated into the construction plans. Where practical, construction will occur during daytime hours (7:30 AM to 3:30 PM), excluding weekends. Construction equipment will have appropriate mufflers to minimize noise and idle equipment will be shut off.

4.7.2.4 Material Transport / Traffic Impacts

Truck routing to the project areas will utilize connectors and major routes. No trucking will be allowed to approach the site using local roads and through neighborhoods unless necessary for access. Truck traffic will vary throughout the construction period, depending on the activity.

Police details will be stationed along the project site to coordinate traffic flow and assist in pedestrian direction. Truck routing and traffic management plans will be reviewed and coordinated with the Taunton DPW. For work in state roads, construction activities and traffic management will adhere to the permit issued by the MHD. Street sweeping will be performed as required and daily during all heavy trucking periods.

4.7.2.5 Disposal of Excess Material

The contractor will be directed to reuse suitable excavated material to the greatest extent feasible. Excess soil that cannot be reused on-site will be transported in covered trucks to an approved disposal site. If contaminated soils are encountered through subsurface exploration during the project design or during construction, they will be managed and disposed of at an approved facility according to MassDEP regulations.

4.7.2.6 Environmental Resources

The project will not directly impact or encroach upon existing streams, lakes, ponds, or wetlands. If pump station structures must be placed within flood plain, the project design will replicate the flood plain volume within the project site.

Wetland resource areas and buffer zones thereto will be clearly marked as off-limits to construction equipment and materials storage. Excavated material from utility trenches will not be placed between the trench and a wetland resource area. Trenches shall be promptly backfilled and stabilized to reduce the risk of erosion. Stockpiled soil shall be located away from streams and drainage ways so that runoff cannot carry sediment downstream.

4.7.2.7 Vegetated Areas

Clearing and grubbing shall be held to a minimum as necessary for grading and equipment operation and construction shall be sequenced to minimize the exposure time of cleared surface areas. Soil will be stabilized with perennial vegetation as soon as possible after final grading. All cuts, fills, and disturbed areas adjacent to paved areas and roadways shall be stabilized with appropriate temporary or permanent vegetation.

4.7.2.8 Adjacent Land Use

The project will not impact adjacent land use such as protected open space, parks, or recreational areas.

4.7.2.9 HISTORIC RESOURCES

The proposed construction will consist of underground sewer and will occur mainly within existing roadways. The pipeline construction will not proceed onto private properties. There are several proposed pump stations that may require an easement on private property; however, they would be located as close to the roadway as possible. The pump stations could include above-ground structures.

Once the project design for each phase of sewer expansion has generated adequate construction plans and details, the City will provide this information to the MHC to determine what effect the project will have on identified resources. The design will include preparation of a Project Notification Form for submittal to the MHC as necessary, and will coordinate with the determination made by the MHC on the project.

5.0 NEEDS ANALYSIS – WASTEWATER TREATMENT FACILITY

5.1 GENERAL

Taunton's centralized wastewater treatment system is served by a single Wastewater Treatment Facility, located on West Water Street. The facility was originally built in 1950, with significant upgrades constructed in 1978 and 2000. A graphic showing the history of construction at the WWTF is shown in Figure 5-1. Due to the age and condition of many of the systems at the WWTF, the requirements of the new discharge permit, and the need for CSO abatement, the WWTF is due for a major upgrade. In preparation for this upgrade, a condition assessment was performed on the facility in 2017. This chapter outlines the condition of the existing facility, as well as the other needs that must be addressed by the upcoming facility upgrade.

5.2 DISCHARGE PERMIT

The Taunton WWTF is authorized to discharge treated effluent to the Taunton River under NPDES Permit No. MA0100897. The permit is attached to this report as Appendix I. Discharge limitations imposed by the NPDES Permit that became effective in 2015 are summarized in Table 5-1. The City of Taunton is required by the permit to achieve an interim total nitrogen limit of 5 mg/l, with a final limit of 210 pounds per day (3 mg/l at a flow rate of 8.40 MGD). However, MassDEP is considering a revision to the salt water Dissolved Oxygen criteria established in the Massachusetts Surface Water Quality Standards (314 CMR). The current standard for dissolved oxygen for water with an SB classification is 5.0 mg/l. The proposed standard, which has been adopted by most states along the eastern seaboard, ranges from 2.9 mg/l to 4.6 mg/l depending on water body characteristics, and whether the condition is acute or chronic. This lower standard could result in a less stringent total nitrogen requirement in the permit. Should the standard be changed, the City will likely apply for a permit modification. In addition, in August 2019 a technical memorandum[1] was issued by the University of Massachusetts School for Marine Science and Technology (SMAST). The memorandum provided updated information and analysis on the relationship between nitrogen discharged to the Taunton River and dissolved oxygen levels in the river and in Mount Hope Bay. The findings of this report could also result in a less stringent total nitrogen discharge requirement for the Taunton WWTF.

The reclassification of the Taunton River in the vicinity of the Taunton WWTF discharge, to a salt water body (estuary), resulted in a much more stringent discharge standard for total recoverable copper. Taunton is working with USEPA and MassDEP to develop and implement a program to evaluate site specific toxicity criteria for copper. Taunton completed a study and report establishing a water effect ratio and recommended site-specific criteria for the WWTF in March 2019. If approved by USEPA, the criteria can take effect and Taunton may get relief from that change in discharge limits.

5.3 EXISTING WASTEWATER TREATMENT FACILITY

The Taunton WWTF is presently designed to treat an average daily flow of 8.4 mgd, a peak daily flow of 17.4 mgd, and a peak hour hydraulic condition of 22.4 mgd through the main process units. A site plan of the existing WWTF is shown in Figure 5-2. Prior to the year 2000, the biological treatment process was configured as a two-stage activated sludge plant that was operated as a single treatment train. Pure oxygen was delivered to each of the aeration basins. In 2000, the biological treatment process was reconfigured to function as two independent parallel batteries consisting of a set of aeration tanks

[1] Brian Howes et. al., "Nutrient Water Quality Monitoring in the Taunton River, June-September 2018"

paired with two clarifiers. The pure oxygen system was replaced with a combination of surface aerators and fine bubble diffused air.

Four liquid treatment processes are employed at the treatment facility: preliminary treatment (headworks), primary treatment, advanced secondary treatment (nitrification) and disinfection prior to discharge to the Taunton River. Solids handling operations consist of gravity thickening and dewatering using centrifuges, prior to disposal at the Taunton landfill. A brief description of the major process components and a condition assessment for major process equipment is given below.

Table 5-1
Existing NPDES Permit Discharge Limitations (2015 Permit)

Parameter	Average Month	Average Week	Maximum Day
Flow	8.4 mgd	------	------
$CBOD_5$ (Apr. –Oct.)	15 mg/l 1051 lbs/day	15 mg/l 1051 lbs/day	------
BOD_5 (Nov. – Mar.)	30 mg/l 2102 lbs/day	45 mg/l 3153 lbs/day	------
TSS (Apr. –Oct.)	20 mg/l 1401 lbs/day	20 mg/l 1401 lbs/day	------
TSS (Nov. – Mar.)	30 mg/l 2102 lbs/day	45 mg/l 3153 lbs/day	------
Total Residual Chlorine	0.026 mg/l	------	0.044 mg/l
Fecal Coliform	88 cfu/100 ml	------	260 cfu/100 ml
Enterococci	35 cfu/100 ml	------	276 cfu/100 ml
Ammonia Nitrogen (Jun. – Sep.)	1 mg/l	1 mg/l	2 mg/l
Total Nitrogen (May – Oct.)	210 lbs/day	------	------
Total Recoverable Copper	0.008 mg/l	------	0.016 mg/l
Dissolved Oxygen	>6 mg/l	>6 mg/l	>6 mg/l

Note: The flow limit is an annual average reported as a rolling average of the current month and the previous eleven months. The limit for total nitrogen is a seasonal rolling average that considers the current month and the previous five months when the limit was in effect.

Figure 5-1 - History of Construction of the Taunton WWTF

LEGEND:

1950 CONSTRUCTION

1978 UPGRADE ($15M)

2000 UPGRADE ($9M)

NUMBER	DATE	MADE BY	CHECKED BY	DESCRIPTION

REVISIONS

DRAWN BY: AJG

DEPT. CHECK: SJR

PROJ. CHECK: SJR

TAUNTON, MA

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SCALE: 1" = 100'

TAUNTON WWTF

JOB 3474

FILE NO.

SHEET 1

Figure 5-2 - Existing WWTF Site Plan

WEST WATER STREET

FLOW METER CHAMBER NO.2
AERATION TANK NO.3
AERATION TANK NO.2
AERATION TANK NO.1
TRANSFORMER PAD
SECONDARY SETTLING TANK NO.3
SECONDARY SETTLING TANK NO.4
SLUDGE PUMP STATION NO.2
MANHOLE STRUCTURE NO.2
MANHOLE STRUCTURE NO.3
LIME SILO
PRIMARY SETTLING TANK NO.3
PRIMARY SETTLING TANK NO.2
PRIMARY SETTLING TANK NO.1
PIPE GALLERY
HEADWORKS
SCREENING BUILDING
SLUDGE THICKENER NO.2
SLUDGE THICKENER NO.2
SOLIDS HANDLING BUILDING
DECANT TANK
OPERATIONS BUILDING
ADMIN. BUILDING
SECONDARY SETTLING TANK NO.1
SLUDGE PUMP STATION NO.1
SECONDARY SETTLING TANK NO.2
MANHOLE STRUCTURE NO.1
BLOWER BUILDING
AERATION TANK NO.3
AERATION TANK NO.2
AERATION TANK NO.1
CHLORINE MANHOLE
CHEMICAL HANDLING BUILDING
CHLORINE CONTACT CHAMBER
FEMA 100-YR FLOODPLAIN
FLOW METER CHAMBER NO.2
APPROX. EXIST. OUTFALL LOCATION
TAUNTON RIVER
TAUNTON RIVER

12/4/2018 10:11 AM J:\TAUNTON\WWTF DESIGN\PRELIMINARY DESIGN\AUTOCAD\PLAN SET\WWTF EXISTING SITE PLAN.DWG (BETA STB BW.STB)

PREPARED BY

BETA
www.BETA-Inc.com

REGISTERED PROFESSIONAL

SUBCONSULTANT

PROJECT

Taunton Wastewater Treatment Facility Existing Site Plan

Taunton, MA

TITLE

WWTF Existing Site Plan

NO.	REVISIONS	DATE

DRAWN BY:	BM
DESIGNED BY:	JD
CHECKED BY:	--
ISSUE DATE:	10/11/2018
BETA JOB NO.:	5582

SCALE

40 0 40 80
SCALE IN FEET: 1"=40'

Not for Construction

SHEET NO.

Figure 5-2

5.3.1 Preliminary Treatment (Headworks)

Raw sewage is pumped to the WWTF via one 24-inch force main from the Main Lift Pumping Station. An additional 20-inch force main operates only under bypass conditions. The two force mains merge into one 30-inch raw sewage force main with a Y-connection in the WWTF yard. Preliminary treatment starts at the headworks, where raw wastewater passes through an aerated grit chamber and then two mechanically cleaned climber screens that were installed in 2000. A bypass channel around the screens, equipped with a manual bar rack, is also provided. Wastewater then flows into a distribution structure where it is conveyed equally to each of the three primary settling tanks.

Figure 5-3
Preliminary Treatment

Excessive humidity and inadequate ventilation in the metal screenings building has caused corrosion of the structure, piping, and equipment. The building needs to be replaced.

The configuration of the headworks with grit removal ahead of the screenings facility is reverse of that of a typical installation. Rags and other large solids are generally removed first to avoid negative impacts on the grit removal equipment. In the case of Taunton, grit is removed from the grit chamber manually with a vacuum truck so some of the adverse impacts are negated.

5.3.2 Primary Treatment

Primary treatment is accomplished by three independent circular clarifiers installed in square tanks (a "squircle" configuration). The tanks are 55 feet long by 55 feet wide with a sidewater depth of 9 feet. The clarifier mechanisms were replaced in 2000.

Primary settling at the facility removes approximately 25 percent of the raw BOD_5 (the amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter) and 50 percent of the total suspended solids. With all tanks in operation, the design average and maximum

hour overflow rates fall within recommended design criteria[2] at 920 and 2,468 gpd/ft^2, respectively. Scum collected from the surface of the settling tanks is pumped to a scum concentrator in the sludge handling building.

Figure 5-4
Primary Clarifiers

Primary sludge is pumped to a cyclone degritter for grit removal prior to its delivery to the gravity thickener(s). The clarifier mechanisms and primary sludge pumps were most recently replaced in 2000. Due to their age, the primary clarifier mechanisms, primary sludge pumps, and all valves in the sludge withdrawal piping and on the pump discharges require replacement.

5.3.3 AERATION

After primary settling, the flow is distributed to two batteries of aeration tanks for advanced treatment (BOD removal and nitrification). Three aeration tanks operating in parallel are provided in each battery. Battery 1 aeration tanks are smaller, and process approximately 35 percent of the facility flow, with the remaining 65 percent treated in Battery 2. The aeration system is sized to provide sufficient oxygen to allow seasonal nitrification from June through September.

The plant upgrade completed in 2000 included two new aeration tanks, one in each battery. The four original aeration tanks are each equipped with concrete covers and three mechanical surface aerators that are operated with variable frequency drives, while the two new aeration tanks employ fine bubble diffused air. The first stage mechanical aerators in each surface air tank in Battery 1 are equipped with 30 HP motors while the second and third stage aerators are equipped with 20 HP motors. In Battery 2, the first and second stage aerators are equipped with 40 HP motors while the third stage aerators are

[2] TR-16, section 5.2.3.2 recommends maximum of 1,200 gpd/ft^2 at average flow, and 3,000 gpd/ft^2 at max flow

equipped with 30 HP motors. Air to the two new aeration tanks is distributed by fine bubble diffusers fed by a three-blower system. Each blower is capable of providing an air flow of 1,600 scfm.

Figure 5-5
Diffused Aeration Tank

Return activated sludge (RAS) combines with primary effluent and then is discharged directly into the aeration tanks. Concentrations of mixed liquor are maintained between 3,500 mg/l and 4,500 mg/l during the non-nitrifying months and between 4,500 mg/l and 5,500 mg/L during the nitrification season. The RAS rate is automatically controlled as a ratio of the plant flow.

The biological treatment process must be enhanced to achieve total nitrogen removal as required by the NPDES permit, and modified to treat the future design flow rate.

5.3.4 Secondary Settling

Two 100-foot diameter secondary clarifiers with 12-foot sidewater depths accept the mixed liquor from each battery of aeration basins. The sludge collection equipment in each clarifier was installed in 1975. During the 2000 plant upgrade, the collection equipment was sandblasted and painted but not replaced.

Figure 5-6
Secondary Clarifier

Separate sludge pump stations are provided for each battery of clarifiers. Sludge off the bottom of the clarifiers is piped to the waste activated sludge (WAS) and RAS pumps in the sludge pump station. Two return sludge pumps convey RAS to the aeration tanks and two waste pumps send WAS to the gravity sludge thickener. During the 2000 plant upgrade, the motors on the return and waste activated sludge pumps were replaced with new motors equipped with variable frequency drives. The pumps were not replaced. All existing RAS and WAS pumps need to be replaced, along with all associated valves in the pump stations.

5.3.5 DISINFECTION

Effluent from the secondary clarifiers is sent to the chlorine contact chamber where it is disinfected with sodium hypochlorite. Wastewater is then dechlorinated through the addition of sodium bisulfite. The chlorine contact chamber consists of two baffled tanks, each 50 feet by 36 feet by 6.5 feet deep. The total chlorine contact time is 15 minutes at a maximum daily flow of 17.4 mgd (11.3 minutes at 22.4 mgd). The effluent is discharged through a reaeration cascade prior to discharge to the Taunton River.

The existing disinfection system and tankage is inadequate to properly treat the increased design flow incorporated into the facility upgrade. The higher design flow associated with the upgrade will necessitate construction of additional disinfection capacity.

5.3.6 SOLIDS HANDLING

Primary sludge and WAS are pumped to one 50-foot diameter gravity thickener, which is covered for odor control. A second sludge thickener is available for use but is not covered. It should be noted that due to difficulties in operation, the chlorine scrubber used for odor control is not used. Inadequate air handling is contributing to corrosion in the thickener and headworks facility.

Thickened sludge is then pumped through a sludge grinder to two 2,500 lb/hour centrifuges for dewatering. The pumps are located on the first floor of the solids handling building approximately 20 feet above the sludge draw-off point on the thickener. The lack of head on the pumps has caused issues with the pumping of thickened sludge. Dewatered sludge is hauled to the Taunton Landfill for disposal. However, the landfill is expected to only have capacity for sludge disposal through early 2020.

Operational changes and increased flow and load are anticipated to generate additional sludge in future years. As such, it will be necessary to rehabilitate both gravity thickeners, and install a cover on thickener #2. Functional odor control will also be necessary for the protection of workers and the equipment. In addition, higher design flows and the age of the existing centrifuges warrants replacement of the centrifuge units.

5.3.7 Septage

Although the Taunton WWTF was originally designed to accept septage, it is not accepted. Variability in the composition of septage from both residential and commercial sources was thought to contribute to periodic process upsets. Water Solutions Group (WSG) operates a private septage treatment plant located on Mozzone Boulevard in Taunton. WSG accepts hauled septage, which is treated and discharged into the Taunton wastewater collection system at a permitted maximum daily rate of 280,000 gallons per day. The WSG plant is considered a Significant Industrial User (SIU) and is monitored as part of the Taunton Industrial Pretreatment Program (IPP). It is not anticipated that the City will need to accept septage at the wastewater treatment facility, and the capacity to receive septage at the WWTF will not be considered at this time.

5.3.8 Buildings and Utility Systems

Most of the WWTF buildings were constructed during the 1975 upgrade, and some date back to the original plant construction in 1950. Buildings do not meet current building codes, and have old utility systems (plumbing, electrical, HVAC, etc.). Electrical and plumbing systems will require updating as part of the WWTF upgrade. Windows, doors, and roofs on all buildings need replacement.

5.3.9 Odor Control

The Taunton WWTF has an odor control system intended to provide ventilation for the headworks building, the covered sludge thickener, and the solids handling building. In practice, this system is not operated. The odor control scrubber is not functional, and ventilation fans are generally not used. As a result, equipment in the spaced that are supposed to be served by this system are all showing signs of corrosion and wear beyond what would be expected based on their age. Odor control and ventilation of high-corrosion areas will be an area to be addressed in the upcoming facility upgrade. Areas needing odor control include the headworks building, the gravity thickeners, and the solids handling building. Due to the complexity and operational cost of chemical scrubbers, it is recommended that an alternative technology, such as a biofilter, be employed for odor control.

5.3.10 Plant Water

The plant water system provides facility effluent water to be used by the headworks, gravity thickeners, plant hydrants, washdown water, and polymer system. The current system is functional, but is currently operated at a very high pressure setpoint to maintain proper pressure and flowrate in the headworks. The planned upgrade of the facility will result in additional plant water requirements. Changes in the facility's needs will result in significant changes to the plant water system. A new plant water system will be installed as part of the facility upgrade.

5.3.11 Energy Usage

As part of the evaluation of the Taunton WWTF, an energy audit of the facility was performed in 2017. J.K. Muir was retained to review process equipment, while TNZ Energy Consulting was tasked with reviewing building systems. This section is a brief summary of these reports; the complete reports are

included as Appendix J to this report. The audits made several observations and recommendations, which will be incorporated into the design of the upcoming WWTF upgrade. These include:

- System inefficiencies, such as an over-pressurized plant water system and inefficient pumps
- Replacement of surface aerators with bubble aeration
- Operational changes, such as grit blower cycling
- Power demand monitoring for reduced power rates
- Upgrades to building systems including insulation and more energy efficient doors and windows
- Automatic systems for lighting and heat that only turn on lights or heaters in spaces when they are occupied
- Connecting the facility to natural gas instead of the existing heating oil system.

In addition to modifications to the existing WWTF, the report identified multiple locations at the site which would be suitable for the installation of solar panels. Given the large amount of energy that a facility of this size utilizes, generation of power will be considered during the upgrade as an opportunity to reduce energy costs.

5.4 Existing Wastewater Flows

Flow records for the years 2015-2018 were reviewed to determine existing flow rates to the WWTF and related trends. A summary of this data is presented in Table 5-2.

As shown in Table 5-2, average daily wastewater flows for 2015, 2016 and 2017 were 6.42 mgd, 6.09 mgd and 6.78 mgd, respectively. Existing flows to the WWTF in 2018 exceeded the permitted flow limit of 8.4 MGD, when the City experienced historically high rainfall. The average daily flow for calendar year 2018 was 8.60 MGD. However, the WWTF discharge permit only includes a Total Nitrogen (TN) limit during the months of May through October (the "permit season"). During these months, flows to the WWTF are typically much lower than at other times of the year. The flow discharged during these months in 2018 averaged only 7.48 MGD, well below permitted discharge levels. In previous years, a similar trend has been observed, where average permit season flows are considerably lower than flows during other months. It should be noted that the existing flow data includes infiltration and inflow into the system.

With such high seasonal variability evident in the WWTF flow data, the existing flow has been split between the TN permit season, and the remainder of the year (the "wet season"). Based on an analysis of recent flows, the existing flows at the WWTF are as follows:

Permit Season	Wet Season
6.6 MGD	9.8 MGD

Future flows assume that existing flows will remain steady. Assuming that the baseline flow will continue throughout the planning period assumes that infiltration and inflow will continue at current rates. This is conservative, as the City continues its efforts to reduce I/I in the collection system. To further evaluate infiltration and inflow, Taunton is conducting a city-wide flow monitoring program in 2019. This program will help to identify areas that may still be contributing excessive amounts of I/I and serve to evaluate the effectiveness of previous I/I reduction efforts.

Table 5-2
Summary of Wastewater Flows

2015			
Month	**Monthly Average**	**Maximum Day**	**Rain (in.)**
January	7.04	8.61	3.06
February	6.05	6.48	3.00
March	10.23	15.46	4.18
April	9.34	11.90	2.33
May	6.48	7.46	1.92
June	6.25	7.06	3.81
July	5.72	6.69	2.18
August	5.19	6.26	2.63
September	5.03	7.12	3.79
October	5.05	5.57	2.34
November	4.94	5.43	2.87
December	5.75	7.68	4.92
Annual Average	**6.42**	-----	**Total: 37.03**
2016			
Month	**Monthly Average**	**Maximum Day**	**Rain (in.)**
January	6.90	8.43	3.29
February	8.23	10.04	5.26
March	7.21	8.05	2.46
April	8.13	11.48	4.50
May	6.67	7.57	3.50
June	5.77	6.33	2.05
July	5.19	5.65	1.43
August	4.88	5.18	1.80
September	4.68	5.20	2.04
October	5.05	6.23	5.67
November	4.99	5.68	2.53
December	5.26	6.00	3.12
Annual Average	**6.09**	-----	**Total: 37.65**
2017			
Month	**Monthly Average**	**Maximum Day**	**Rain (in.)**
January	6.83	9.78	5.71
February	7.09	7.90	2.88
March	7.27	8.98	4.64
April	10.35	15.12	7.17
May	8.72	10.49	5.32
June	7.05	7.88	3.49
July	5.91	6.62	3.14
August	5.21	5.66	0.94
September	5.07	5.58	4.62
October	5.41	8.70	6.75
November	6.31	8.08	3.23
December	6.16	6.68	2.75
Annual Average	**6.78**	-----	**Total: 50.64**

2018			
Month	**Monthly Average**	**Maximum Day**	**Rain (in.)**
January	8.55	12.70	6.63
February	9.38	11.15	5.52
March	11.25	15.42	8.76
April	9.38	11.30	6.49
May	8.20	9.85	1.75
June	7.04	7.66	3.00
July	6.57	7.41	2.48
August	6.75	7.81	6.44
September	7.53	10.62	12.39
October	8.76	11.35	6.08
November	10.63	12.88	9.66
December	9.19	11.57	4.00
Annual Average	**8.60**	-----	**Total: 73.20**

5.5 EXISTING POLLUTANT LOADING

During the design of the 2000 upgrade of the Taunton WWTF, the influent wastewater strength was determined to be very weak[3] due to high rates of infiltration and inflow. The design raw influent concentrations (average day) for both BOD_5 and TSS were estimated at 175 mg/l while the concentration of TKN was estimated at 29 mg/l. Corresponding design pollutant loads for BOD_5, TSS and TKN were 12,100 lb/d, 12,200 lb/d and 2,000 lb/d (all at 8.4 mgd), respectively.

Over the past several years, influent concentrations have steadily increased in part due to the removal of infiltration and inflow from the collection system. Current concentrations of BOD and TSS are 240 mg/l and 200 mg/l, respectively. The influent TKN concentration is not analyzed frequently but reported concentrations have historically ranged from 30 mg/l to 40 mg/l. To better define the influent concentration, sixteen 24-hour composite samples of the raw influent were collected during March and April 2018. The TKN concentration in these samples ranged from 20 mg/l to 40 mg/l with an average concentration of 30.4 mg/l.

At the existing flow rates described in Section 5.3, the current average daily BOD_5, TSS and TKN loads to the facility are:

BOD_5	13,000 lb/d
TSS	11,050 lb/d
TKN	1,750 lb/d

As demonstrated, the current average day BOD_5 load to the Taunton WWTF exceeds the current design average daily load. Safety factors incorporated into the design keep the plant in compliance with its current NPDES permit. The planned facility upgrade will consider higher loading of these constituents.

[3] Typical design values for influent wastewater are 200-250 mg/l for BOD_5 and TSS, and 35-60 mg/l for TKN

5.6 PROJECTED WASTEWATER FLOWS

5.6.1 WASTEWATER NEEDS IN ADJACENT COMMUNITIES

Currently, the adjacent communities of Raynham, Dighton, and Norton contribute flow to the Taunton WWTF at average rates of 0.90 mgd, 0.11 mgd, and 0.02 mgd, respectively. Flows from each community are measured at the point where they enter the Taunton collection system. Present capacity commitments to these communities through Inter-municipal Agreements (IMAs) are 1.3 mgd from Raynham, 0.60 mgd from Dighton, and 0.052 mgd from Norton. At the time the DEIR was written, the Town of Easton was also considering a capacity allocation of 0.4 mgd. Since that time, Easton has pursued other means of wastewater management and no longer requires capacity from Taunton. A summary of the current and projected flows from contributing communities is shown in Table 5-3.

Table 5-3
Current and Future Flows from Adjacent Communities

IMA Community	Flow Allotment (MGD)	2017 Flow (MGD)	2027 Flow (MGD)	2037 Flow (MGD)
Raynham	1.30	0.90	1.10	1.30
Dighton	0.60	0.11	0.20	0.30
Norton	0.052	0.020	0.036	0.052
Easton	0.00	0.00	0.00	0.00
Total:	**1.952**	**1.030**	**1.336**	**1.652**

Raynham

All collected wastewater in Raynham is transmitted to and treated at the Taunton WWTF. Measured flows from Raynham currently average approximately 0.9 mgd. The projected flow is based on planned expansion of the sewer system in Raynham, as well as infill connections within the existing sewered area. It is expected that half of Raynham's 0.4 mgd remaining flow allocation will be utilized within the next 10 years with the remainder used by the year 2037.

The Raynham collection system is fairly new, as the oldest pipes in the system date to 1977. Flow metering completed during the Raynham CWMP indicates that there is not a significant volume of infiltration and inflow coming from the Raynham system.

Dighton

Taunton signed a 20-year IMA with the Town of Dighton in 1979. The IMA allows Dighton to "deliver sewage… at an average rate not exceeding 0.60 million gallons per day, and at no time shall the sustained peak flow exceed a rate of 1,100 gallons per minute (1.6 mgd) for longer than one hour…". The Town of Dighton is required to inspect and maintain the sewer system within its borders, and measure the flow being delivered to Taunton's sewer system. The IMA makes provision that if Dighton's flows should exceed those specified, the municipalities will jointly plan additional facilities to handle additional flows.

At present, Dighton is delivering considerably less than its permitted flow to Taunton. For planning purposes, it is assumed that Dighton will utilize half of its maximum allowed flow under its IMA with Taunton, or 0.30 mgd by the end of the planning year (2037). Discussions are ongoing with the Dighton

Sewer Commission, which will likely result in an alteration to the existing inter-municipal agreement, lowering their allotted flow.

Norton

Taunton and Norton signed their current IMA in 2001, for a term of 25 years. It includes a total flow allocation from Norton of 52,000 gpd. The IMA defines specific areas of Norton that will be serviced by the Taunton collection system. At present, Norton contributes approximately 20,000 gpd to the Taunton system. Considering infill in the defined service areas, however, it is reasonable to assume that Norton will contribute its statutory maximum of 52,000 gpd by the design year of 2037.

As shown in Table 5-3, there is approximately 0.62 mgd of allocated capacity within the existing IMAs that is currently not being used. All of this available capacity is expected to be utilized by the end of the planning period (2037).

5.6.2 Projected Wastewater Flow Generated Within Taunton

Additional flows to the Taunton WWTF may be generated from several sources within Taunton. Future flows to the WWTF must account for:

- sewer extensions into needs areas;
- contributions from those communities with Intermunicipal Agreements with Taunton;
- sewer connections from infill development;
- sewer extensions to planned developments in the sewer district; and
- growth within the City's industrial and commercial base.

The wastewater flow projected to the year 2037 from each of the priority wastewater needs areas where sewer service was recommended (see Chapter 4) is 0.26 mgd, as summarized in Table 5-4. All of the identified needs areas are nearly fully developed; approximately 85 percent of the projected flow is from existing development with the remainder allocated to a small amount of infill development that may occur. Since Taunton does not have a mandatory connection policy, it is assumed that if sewers are extended to an area, 70% of the properties in the area will connect to the sewer. Extending sewers into the identified needs areas is solely a means to improve wastewater management practices for properties experiencing difficulties with on-site disposal systems. It is not intended as a mechanism to promote growth.

Flow allocations for infill development within Taunton consists of new building construction on vacant lots in the existing sewer area and the connection of existing buildings that are presently not tied into the sewer system but have sewer service available. Since the sewer service area is well developed, new building construction on vacant lots is not a significant flow component. Sewer connection for existing buildings where sewer service is presently available is a significant factor particularly in some of the newly sewered areas such as Lake Sabbatia, the Duffy Drive neighborhood and Winthrop Street West. The sewer connection rate in the Lake Sabbatia is nearly 80 percent; however, the connection rates in the Duffy Drive Winthrop Street West are presently less than 20 percent.

Table 5-4
Projected Wastewater Flows from Needs Areas

Needs Area	Projected Average Daily Flow (gpd)
Q	8,300
L	71,400
A	20,300
X	14,300
C	73,900
M	9,300
R	14,700
V	13,400
E	30,200
Total:	**255,800**

There are seven planned residential developments within the City with proposed connections to the wastewater collection system. These projects, which have combined average daily wastewater contribution of 91,300 gallons, are listed below:

Planned Project	Estimated Flow (gpd)
Highland Heights	5,800
Woodbine Street	1,800
Run Brook Circle	4,700
Hart's Hills	1,400
Hamlen Street	1,800
Hart/County Streets	15,800
Whittenton Mills	60,000

In addition to residential expansion, the City has plans for additional industrial/commercial growth. There are current plans to site and construct a casino in proximity to the intersection of Routes 24 and 140 in the eastern portion of the City. Planning and preliminary design documents for the casino project have estimated the wastewater flow, at full build-out, at 0.225 mgd. Based on this projection, and ongoing expansion of the Myles Standish Industrial Park (Phases IV and V), the planned industrial/commercial flow increase has been projected at 0.38 mgd. Since development of the casino and industrial park would be phased, a portion of this allocation is included in the year 2027 flow projection with the balance allocated to the end of the planning period.

5.6.3 TOTAL PROJECTED FLOWS

Based on the factors discussed above, the projected average daily flow to the Taunton WWTF in the year 2037 is estimated to increase by approximately 1.80 mgd, as shown in Table 5-5. This estimate is considered to be conservative, for several reasons:

- Although I/I reduction efforts will continue, existing flow is conservatively assumed to remain steady, meaning no I/I removal credit is being assumed.
- While nine needs areas are recommended for sewering, it is unlikely that all areas will actually construct sewers in the next 20 years (see discussion in Chapter 4)
- Additional flow from IMA communities assumes that all communities involved will use their maximum allotted flow.
- Recently sewered neighborhoods (Lake Sabbatia, Needs Area K, and Needs area U) are assumed to achieve 100% sewer connection within the planning period.

For these reasons, the 2037 estimate of WWTF flows should be considered to be a "worst case" scenario. It is likely that in 2037 the actual flow to the WWTF will be somewhat less than this amount. However, these flow estimates are possible, and it is prudent to plan for all eventualities. At present, the City is pursuing the option of a "split" flow permit, whereby the WWTF would be permitted to discharge above the currently allowed average flow of 8.4 mgd during the wet season, while maintaining the 8.4 mgd limit during the permit season. The WWTF has already experienced average flows above 80% of its permitted flow for the past two years, and is planning for flows in excess of its permitted flow of 8.40 mgd. Assuming the flow projections are accurate, contingency plans for flows above the permitted discharge of 8.40 mgd have been developed (see Section 6.5) and are being implemented.

5.7 CSO ABATEMENT

An analysis of CSO flows and abatement measures was previously presented in Section 2.1.2 of this report. Based on that analysis, it was determined that a high flow management strategy, including CSO storage, may be required to further abate the CSO.

However, since Taunton is still actively pursuing the separation of sanitary and storm sewers as well as other I/I reduction measures, it expected that the overflow volume under the 1-year, 24-hour storm will continue to decrease. Operational improvements (lowering the operating level) to the existing Main Lift Pumping Station have also served to reduce the frequency and volume of overflow events.

Increasing the pumping capacity of the new Main Lift Pumping Station to 25 MGD from its present maximum rate of 20 mgd will serve to further abate combined sewer overflows. Once in service, the beneficial impacts of higher pumping rates through the main treatment process need to be assessed.

If determined to be necessary, the high flow management strategy would to pump 25 mgd through the treatment process, convert the former main lift pumping station to a 5 mgd wet weather facility that would take overflow from the new station and discharge it to a storage facility on the WWTF site. The combined peak pumping rate would thus be increased to 30 mgd compared to the peak pumping rate of 20 mgd that is provided by the existing main lift station. If the storage facility fills, it would then overflow to the chlorine contact tanks where the wastewater would be chlorinated, dechlorinated and then discharged to the Taunton River. Stored wastewater would be pumped to the headworks and treated through the entire treatment process once plant influent flow subsides.

Previous analyses have indicated that a storage volume of 2.25 million gallons would handle over 90 percent of the historical overflow events. This storage volume needs to be reassessed once the new main lift station is operational.

Table 5-5
Projected WWTF Flows Through 2037

Description	Average Daily Flow (MGD)					
	Existing		Year 2027		Year 2037	
	Permit Season[1]	Wet Season[2]	Permit Season	Wet Season	Permit Season	Wet Season
Existing Flow	6.60	9.80	6.60	9.80	6.60	9.80
Flow From Priority Needs Areas			0.16		0.26	
Flow From Planned Residential Developments			0.09		0.09	
Flow From Infill Sewers[3]			0.10		0.19	
Additional Flow from IMA communities			0.31		0.62	
Planned Industrial/Commercial Development[4]			0.23		0.38	
Future Industrial/Commercial Allowance			0.1		0.16	
Future Residential Allowance			0.05		0.10	
Total: .	**6.60**	**9.80**	**7.64**	**10.84**	**8.40**	**11.60**
Projected Peak Flow[5]	22.4		25		25	

Notes:

1. Permit Season is April 1 - October 31
2. Wet Season is November 1 - March 31
3. New connections in areas of recent sewer expansion, including Lake Sabbatia, Needs Area K, and Needs Area U
4. Planned industrial and comercial development includes Phases IV and V of the Miles Standish Industrial Park expansion, and the proposed casino.
5. Peak Hourly wet weather flow through the WWTF (Main Lift PS Capacity)

6.0 RECOMMENDED PLAN FOR WWTF

6.1 DISCHARGE PERMIT AND FLOW CONSIDERATIONS

The recommendations for plant improvements in this chapter focus on three categories:

1. Improvements needed to comply with the total nitrogen limit established in the City's NPDES permit
2. Improvements necessary to increase the treatment capacity and enhance operations at the treatment facility to handle its projected wet season average day and peak hourly design flows of 11.6 mgd and 25.0 mgd, respectively
3. General improvements to upgrade systems and buildings that are aging or in poor condition.

Since CSO abatement is also a key component of this plan, a summary of recommendations is also provided in this Chapter. The CSO abatement plan includes future infrastructure at the WWTF site that will impact how the facility can be expanded.

The objective in evaluating alternatives was to utilize existing facilities to the maximum extent possible, minimize structural modifications, and provide a cost-effective solution for removal of total nitrogen from the City's wastewater.

Cost estimates included in this chapter include both capital costs and additional operation and maintenance costs resulting from the construction of new processes. Capital costs include construction costs for process equipment, structures, auxiliary equipment, piping, electrical, instrumentation, control systems, and allowances for contingencies, engineering, and project administration. Costs were determined through several methods including quotations from equipment suppliers, recent construction experience on similar projects, and published information on construction costs. All costs are referenced to an Engineering News Record (ENR) cost index of 10,900 (February 2018 - Boston).

Annual operation and maintenance costs for the additional processes include factors such as labor, chemicals, energy and maintenance. Labor costs were derived from estimated man-hours required on a weekly basis for maintenance of the systems that require special attention. Chemical costs were based on the average dosage of chemical applied to the wastewater at the design average day loading rate to the facility. Actual costs of the chemicals were based on information obtained from local suppliers. Energy costs for equipment operation were determined using the average power draw for the equipment, number of service hours for the equipment and local electricity costs estimated to be $0.15 per kilowatt-hour.

A project service life of 20 years was assumed and all construction was assumed to use Clean Water State Revolving Fund (CWSRF) financing to develop cost comparisons. Additional discussion on financing is included in Chapter 7.

6.2 EVALUATION OF PERMIT DRIVEN IMPROVEMENTS – NITROGEN REMOVAL

The secondary treatment process at the Taunton WWTF was originally constructed as a two-stage aerobic process using pure oxygen in which BOD in the wastewater from the primary clarifiers was removed in the first set of aeration tanks (Battery 1). The clarified effluent from the first stage was aerated in the second stage (Battery 2) to promote nitrification (oxidation of ammonia to nitrates). The

configuration of the tanks was such that gravity flow was maintained from the first set of aeration tanks through the second set of clarifiers. The plant was later reconfigured to its current state where the effluent from the primary clarifiers is split to aeration Batteries 1 and 2 and nitrified in two parallel single-sludge treatment trains. However, the water surface elevations in the tanks were not changed, so hydraulically the two treatment batteries are at different elevations. More tank volume is provided in Battery 2, which creates an uneven flow split. The difference in elevation between the two sets of clarifiers limits the opportunity to implement a cost effective suspended growth denitrification process. The aeration tanks cannot be run in series, with the effluent split to each of the four clarifiers, without pumping.

The following limitations are inherent to the existing treatment process:

- Denitrification (conversion of nitrates to nitrogen gas) is not incorporated into the existing treatment process. To remove nitrogen, nitrates produced during the nitrification process must be subject to a subsequent biological process operating under anoxic conditions, whereby the microorganisms are forced to use the oxygen attached to the nitrate molecule to survive instead of free oxygen that is typically available under aerobic conditions. This frees the nitrogen for removal as nitrogen gas. Tank volume to support the necessary anoxic conditions is not available.
- The process was designed to treat a very weak wastewater strength in terms of both BOD and TKN. The current design influent concentrations for BOD and TKN are 175 mg/l and 28 mg/l, respectively. The proposed design increases influent BOD and TKN concentrations to 250 mg/l and 35 mg/l, which are in line with actual current conditions and typical medium strength wastewater.
- The existing aeration basins that are equipped with surface aerators are very shallow, which limits the overall tank volume and the hydraulic retention time available for treatment.
- The 12-foot depth of the final clarifiers is considered shallow for suspended growth processes where total nitrogen limits are stringent. Since microorganisms involved in the treatment process contain approximately 10 percent nitrogen by mass, a high degree of biological solids removal is required to minimize nitrogen in the effluent.

As indicated above, total nitrogen removal is typically accomplished through biological nitrification followed by denitrification. Currently, the Taunton WWTF only provides seasonal nitrification within its secondary treatment system. To comply with the new NPDES permit, denitrification processes will be required.

Total nitrogen is the sum of several nitrogen components including ammonia (NH_3), organic nitrogen, nitrates (NO_3) and nitrites (NO_2). The ability to consistently meet effluent total nitrogen levels of 3.0 mg/l is predicated on the robustness of the selected nitrogen removal technology and the inherent characteristics of the nitrogen species found in the wastewater. Of particular concern is the influent dissolved organic nitrogen (DON) fraction. DON contains the hard-to-degrade forms of nitrogen that can pass through the treatment plant unchanged. Typical municipal wastewater concentrations of DON range from 0.5 - 2.0 mg/l. The concentration of DON in Taunton's wastewater has not been fully characterized but indications are that it is slightly greater than 1.0 mg/l. Therefore, to comply with the total nitrogen limit in the permit (210 lb/day, or 3.0 mg/l at the permitted discharge flow of 8.4 mgd), concentrations of ammonia and nitrate-nitrogen must both be less than 1 mg/l.

Generally, the most cost effective method to achieve an effluent total nitrogen concentration of 3.0 mg/l is a biological nitrification/denitrification system that utilizes both pre and post anoxic zones (following nitrification). The post anoxic or endogenous stage can be included into the main activated sludge process as a single sludge suspended growth process, or as a stand-alone tertiary process downstream (denitrification/anoxic filters) of the secondary clarifiers.

To upgrade the Taunton WWTF, the following nitrogen removal processes were considered:

- Four-stage Bardenpho process (single sludge, suspended growth)
- Denitrification filters following a nitrification process
- Modified Ludzack-Ettinger (MLE) (single anoxic phase) process followed by denitrification filters

The following sections describe these treatment technologies in more detail and discuss how they would be integrated into the Taunton WWTF.

6.2.1 Alternative 1 – Four-Stage Bardenpho Process Using Existing Tanks

The four-stage Bardenpho process has been used successfully to remove total nitrogen at several New England installations. This process is considered very reliable in achieving an effluent total nitrogen concentration of 5 mg/l and, with highly efficient solids removal in the final clarifiers, may meet a limit of 3 mg/l.

The four-stage Bardenpho process consists of a primary anoxic zone, followed by a primary aerobic zone, a secondary anoxic zone and a reaeration zone. A process flow diagram for the Four-stage Bardenpho process is provided as Figure 6-1. Ammonia is converted to nitrates in the primary aerobic zone. Nitrates are recycled back to the primary anoxic zone from the primary aerobic zone where denitrification occurs. Carbon in the plant influent is the substrate used by the microorganisms responsible for denitrification in this zone. The recycle of nitrates offers two operational benefits: 1) some of the alkalinity that is consumed during nitrification is recovered and 2) a portion of the oxygen that is consumed during nitrification is also recovered. In addition, utilizing the incoming wastewater as a carbon source for denitrification reduces the amount of external carbon that must be added in the secondary anoxic zone.

Nitrates exiting the first aerobic zone are further denitrified in the secondary anoxic zone. A supplemental source of carbon is required as a substrate for microorganisms in this zone since most of the carbon in the influent has been consumed at this point. Methanol is commonly used as a carbon source. The final reaeration zone provides an aerobic environment that allows microorganisms to consume any excess carbon introduced in the secondary anoxic zone. The air also aids in the stripping of nitrogen gas that is formed during denitrification.

For this level of evaluation, preliminary sizing of the various treatment zones was developed using modeling software (Biowin). Typical hydraulic residence times for each zone of the four-stage process are shown in Table 6-1. It should be noted that the residence times shown are based on a mixed liquor concentration in the range of 3,500 mg/l to 4000 mg/l and a minimum wastewater temperature of 11^{o}C (52^{o}F).

Combined, the existing aeration basins have a total operating volume of 2.13 million gallons. At the maximum monthly design flow of 12.9 mgd, the volume required for treatment in the four-stage Bardenpho process is 5.9 million gallons. The volume needed for just the first aeration zone where

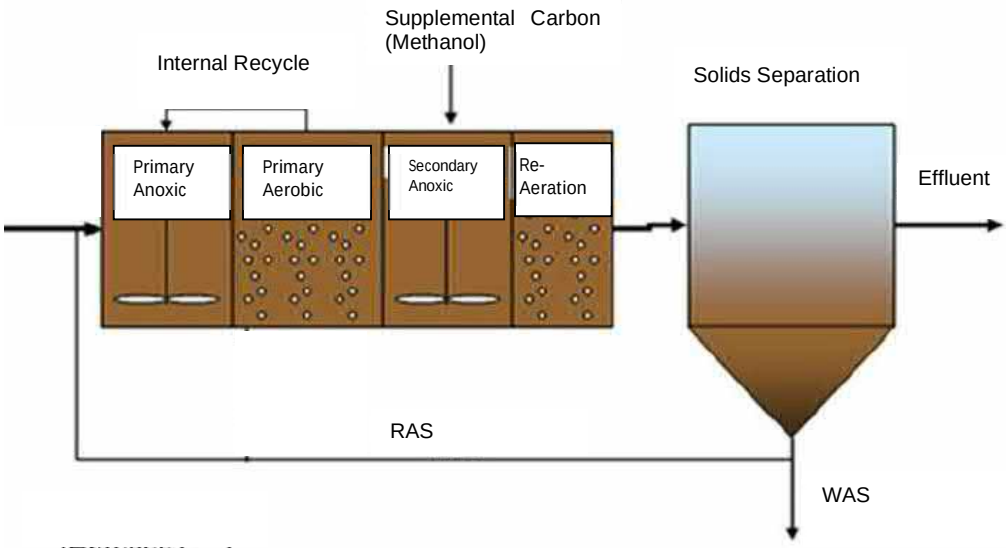
nitrification would be accomplished is in excess of 3 million gallons. Accordingly, significantly more biological treatment capacity must be constructed at the Taunton WWTF to accommodate a four-stage Bardenpho process.

Table 6-1
Preliminary Sizing Criteria for Four-Stage Bardenpho Process

Zone	Typical Hydraulic Residence Time (hrs)	Design Hydraulic Retention Time (hrs)
Primary Anoxic	1.0 to 3.0	2.0
Aeration	4.0 to 8.0	6.0
Post Anoxic	1.0 to 3.0	2.0
Reaeration	0.5 to 1.0	1.0
Total	6.5 to 15.0	11.0

Note: Design HRT is based on design Maximum Monthly flow rates

Figure 6-1
Process Flow Diagram
Four-stage Bardenpho Process



Two alternatives were considered for implementing a four-stage Bardenpho process at the Taunton WWTF. The first alternative (Alternative 1) requires the construction of a new biological treatment tank that would house the primary anoxic and primary aerobic zones. The new reactor would be located north of the clarifiers associated with treatment Battery 2. Using a sidewater depth of 16 feet, the reactor would have a footprint of 300 feet by 110 feet. Flow from this reactor would be directed to the existing Battery 1 aeration basins that would be retrofitted to accommodate the second anoxic and the re-aeration zones. To provide the necessary hydraulic retention time in the second anoxic zone, a new tank of identical size to existing aeration basin no. 3 must be constructed. Following biological treatment, the wastewater flow would be equally distributed to the existing clarifiers. A site plan showing the improvements associated with Alternative 1 is shown in Figure 6-2. An opinion of probable annual cost is provided in Table 6-2.

Advantages of Alternative 1 include:

- Elimination of the current plant configuration that uses two independent treatment processes, making operations less complex while retaining operational redundancy;
- The interim total nitrogen limit of 5 mg/l can be easily achieved. The future total nitrogen limit of 3 mg/l may be achievable without effluent filtration;
- Existing clarifiers can be reused;
- Simplifies construction sequencing as most of the existing treatment process can remain active during the construction of new facilities; and
- Operational savings due to the recovery of alkalinity and dissolved oxygen from the internal recycle of nitrates.
- Use of influent wastewater as carbon source in primary anoxic zone minimizes use of external carbon

Table 6-2
Opinion of Probable Cost
Alternative 1 – Four-Stage Bardenpho Reactor Incorporating Existing Tanks

Capital Improvement	Cost ($)
Construction - New Biological Reactor	$ 13,600,000
Construction - New Anoxic Basin	$ 2,000,000
Rehabilitation – Four Existing Clarifiers	$ 5,000,000
Construction - New Blower Building	$ 4,100,000
Miscellaneous Piping and Materials	$ 500,000
Subtotal	$ 25,200,000
Engineering and Contingency	$ 6,300,000
Total Capital Cost	$ 31,500,000
Annualized Capital Cost (20 Years @ 0%)	$ 1,575,000
Annual Operations and Maintenance Cost	$ 300,000
Total Annualized Cost	$ 1,875,000

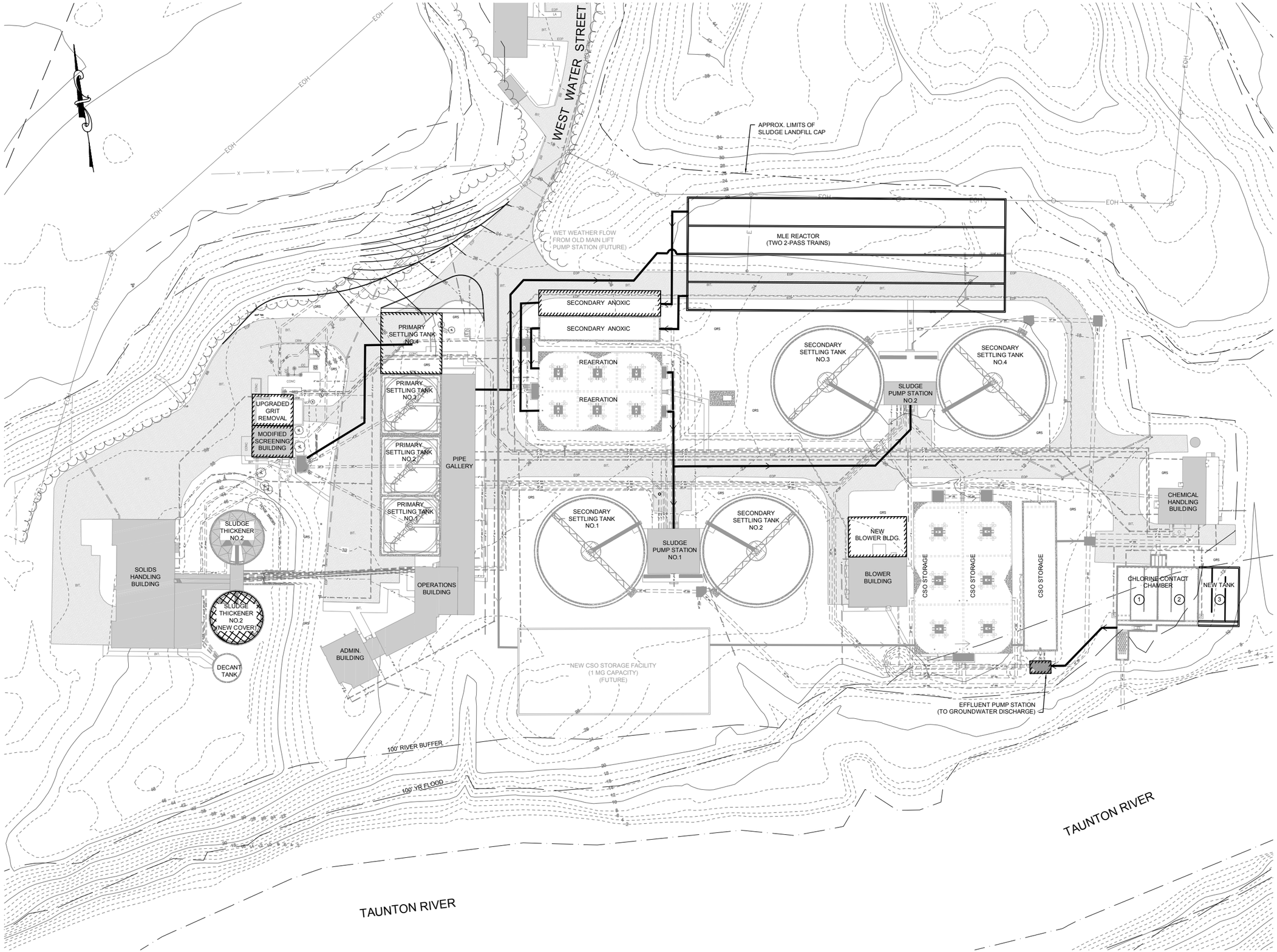


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FIGURE 6-2

WWTF SITE PLAN ALTERNATIVE #1

(SELECTED ALTERNATIVE)

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6.2.2 ALTERNATIVE 2 – FOUR-STAGE BARDENPHO PROCESS IN A NEW REACTOR

The Four-stage Bardenpho process can also be accomplished at the Taunton WWTF by constructing a completely new biological reactor that would incorporate all four treatment stages. To provide a degree of redundancy and allow for maintenance, the reactor would be split into two equal process trains. Using a sidewater depth of 16 feet, the reactor would have a footprint of 250 feet by 200 feet. Due to space constraints on the site, the reactor would have to be constructed in the location of the existing clarifiers associated with treatment Battery 1. Two new clarifiers would then be constructed to the north of the clarifiers associated with treatment Battery 2. A site plan showing the improvements associated with Alternative 2 is provided shown in Figure 6-3.

Advantages of Alternative 2 include:

- Elimination of the current plant configuration that two uses two independent treatment processes, making operations less complex;
- The interim total nitrogen limit of 5 mg/l can be easily achieved. The future total nitrogen limit of 3 mg/l may be achievable without effluent filtration;
- Simplifies construction sequencing as most of the existing treatment process can remain active during the construction of new facilities;
- The existing aeration basins can be re-purposed as wet weather storage tanks to assist in the abatement of the CSO as necessary; and
- Operational savings due to the recovery of alkalinity and dissolved oxygen from the internal recycle of nitrates.
- Use of influent as carbon source in primary anoxic zone minimizes use of external carbon

Table 6-3
Opinion of Cost
Alternative 2 – New Four-Stage Bardenpho Reactor

Capital Improvement	Cost ($)
Demolition – Two Existing Clarifiers	$ 400,000
Construction – Two New Clarifiers	$ 8,300,000
Construction - New Biological Reactor	$ 19,300,000
Rehabilitation - Two Existing Clarifiers and Pump Station	$ 2,600,000
Construction – New Blower Building	$ 4,200,000
Construction - Chemical Feed Systems	$ 500,000
Miscellaneous Piping and Materials	$ 2,500,000
Subtotal	$ 37,800,000
Engineering and Contingency	$ 9,450,000
Total Capital Cost	$ 47,250,000
Annualized Capital Cost (20 Years @ 0%)	$ 2,362,500
Annual Operations and Maintenance Cost	$ 300,000
Total Annualized Cost	$ 2,662,500

The primary disadvantage of Alternative 2 is the high construction cost associated with the new, large biological reactor and the reconstruction of two clarifiers that must be relocated. An opinion of probable cost is provided in Table 6-3.

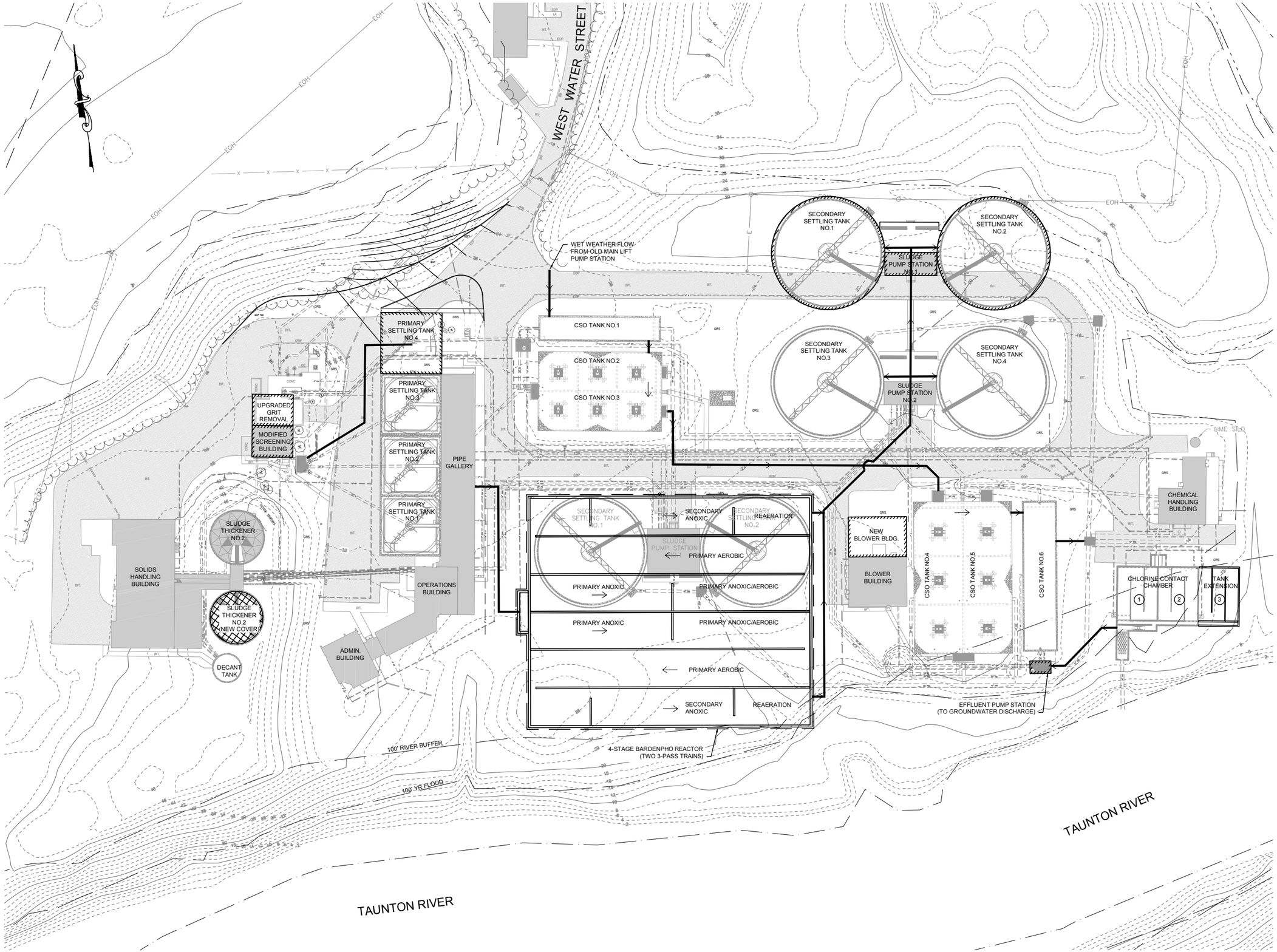

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FIGURE 6-3

WWTF SITE PLAN
NITROGEN
ALTERNATIVE #2

NO.	REVISIONS	DATE

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ISSUE DATE:	11/28/2018
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3/4/2019 12:47 PM J:\TAUNTON\WWTF DESIGN\PRELIMINARY DESIGN\AUTOCAD\PLAN SET\WWTF PROP SITE PLAN - ALT 2.DWG (BETA STB BW, STB)

6.2.3 ALTERNATIVE 3 – SEPARATE STAGE DENITRIFICATION FILTERS

Alternative 3 involves maintaining and expanding the existing aeration system for nitrification, and adding denitrification filters as a separate stage following aeration. A separate stage denitrification system may be appropriate for plants that are achieving nitrification and need to add denitrification capabilities. This is the case at the Taunton WWTF, where the plant is designed to remove BOD on a year round basis and provide nitrification only during the months of May through October. However, due to the projected increase in WWTF flows, the increase in the design influent concentrations of BOD and TKN and the decrease in design temperature due to the potential for year-round nitrogen removal (groundwater discharge), additional aeration tank volume must be provided in addition to the denitrification facilities. As stated in Section 6.2.1, the current aeration tank volume at the Taunton WWTF is 2.13 million gallons. This volume has to be increased to over 3 million gallons to provide complete nitrification under proposed design conditions.

Denitrification filters are a common technology for consistently achieving low effluent Total Nitrogen limits. They have the advantage of providing both denitrification and effluent filtration to significantly reduce effluent solids concentrations. Because most BOD is removed from the wastewater during secondary treatment, a supplemental carbon source must be added. Denitrification filters typically have a small footprint, but require additional pumping to overcome head losses, resulting in additional energy costs.

Denitrification filters have two main process configurations: downflow filters and upflow continuous backwash filters. A downflow denitrification filter contains an inert media onto which the microorganisms responsible for denitrification attach. Nitrified wastewater from the existing aerobic treatment process is introduced to the top of the filter and allowed to flow down through the media. Since the carbonaceous component (BOD) of the wastewater is too low to support the growth of microorganisms, an external carbon source must be added. A process flow diagram for a downflow denitrification filter is shown in Figure 6-4.

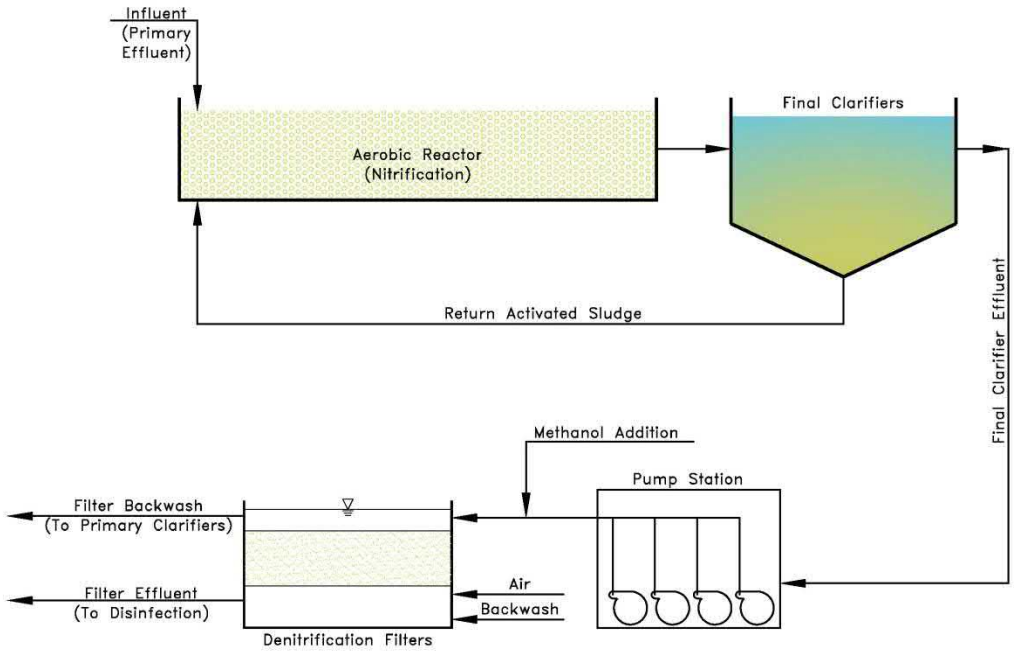
The granular media in the downflow denitrification filter also provides filtration and clarification for solids removal. Backwashing is used to cleanse the media of any particles that accumulate on the media. Backwashing is accomplished by pumping liquid and/or air through the media in the opposite direction of the normal flow of wastewater. The typical backwash rate is less than two percent of the plant's forward flow rate. The backwash liquid is recycled to head of the wastewater treatment facility. The nitrogen gas that forms and becomes trapped in the media is also removed during backwashing and is released to the atmosphere.

Upflow continuous backwash filters differ in that influent wastewater flows upward through the filter countercurrent to the movement of the media bed. Wastewater enters the bottom of the filter where a carbon source is added. Water flows up through an influent pipe and is dispersed into the filter media through distributors. Filtered water discharges at the top of the filter. Filter media continuously travel downward, are drawn into an airlift pipe at the center of the filter, and are scoured before being returned to the filter bed. Upflow filters have the advantage of remaining in service during backwashing. However, they are less effective than downflow filters in their ability to filter solids.

Denitrification filters are hydraulically loaded at an average rate of 1.5 to 3.0 gpm/ft^2. Typical peak hourly loading rates may approach 5.0 gpm/ft^2. Loading rates are dependent on wastewater composition and temperature. Lower loading rates are required at lower wastewater temperatures

because biological activity decreases. Based on these loading rates, approximately 3,500 square feet of filter surface area is needed to treat the design flow rate.

Figure 6-4
Process Flow Diagram of Separate Stage Denitrification Filters



A main drawback to this approach is the relatively large volume of methanol required. With no internal recycle of flow, methanol is the only carbon source used to facilitate denitrification. The typical dosage rate of methanol to denitrification filters is 3 pounds (0.45 gallons) per pound of nitrate to be denitrified, yielding the highest operational cost of all of the alternatives considered. The methanol dosage must be carefully controlled not only to minimize costs but because excess methanol creates an oxygen demand that could cause a permit violation.

Although both types of denitrification filters are viable, downflow filters would be the preferred technology for this project. The smaller backflow rate with downflow filters will result in a lower treatment cost and their ability to filter solids will increase the reliability of achieving low total nitrogen concentrations.

For purposes of this discussion, five 1,120-square-foot filters (96 feet long by 11.7 feet wide) would be provided to handle the proposed design conditions. Four filters would be in service with one offline. A site plan showing the location of the additional aeration tanks and the denitrification filters is shown in Figure 6-5.

For the wastewater to flow through the filters, an intermediate pumping station is needed, following the existing final clarifiers, to overcome the additional filter head loss. This station must be designed with multiple pumps to handle the full range of projected flow rates. Since denitrification is initially expected to be a seasonal requirement, a bypass around the pumping station and filters would be constructed so they can be taken offline when not required.

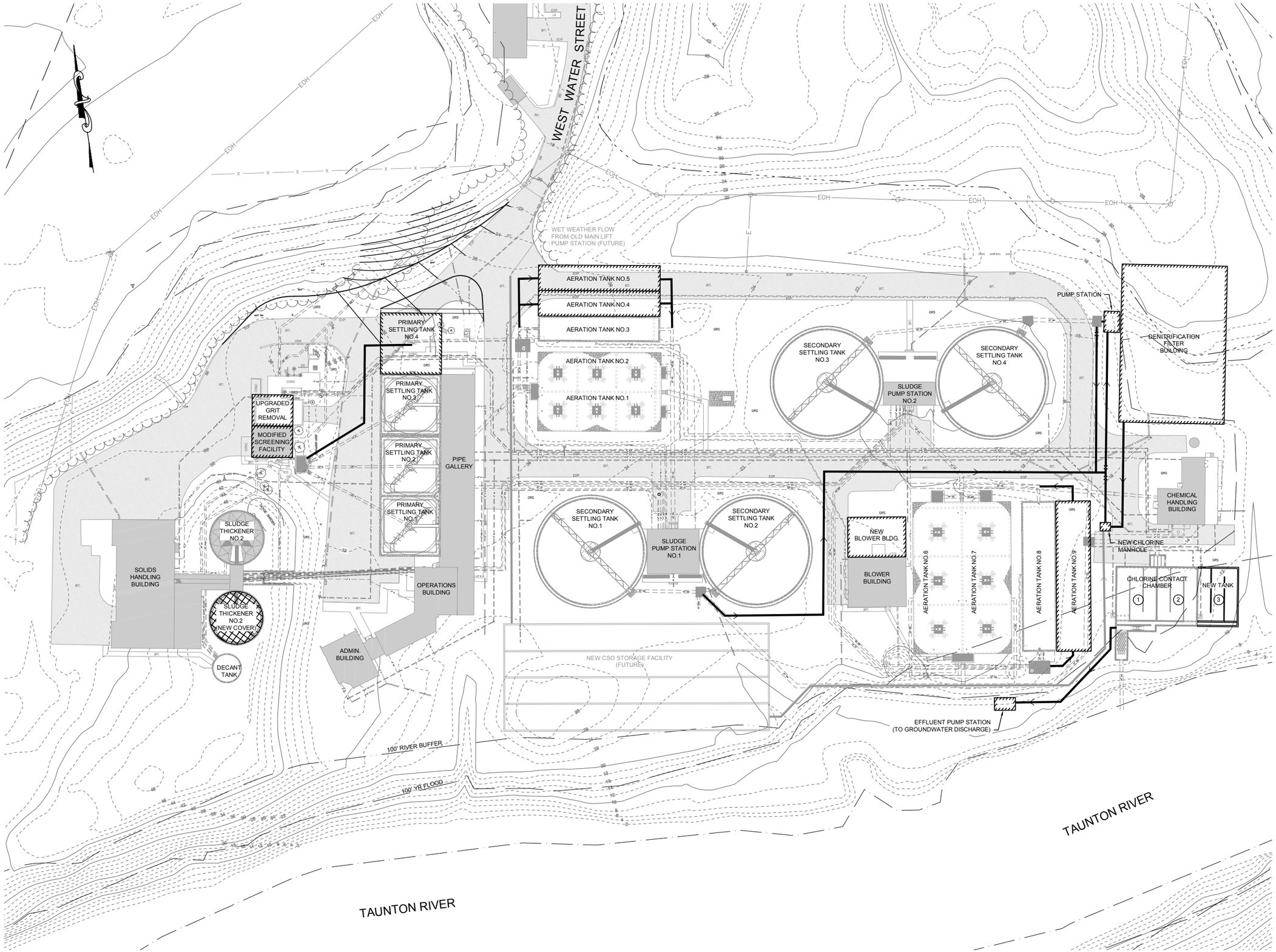


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FIGURE 6-5

WWTF SITE PLAN NITROGEN ALTERNATIVE #3

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Advantages of denitrification filters include:

- The future total nitrogen limit of 3 mg/l is achievable;
- Existing clarifiers can be reused;
- Simplifies construction sequencing as most of the existing treatment process can remain active during the construction of new facilities

There are several disadvantages of denitrification filters following nitrification. These include:

- Additional wet weather storage facilities, if deemed necessary after future evaluations, would have to be constructed;
- High annual methanol cost;
- The biological treatment process remains as two independent trains; and
- No operational savings from the recovery of alkalinity and dissolved oxygen.

An opinion of probable cost to construct downflow denitrification filters and associated appurtenances to treat the future design condition is presented in Table 6-4. Since denitrification filters only handle the effluent from the aerobic reactors, three additional reactors (two in Battery 1 and one in Battery 2) and related equipment to increase nitrification capacity are included in the costs.

6.2.4 Alternative 4 – Modified Ludzack-Ettinger (MLE) Process with Denitrification Filters

The MLE process is essentially the first anoxic zone and the first aeration zone that was described as part of the four-stage Bardenpho process in Section 6.2.1. Since only one anoxic zone is provided, the MLE process is generally applicable to treatment facilities with a total nitrogen limit of 6 mg/l or higher. A process flow schematic is provided as Figure 6-6.

Table 6-4
Opinion of Probable Annual Cost
Alternative 3 - Separate Stage Denitrification Filters

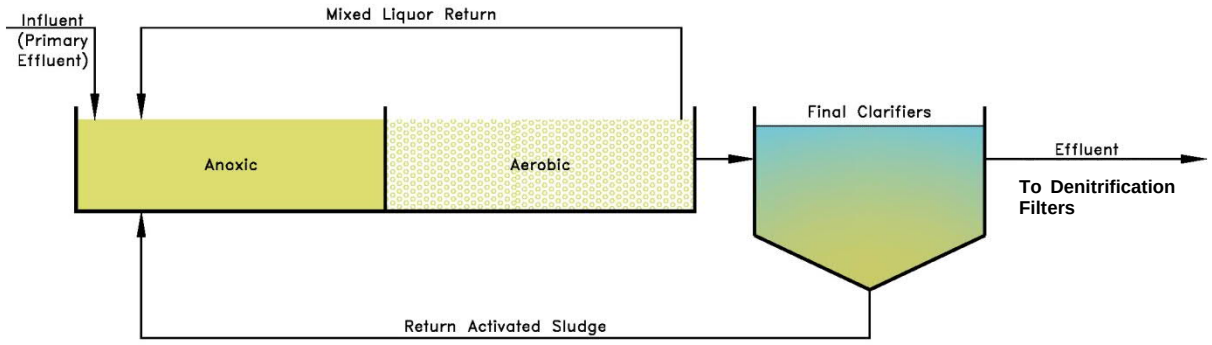
Capital Improvement	Cost ($)
Construction - Nitrification Reactors	$ 6,000,000
Construction of New Blower Building	$ 4,700,000
Construction - Denitrification Filters & Pump Station	$ 20,000,000
Construction Chemical Feed System	$ 700,000
Rehabilitation - Four Existing Clarifiers	$ 5,000,000
Miscellaneous Piping and Materials, CSO Storage	$ 4,500,000
Subtotal	$ 40,900,000
Engineering and Contingency	$ 10,225,000
Total Capital Cost	$ 51,125,000
Annualized Capital Cost (20 Years @ 0%)	$ 2,556,250
Annual Operations and Maintenance Cost	$ 450,000
Total Annualized Cost	$ 3,006,250

To incorporate the MLE process at the Taunton WWTF, a new MLE reactor would be constructed south of the existing Battery 1 clarifiers. The reactor, which would be split into two identical treatment trains, will accept primary effluent. With a sidewater depth of 16 feet, the footprint of the reactor is approximately 140 feet by 250 feet. The partially denitrified effluent from the MLE reactor would be directed to the existing clarifiers and then to denitrification filters as described in Section 6.1.2. Since the nitrate load on the filters would be substantially less than from a nitrification process, the filters would be smaller, and require less media and less supplemental carbon.

Advantages of incorporating a new MLE reactor followed by denitrification filters include:

- Elimination of the current plant configuration that two uses two independent treatment processes making operations less complex;
- The future total nitrogen limit of 3 mg/l is achievable;
- Simplifies construction sequencing as most of the existing treatment process can remain active during the construction of new facilities;
- The existing aeration basins can be re-purposed as wet weather storage tanks to assist in the abatement of the CSO; and
- Operational savings due to the recovery of alkalinity and dissolved oxygen from the internal recycle of nitrates.
- Use of influent as carbon source in anoxic zone minimizes use of external carbon in the denitrification filters.

Figure 6-6
Process Flow Diagram of MLE Process



A site plan showing the location of facilities in Alternative 4 is shown in Figure 6-7. An opinion of probable annual cost is provided in Table 6-5.

Table 6-5
Opinion of Probable Annual Cost
Nitrogen Alternative 4 - MLE Process followed by Denitrification Filters

Capital Improvement	Cost ($)
Construction - New MLE Reactor	$ 14,500,000
Construction – Denitrification Filters and Pumping Station	$ 20,000,000
Construction – New Blower Building	$ 4,200,000
Construction – Chemical Feed Systems	$ 500,000
Rehabilitation – Four Existing Clarifiers	$ 5,000,000
Miscellaneous Piping and Materials	$ 2,500,000
Subtotal	$ 46,700,000
Engineering and Contingency	$ 11,675,000
Total Capital Cost	$ 58,375,000
Annualized Capital Cost (20 Years @ 0%)	$ 2,918,750
Annual Operations and Maintenance Cost	$ 300,000
Total Annualized Cost	$ 3,218,750

Recommended Alternative for Nitrogen Removal

Based on the discussions presented above, the recommended alternative to remove nitrogen at the Taunton WWTF is the Four Stage Bardenpho process utilizing existing biological reactors (Alternative 1). This alternative, which carries the lowest capital cost, requires the construction of a new biological treatment tank that would house the primary anoxic and primary aerobic zones. The new reactor would be located north of the clarifiers associated with treatment Battery 2. Flow from this reactor would be directed to the existing Battery 1 aeration basins that would be retrofitted to accommodate the secondary anoxic and the re-aeration zones. To provide the necessary hydraulic retention time in the secondary anoxic zone, a new aeration tank of identical size to existing basin no. 3 must be constructed. Following biological treatment, the wastewater flow would be equally distributed to the existing clarifiers. The existing clarifiers and sludge pumping stations would be completely rehabilitated.

If wet weather storage is deemed necessary after future evaluations, the Battery 2 biological reactors can be used for this purpose.

The opinion of total project cost for Alternative 1, including engineering and contingencies, is $36,140,000. The annualized cost based on a 20 year loan at 0% interest is approximately $2,100,000, which includes additional annual operations and maintenance costs of approximately $300,000 for chemicals and power.

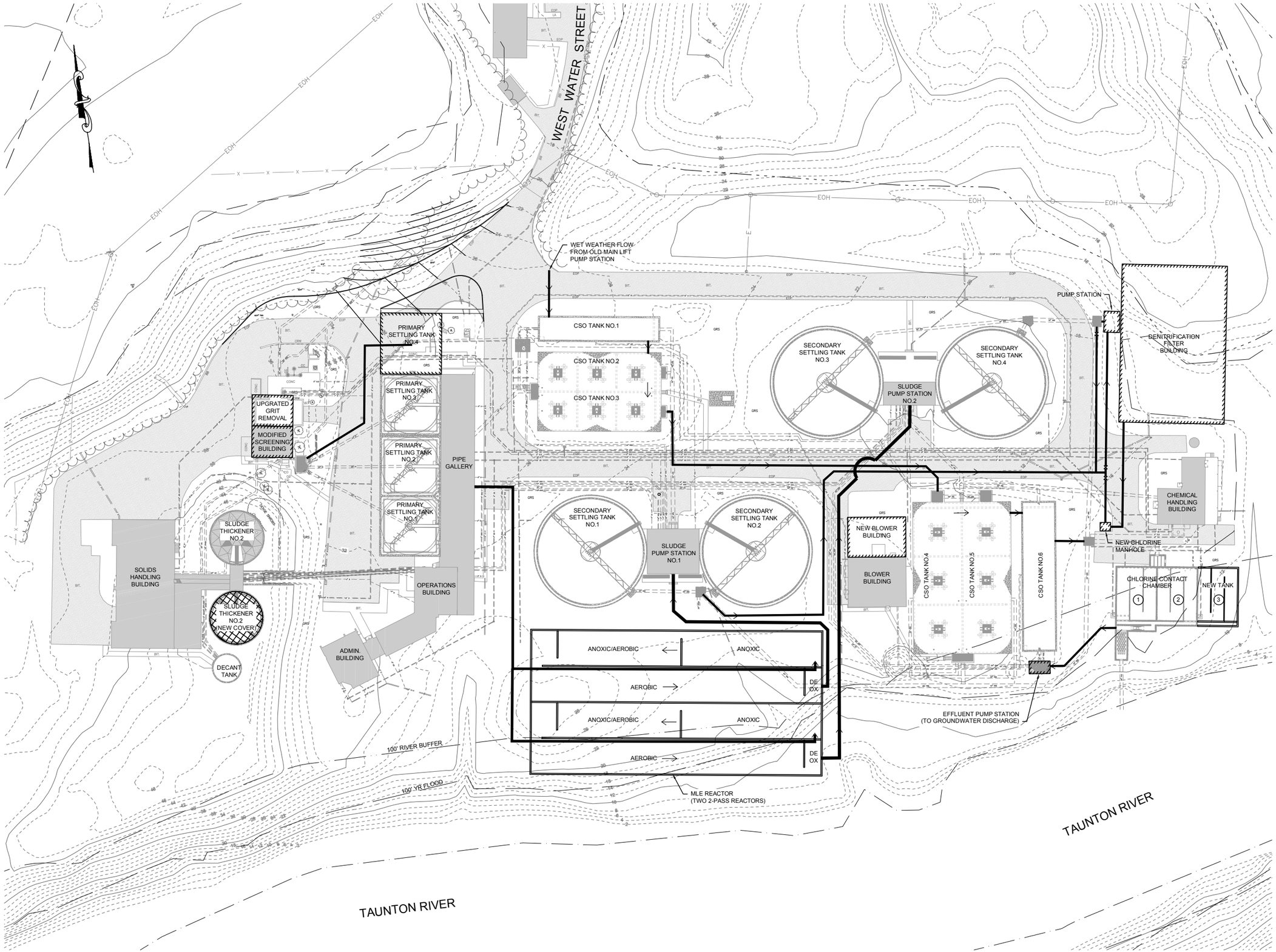


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FIGURE 6-7

WWTF SITE PLAN NITROGEN ALTERNATIVE #4

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6.3 IMPROVEMENTS TO INCREASE TREATMENT CAPACITY AND ENHANCE OPERATIONS

Portions of the Taunton WWTF are approaching 70 years in age, and no major upgrades have been constructed since 2000. Due to age, condition and the need to increase treatment capacity, several improvements are recommended for process areas where permit compliance is not the primary objective. These improvements, which go along with all the Nitrogen Removal alternatives discussed in Section 6.2, will improve operating conditions and ease maintenance issues.

Increasing the average daily flow capacity of the existing WWTF from 8.4 MGD to 11.6 MGD requires expansion of the Main Lift pumping station, primary settling tanks, aeration tanks, chlorine contact tanks, and solids handling operations. Proposed improvements are show on the site plan included as Figure 6-2.

6.3.1 MAIN LIFT PUMPING STATION

The Main Lift Station is the most critical component in the Taunton wastewater collection system since it is responsible for conveying all of the wastewater generated in the service area to the Taunton WWTF. Failure of the Main Lift pump station would result in untreated sewage discharges to the Taunton River and damage to private property, specifically the industrial and commercial business located in close proximity to the pump station. The existing pumping station was constructed in 1947. Although the station has been upgraded on several occasions since it was constructed, it has reached the end of its useful life. In 2019, construction will begin on the new Main Lift Pumping Station. To assist in abatement of the West Water Street CSO, the pumping capacity of the new station will be increased to 25 mgd. This capacity is approximately 5 mgd greater than the actual pumping capacity of the existing station.

Hydraulic improvements to the influent sewer, the use of a lower operating level in the wet well and a much more reliable pumping system are expected to mitigate or eliminate the vast majority of CSO events. The Draft EIR discussed the conversion of the existing main lift pumping station to a 10 mgd wet weather station that would activate upon diversion of high flows from the new station. Wet-weather flow would be conveyed to storage tanks at the WWTF site. This report does not recommend construction of these facilities at this time, and they are not included in any of the opinions of probable cost. The need for wet weather pumping and storage will be re-evaluated upon completion of a flow metering and sewer system modeling program that was conducted in the Spring of 2019. Costs for these facilities have not been included in the list of recommended improvements.

6.3.2 PRELIMINARY TREATMENT (HEADWORKS)

With the exception of the metal-framed building that houses the screens and the screenings press, headworks facilities are in good condition. The screens were designed to handle flows up to 22.4 mgd. Operating at a slightly higher level in the influent channel, they are capable of operating at the proposed 25 mgd design peak hour flow. Noted improvements to the headworks will include:

- A new headworks building with new electrical and heating/ventilation systems;
- Activating the second aerated grit chamber;
- Replacing gates on the influent channel;
- Rehabilitating the existing grit chamber

6.3.3 PRIMARY CLARIFIERS

Recommended design guidelines[1] for primary clarifiers suggest that the maximum surface overflow rates at average daily flow and peak hourly flow not exceed 1,200 and 3,000 gallons per day per square foot of surface area, respectively. The projected peak flow rate will increase the overflow rate through the three existing primary clarifiers to the maximum extent of the design guidelines. Therefore, the addition of a fourth primary clarifier is recommended to lessen the stress on the existing units and to provide some operational flexibility. Recommended improvements include:

- Modifications to the primary flow splitting structure;
- Replacement of clarifier mechanisms, weirs, and baffles in all three existing tanks;
- Construction of a new 55 foot by 55 foot clarifier adjacent to Primary Settling Tank No.3;
- Construction of a new 24-inch primary influent line from distribution chamber;
- Replacement of the existing primary sludge pumps and their associated suction and discharge valves;
- Addition of a new sludge pump and piping for the new clarifier;
- Connection of the effluent from the new primary tank to the existing 36-inch effluent pipe;
- Relocation of the roadway, lime slurry piping, 6-inch plant water, and 6-inch foam spray lines around new tank;

6.3.4 DISINFECTION

Disinfection is currently accomplished by the injection of sodium hypochlorite into the secondary effluent, ahead of two contact tanks. Following disinfection, the wastewater is dechlorinated through the injection of sodium bisulfite. At this time, no changes to the permitted effluent fecal coliform counts or the concentration of chlorine residual are anticipated.

State requirements for disinfection call for a chlorine contact time of 30 minutes at average daily flow and 15 minutes at peak hourly flow. With both contact tanks in service, the total working volume is 175,000 gallons. Chlorine contact times at current design average daily flow and peak hourly flow are 30 minutes and 11.25 minutes, respectively. At projected year 2037 flows, the contact times under average day and peak hourly flows would drop to 25.2 minutes and 10.1 minutes, respectively. Required detention times can be achieved by adding a third contact tank of similar size (87,500 gallons) to the existing units. This will provide approximately 15 minutes of contact time at the peak flow of 25 mgd.

Therefore, it is recommended that a third contact tank (50 feet by 36 feet by 6.5 feet deep) with serpentine baffling be constructed adjacent to the existing tanks. Due to the close proximity to the Taunton River and associated wetlands, as well as the existing structures, the entire excavation will need to be sheeted. The inlet piping to the new tank must be connected to the existing 42-inch stub at distribution chamber.

To minimize chemical usage, consideration was given to the use of ultraviolet (UV) light instead of sodium hypochlorite for disinfection. However, this alternative was not considered viable at this time since there is a potential to re-use treated effluent for irrigation. Current Massachusetts regulations require a chlorine residual of at least 0.5 mg/l in the reclaimed water during conveyance from the treatment facility to each re-use site. This requirement can be waived however, if it is proven that

[1] TR-16, section 5.2.3.2

another disinfection method has been used that adequately protects public health and the environment.

6.3.5 Solids Handling

Dewatered solids generated at the Taunton WWTF are currently disposed at the City's landfill. By the end of 2020, it is expected that the landfill will be closed and alternative methods of solids disposal will be required. To this end, the City is investigating solids disposal and reuse options. Due to capacity issues and closures of facilities like the Taunton landfill, the solids disposal industry is in an uncertain state, and it is unclear what the City's options are for solids disposal. In addition, the uncertainty surrounding the future of land application of biosolids products due to concerns over PFAS contamination makes several options unattractive at the present time. Once the requirements associated with future solids disposal are identified, modifications to the solids handling improvement plan, which is discussed below, may be required. At present, improvements will be limited to replacement of equipment in-kind. Due to the time limitations imposed by the closing of the landfill, it is likely that the solids handling improvements will be completed as a separate, accelerated project.

As stated earlier in this report, the wastewater treatment facility was designed on very dilute influent concentrations for BOD and TSS. The current wastewater strength is much greater than design levels resulting in higher solids generation rates. Under the proposed design condition, additional solids will be produced as BOD and TSS loads will increase further. The two existing centrifuges, which are used to dewater the solids, will have to be replaced with higher capacity spiral filter presses or similar technology to keep up with the increasing demand. The centrifuges are also 20 years in age and are nearing the end of their useful life. Screw and belt conveyors that move dewatered solids from the centrifuges to roll-off containers will also need to be replaced.

In addition to the centrifuges, the drive, collector mechanism and weirs in Gravity Thickener No. 2 have deteriorated and are in need of replacement. Gravity Thickener No. 1, which is not covered and only activated when maintenance is being performed on Thickener No. 2, also needs to be completely rehabilitated and covered. The air handling and odor control system (chemical scrubber) associated with the gravity thickeners (including the solids handling building and the screenings building) never worked properly and is not operated. This system needs to be replaced. Modular biofilters are a viable low cost alternative to the chemical scrubber. The existing scum concentrator, which was installed in 1975, also needs to be replaced.

6.3.6 SCADA and Controls

The process monitoring system that was installed in 1975 has been largely decommissioned and replaced by a head end SCADA system. The monitoring/control panels associated with the former system remain in the control room and essentially serve as a junction box between field instrumentation and the newer SCADA system. However, the SCADA system itself is obsolete with parts difficult to obtain. In addition, the system lacks redundancy.

Large scale changes to plant operations, as well as the age of the existing control system, will require a complete overhaul of SCADA and control systems at the WWTF. Upgrades will include:

- Conversion of a former break room to a new control room allowing the existing control system to remain operational during construction;
- Conversion of the existing control room to a break room once the new system is operational;
- Replacement of all current data wiring with fiber optic cable; and

- Upgrade all SCADA computers and software.

6.3.7 BUILDINGS

The buildings on the site are in need of significant architectural improvements to both enhance conditions and increase building efficiency. Building improvements will include:

- Replacement/repair of roofs, doors, windows, HVAC systems;
- Upgrade security and fire alarm systems;
- Upgrade electrical systems including the emergency generators; and
- Upgrade bathrooms, locker rooms and laboratory facilities.

6.3.8 ENERGY USE AND GREENHOUSE GAS EMISSIONS

The age of the existing equipment being used at the WWTF, as well as existing inefficiencies presents many opportunities throughout the facility for increased efficiency and decreased greenhouse gas emissions. However, enhancing the level of treatment (in this case Total Nitrogen removal) necessarily requires the expansion of treatment facilities, which can result in higher motor horsepowers and increased energy consumption. An analysis was performed on all of the WWTF processes to determine where opportunities for energy efficiency exist, and what effect the WWTF upgrade will have on energy consumption and greenhouse gas emissions. The analysis concluded that while energy consumption at the WWTF will increase slightly due to the increased level of treatment, significant energy savings will be realized from the use of more efficient motors, energy saving equipment such as variable frequency drives, and changes to operational strategies. Greenhouse gas emissions will likewise be minimized with the use of energy efficiency measures, since the vast majority of greenhouse gas emissions generated by a WWTF are as a result of energy production. For the full energy efficiency and greenhouse gas emissions report, see Appendix K.

6.3.8.1 RENEWABLE ENERGY

As part of the energy audit performed on the WWTF (See Appendix J), potential sources and locations of renewable energy were examined. The audit identified three locations that could be used as sites for solar panels. Of these, the closed 4-acre sludge landfill represent the largest potential producer or renewable power. If all three sites are installed with panels, the potential exists to generate enough electricity to power the entire WWTF with solar energy. The City plans to work with renewable energy providers to work out lease arrangements for power production.

Figure 6-8
Potential Sites at WWTF for Solar Panels

6.3.9 OPINION OF PROBABLE COST

As previously stated, improvements discussed in this section are necessary and are not contingent on the recommended alternative for nitrogen removal. An opinion of probable project cost is presented in Table 6-6.

Table 6-6
Opinion of Cost
Other Wastewater Treatment Facility Improvements

Capital Improvement	Cost ($)
Solids Handling Improvements[1]	$ 4,800,000
Headworks Facility	$ 2,500,000
New Primary Clarifier/Flow Splitter Box	$ 2,000,000
Rehabilitate Primary Clarifiers and Pump Station	$ 2,300,000
New Chlorine Contact Tank	$ 1,500,000
Emergency Generator and Switchgear	$ 1,100,000
SCADA Upgrades	$ 3,000,000
Architectural	$ 2,600,000
Chemical Feed Systems	$ 1,000,000
Odor Control	$ 500,000
Yard Piping and Miscellaneous Equipment	$ 1,500,000
Subtotal	$ 22,800,000
Engineering and Contingency	$ 5,700,000
Total Capital Cost	$ 28,500,000
Annualized Capital Cost (20 Years @ 2.0%)	$ 1,742,966
Additional Operations and Maintenance Cost	$ 200,000
Total Annualized Cost	$ 1,942,966

Notes:

1. Solids Handling Improvements will likely be completed as a separate project.

6.4 CSO MITIGATION

Section 2.1.2 provided a discussion related to the actions that have been undertaken by Taunton to reduce infiltration and inflow into the wastewater collection system. These actions have dramatically reduced the volume of infiltration and inflow entering the collection system, and subsequently reduced the volume and frequency of combined sewer overflows at the outfall along West Water Street.

6.4.1 PREVIOUS RECOMMENDATIONS

The recommended alternative to abate the CSO in the Draft EIR was to construct a 2.25 million gallon CSO storage tank, and a new main lift pumping station with an increase in firm pumping capacity to 25 mgd. The former main lift station would be converted to a wet weather station conveying an additional 5 mgd to storage facilities situated at the WWTF site. The combined peak pumping rate would thus be increased to 30 mgd compared to the peak pumping rate of 20 mgd that is provided by the existing main lift station. Flows in excess of 30 mgd would overflow to the Taunton River but the frequency and duration of CSO events will be significantly reduced. Once plant influent flow subsides, the stored wastewater would be pumped to the headworks and treated through the entire process.

6.4.2 RECOMMENDED PLAN

Upon evaluation of the infiltration and inflow removal efforts that have taken place since 2008 and the impacts from lowering the operating level in the in the Main Lift Pump Station, CSO events have been dramatically reduced in both frequency and volume. No events were recorded in 2017, and 2018 only experienced two events. Hydraulic improvements to the influent sewer and increasing the pumping capacity of the new Main Lift Pumping Station to 25 MGD will serve to further abate combined sewer overflows. The current plan for abating the CSO is to continue efforts to remove I/I from the system (following recommendations from the ongoing I/I analysis), and to evaluate the effects of increased pumping capacity at the Main Lift Pumping Station. If it is determined that additional CSO storage at the WWTF would be beneficial, it will be constructed in the future.

6.5 COMPLIANCE FOR FLOWS ABOVE 8.4 MGD

6.5.1 ANTI-DEGRADATION ANALYSIS

The Taunton WWTF is currently permitted to discharge 8.4 mgd to the Taunton River. However, as previously shown in Table 5-5, in future the permitted flow of 8.4 mgd is projected to be reached, and exceeded, during the wet season. As discussed in Section 5.6.3, these flows are considered conservative, and actual flows may be lower than projected.

The preferred option for the City to discharge wet season flows above 8.4 MGD would be to apply for a modification of its existing NPDES permit that would allow additional flow to be discharged to the Taunton River during these months. To complete this application, the City will complete an anti-degradation analysis to demonstrate that additional flow and the associated pollutant loads from the WWTF would not be detrimental to water quality in the river or its downstream waterbodies. The City has submitted a plan to MassDEP outlining this analysis, and intends to complete the analysis within the next 2 years.

Antidegradation rules of Massachusetts' Surface Water Quality Standards (314 CMR 4.04(2)) allow the Massachusetts Department of Environmental Protection (MassDEP) to approve an increased wastewater discharge to Tier 2 High Quality Waters. The Taunton River, as a Class SB waterway, qualifies as a High Quality Water. MassDEP may approve an increased discharge:

> "where it determines that a new or increased discharge is insignificant because it does not have the potential to impair any existing or designated water use and does not have the potential to cause any significant lowering of water quality".

The definition of significance is provided in a 2006 MassDEP document, "Implementation Procedures for the Antidegradation Provisions of the Massachusetts Surface Water Quality Standards, 314 CMR 4.00" where insignificant discharges are defined as:

> "a new or increased loading of a pollutant that would use less than 10% of the available assimilative capacity of the receiving water for that pollutant."

314 CMR 4.04(5) also authorizes MassDEP to permit an increased discharge to High Quality Waters where the applicant demonstrates that:

1. The discharge is necessary to accommodate important economic or social development in the in which the waters are located;

2. No less environmentally damaging alternative site for the activity, receptor for the disposal, or method of elimination of the discharge is reasonably available or feasible;
3. To the maximum extent feasible, the discharge and activity are designed and conducted to minimize adverse impacts on water quality, including implementation of source reduction practices; and
4. The discharge will not impair existing water uses and will not result in a level of water quality less than that specified for the Class.

The scope of work for the analysis will include:

- Extensive sampling of the Taunton River upstream of the WWTF for various substances;
- WWTF effluent sampling;
- Development of mass balances for all measureable parameters to determine predicted instream concentrations under the proposed conditions of increased wastewater discharge;
- Predicted concentrations will then be compared to Massachusetts Water Quality Standards to determine compliance and significance of the increased concentrations. If one or more pollutants should be determined to be significant, then a broader demonstration pursuant to 314 CMR 4.04(5) would need to be made.

Since the anti-degradation analysis has not yet been completed, and therefore no assumptions can be made about its outcome, for the purposes of this report it is assumed that allowable discharges to the Taunton River are capped at the currently permitted annual rolling average flow of 8.4 MGD.

6.5.2 GROUNDWATER DISCHARGES

As a contingency plan, if future discharges to the Taunton River are capped at the current permit limit of 8.4 mgd, average flows (and their associated loads) above the limit will need to be disposed of as part of a future groundwater discharge permit in accordance with 314 CMR 5.00 (Massachusetts Groundwater Discharge Permit Program). Table 5-5 shows that by 2037, the permit season average flow is estimated to be 8.40 mgd, and the wet season average flow is estimated to be 11.60 mgd. Taken together, this yields an annual average of 10.0 mgd. Since groundwater discharges are determined by the hydrology of the soils, flows to groundwater disposal sites are better analyzed as annual averages.

Unlike surface water discharge permits, which are overseen by USEPA, groundwater discharge permits are issued by MassDEP. The City has performed a preliminary search and identified several large, undeveloped sites as potential locations for groundwater disposal or water reuse. The complete list of potential sites is shown in Table 6-8, along with an approximate cost to install pipe to the site from the WWTF.

Based on factors such as distance from the WWTF, ownership, and drinking water protection, the list was reduced to the three most feasible locations: the WWTF, TMLP Cleary Flood Generating Station, and Mount Hope Farm. Table 6-7 shows the total anticipated flows to each site through the planning period. A description of each of these sites and its capacity is provided below. For each site, a USDA soil report was generated to determine the suitability of soil conditions for accepting a groundwater discharge. These soil reports are included as Appendix H.

Table 6-7
Estimate of WWTF Projected Flows and Discharge Capacity

Description	Average Daily Flow (MGD)		
	Existing	Year 2027	Year 2037
Projected Total Wastewater Flows	8.20	9.24	10.00
Discharge Capacity:			
NPDES Permit - Discharge to Taunton River	8.40	8.40	8.40
Groundwater Site #1 - WWTF		0.40	0.40
Groundwater Site #2 – TMLP Cleary Flood Generating Station		0.70	0.70
Groundwater Site #3 - Mount Hope Farm			0.70
Total Discharge Capacity:	8.40	9.50	10.20

6.5.2.1 GROUNDWATER DISPOSAL SITE #1 – TMLP CLEARY FLOOD

Site #1 is an approximately 450,000 ft^2 (10.3 acre) parcel located 0.8 miles from the WWTF, adjacent to the Taunton Municipal Light Department (TMLP) Cleary Flood Generating Station. The site is currently unoccupied, but is planned for the near-future installation of a solar array by TMLP. In addition, a rail-to-trail bike path is planned for the former railroad bed that forms the east side of this site. For this reason, any groundwater disposal considerations for this site would utilize sub-surface disposal chambers. The planned construction of solar panels and bike path will necessitate that the subsurface disposal system be installed before the solar array and the bike path are constructed. Groundwater Disposal Site #1 is shown in Figure 6-9.

Soils

Soils on Site #1 are primarily composed of Hinckley Loamy Sand, with some areas of Paxton Fine Sandy Loam. Hinckley Loamy Sand is described as "excessively drained", and Paxton Fine Sandy Loam is described as "well drained". Hinckley Loamy Sand is classified as Hydrologic Soil Group A, while Paxton Fine Sandy Loam is classified as Hydrologic Soil Group C. This makes the area of the site with Hinckley Loamy Sand a prime candidate for groundwater discharge, while the area which includes Paxton Fine Sandy Loam a less desirable candidate. Eight deep test holes excavated on this site

Environmental Issues

Site #1 is located immediately adjacent to the Taunton River. A small portion of the property is within the 100-year floodplain, which would make that area of the site unusable for infiltration beds. The site is not located in any designated drinking water zones (Zone I, Zone A, or Wellhead Protection Areas). There are no known past contamination issues that would impact the site's use as a groundwater discharge area.

Table 6-8 Potential Sites for Groundwater Disposal/Water Reuse

Site	Ownership	Municipality	Size (ac)	Open Space?	Level of Protection	Zone II?	Distance (mi)	Force Main Cost
Bridgewater State College	Commonwealth of Massachusetts	Bridgewater	16	Yes - All	Limited	No	12	$36,000,000
Bridgewater State College	Commonwealth of Massachusetts	Bridgewater	6.5	Yes - All	Limited	No		
Bridgewater Correctional Complex	Commonwealth of Massachusetts	Bridgewater	763	Yes - All	None	No	12.2	$36,600,000
Hockomock Swamp WMA	Department of Fish & Game	Bridgewater	147	Yes - All	In Perpetuity	No	9	$27,000,000
Hockomock Swamp WMA	Department of Fish & Game	Bridgewater	10	Yes - All	In Perpetuity	No		
Hockomock Swamp WMA	Department of Fish & Game	Bridgewater	18	Yes - All	In Perpetuity	No		
Hockomock Swamp WMA	Department of Fish & Game	Bridgewater	18	Yes - All	In Perpetuity	Yes - All		
Black Mallard Rd	Town of Bridgewater ConComm	Bridgewater	10	Yes - All	In Perpetuity	Yes- Some	7.5	$22,500,000
The Borden Colony	Town of Raynham Rec Commission	Raynham	223	Yes - All	In Perpetuity	No	5	$15,000,000
Borden Colony Recreation Area	Town of Raynham Rec Commission	Raynham	28	Yes - All	Unknown	No		
Raynham State Forest	Massachusetts DCR	Raynham	16	Yes - All	In Perpetuity	No	7	$21,000,000
Raynham South St East	Raynham	Raynham	30	No	None	No	5.4	$16,200,000
Bunk Pond	City of Taunton ConComm	Taunton	51	Yes - All	In Perpetuity	No	10	$30,000,000
Dever State School/Watson Pond	Unknown	Taunton	476	Yes - All	Unknown	Yes - Some	5.6	$16,800,000
Watson State Park	Massachusetts DCR	Taunton	11	Yes - All	In Perpetuity	Yes - Some	6	$18,000,000
Mayflower Hill Cemetery	Mayflower Hill Cemetery	Taunton	56	No	None	No	3.7	$11,100,000
Chamberlain School/Frieman School	City of Taunton	Taunton	54	No	None	No	5.2	$15,600,000
Taunton State Hospital	Massachusetts DMH	Taunton	154	Yes - All	Limited	No	3	$9,000,000
Parker Golf Course/Lovering Co	City of Taunton Parks Dept	Taunton	169	Yes - All	In Perpetuity	No	3	$9,000,000
Boyden Park	City of Taunton Parks Dept	Taunton	57	Yes - All	In Perpetuity	No	3.1	$9,300,000
Mount Hope Farm	Mount Hope Farm Limited Partnership	Taunton	167	Yes - All	In Perpetuity	No	3	$9,000,000
Emmie F. Hutt Forest	City of Taunton ConComm	Taunton	408	Yes - All	In Perpetuity	No	6.9	$20,700,000
Massasoit State Park	Massachusetts DCR	Taunton	1134	Yes - All	In Perpetuity	No	9	$27,000,000
Spring Rain Farms	Spring Rain Farms	Taunton	95	No	None	No	6.9	$20,700,000
Spring Rain Farms	Spring Rain Farms	Taunton	108	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	86	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	18	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	4	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	11	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	2.5	No	None	No		
Spring Rain Farms	Spring Rain Farms	Taunton	22	No	None	No		
TMLP - Cleary Flood Generating Station	TMLP	Taunton	112	Yes - All	Unknown	No	0.9	$2,700,000
Route 44 selected sites	Raynham	Raynham	14	No	None	No	4	$12,000,000
Raynham 512 South St East	Raynham	Raynham	41	No	None	No	5.6	$16,800,000

Figure 6-9 Groundwater Disposal Site #1 - TMLP Cleary Flood

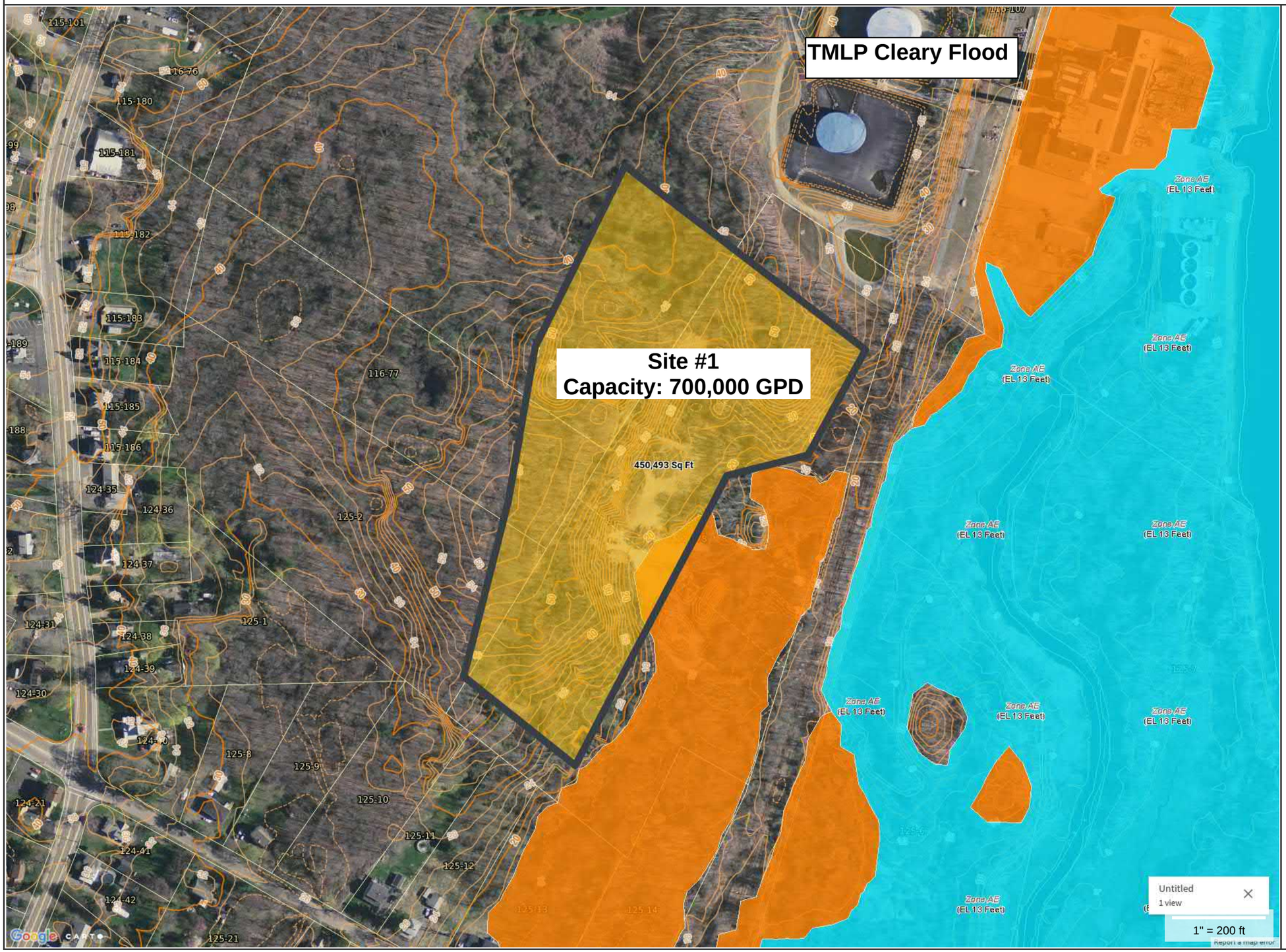


Figure 6-9

Capacity

The total area of the site identified is approximately 450,000 ft^2. Due to the presence of flood plain, TMLP's planned solar array and practical construction considerations, for this report it is assumed that 30% of the site is potentially available for purposes of effluent disposal. Using Table 3 from MassDEP's "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal", the allowable loading rate for a system of this type would be 5 gpd/ft^2. Based on the available land area and the potential hydraulic loading rate, the theoretical disposal capacity of Site #1 is approximately 700,000 gpd (0.7 mgd).

6.5.2.2 GROUNDWATER DISPOSAL SITE #2 - WWTF

Site #2 is an approximate 250,000 ft^2 (5.75 acre) area located immediately west-southwest of the WWTF. It primarily lies on the same parcel as the WWTF with a portion of the land area on an adjacent parcel that is also owned by the City. The site is currently un-occupied and appears to be a popular site for illicit use by off-road vehicles. TMLP transmission lines run through the area, which will reduce the area available for infiltration purposes. Due to the relatively open nature of the site, the preferred groundwater disposal method would be open sand beds. Groundwater Disposal Site #2 is shown in Figure 6-10.

Soils

The soils on the site are almost entirely classified as "Windsor Loamy Sand", which is classified as Hydrologic Soil Group A. This is an ideal soil type for this application as it is described as "excessively drained". There are no known restrictive layers in this area, and depth to groundwater is sufficient for groundwater discharge.

Environmental Issues

Site #2 is located immediately adjacent to the Taunton River. Portions of the property are within the 100-year floodplain, which would make those portions of the site unusable for infiltration beds. The site is not located in any designated drinking water zones (Zone I, Zone A, or Wellhead Protection Areas). The site does have a history of use as a tannery waste disposal site, resulting in some soil contamination, primarily with nickel and lead. As a result, before the site could be used for groundwater discharge, additional soil testing would need to be performed to determine if any remediation would be required prior to the site being used for groundwater discharge.

Capacity

The total area of the site is approximately 250,000 ft^2. Due to the presence of flood plain, underground gas pipeline, and power transmission lines, as well as practical construction considerations, it is assumed that 25% of the site could be used as an active open sand bed for purposes of effluent disposal. Using Table 3 from MassDEP's "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal", the allowable loading rate for a sand bed of this type would be 5 gpd/ft^2. Based on available land area and the anticipated hydraulic loading rate, the theoretical capacity of Site #2 is approximately 400,000 gpd (0.4 MGD).

Figure 6-10 Groundwater Disposal Site #2 - WWTF

Figure 6-10

6.5.2.3 GROUNDWATER DISPOSAL SITE #3 – MOUNT HOPE FARM (WATER REUSE)

Site #3 is a collection of parcels totaling approximately 3.8 million square feet (88 acres) located just west of the Three Mile River and south of Winthrop St (Route 44). The property is agricultural in nature, and has historically been used for raising crops or dairy cattle. Effluent conveyed to this site would be used to irrigate a proposed tree farm. As an active (although largely unused) farm, no clearing of existing vegetation would be necessary. Since it is both well suited and zoned for agricultural use, it is an ideal location to plant trees. For the purposes of this planning document, the trees to be planted are assumed to be poplar trees due to their characteristics as a nutrient sink and their high water demand during rapid growth periods early in their life cycle. Groundwater disposal site #3 is shown in Figure 6-11.

Soils

Soils at this location vary, from Paxton Fine Sandy Loam to Deerfield Loamy Fine Sand, to Wareham Loamy sand. The variability of the soils on the site do not make it a good candidate for traditional groundwater disposal. However, the site's current use as an agricultural property make it a very good candidate for use as a tree farm.

Environmental Issues

Site #3 is located immediately adjacent to the Three Mile River. The eastern portion of the property is within the 100-year floodplain, and a portion of the site is a delineated wetland. The site is not located in any designated drinking water zones (Zone I, Zone A, or Wellhead Protection Areas) and there are no known past contamination issues that would impact the site's use.

Additional Issues

The proposed use of the site as a tree farm will involve additional permitting for water reuse in accordance with 314 CMR 20. Given the level of treatment that the water will receive at the WWTF, and the use of the water to irrigate trees, it is not anticipated that this permit will be problematic to obtain. Legally, the land has deed restrictions that limit the land to agricultural use. A tree farm appears to be an acceptable use for the property, but an official determination will need to be made prior to the project moving forward. Lastly, a tree farm will need to be managed properly. This will mean that the City will need to partner with either a private or educational entity, to operate the tree farm, harvest the trees, and turn them into a usable product. The selection of poplar trees as a crop is partially based on the many uses that poplar wood provides, including paper, lumber, and biofuel. Preliminary conversations with companies in the wood product industry have indicated that there is a robust market for poplar wood. However, additional market analyses will have to be conducted to determine the viability of this alternative.

Figure 6-11 Groundwater Disposal Site #3 - Mt Hope Farm

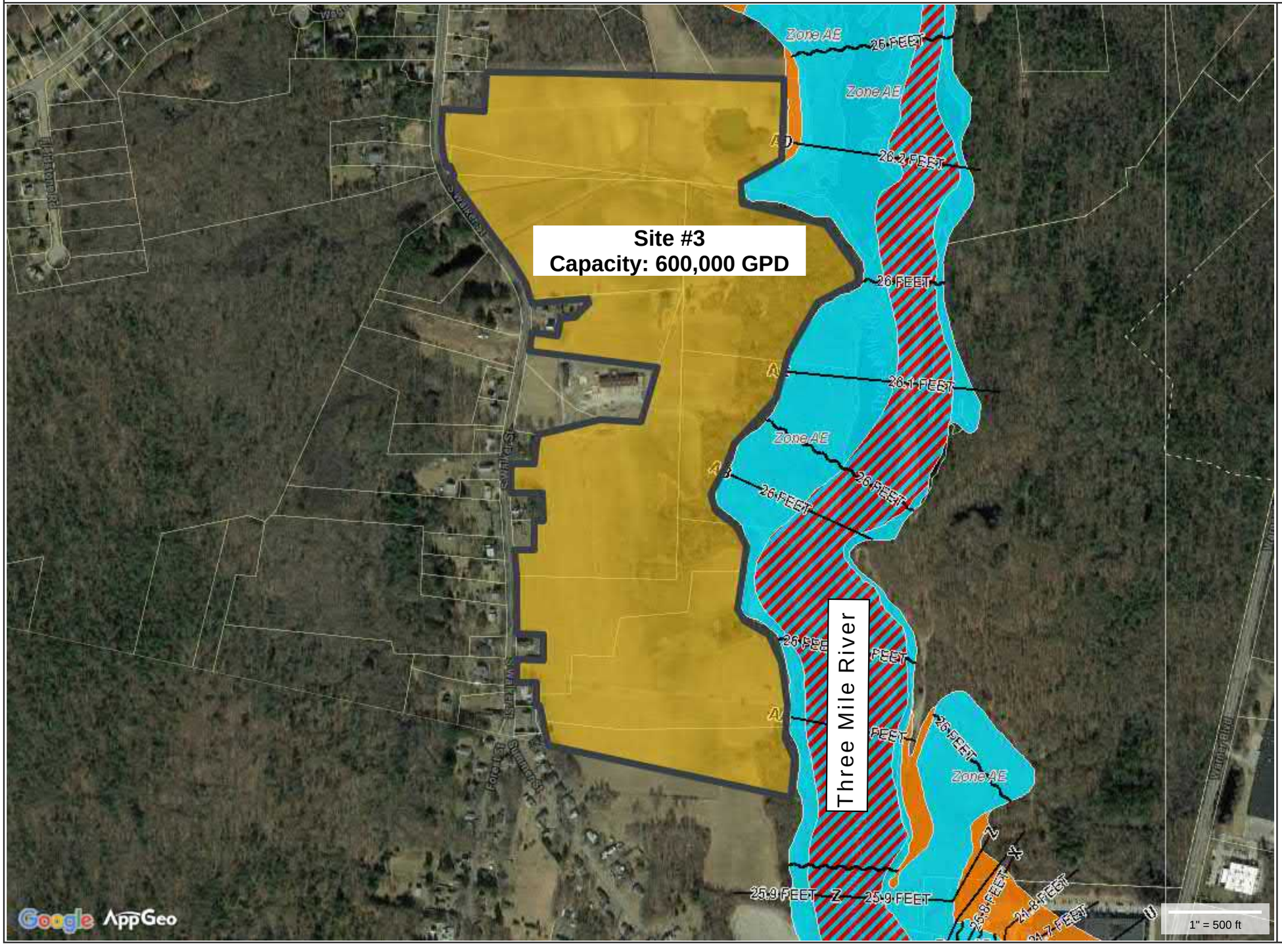


Figure 6-11

Capacity

The total area of the Mount Hope Farm site is approximately 88 acres, the large majority of which is available for tree farming. Based on that size, and the site's topography, it is estimated that the theoretical disposal capacity of the site is approximately 700,000 gpd (0.7 MGD).

6.5.2.4 COSTS FOR GROUNDWATER DISCHARGES

Based on other projects of comparable size and scope, preliminary opinions of cost have been developed for the three groundwater discharge sites. It should be noted that the three sites would share a common pump station; costs for the pump station wet well have been shared among the sites, although the entire wet well will likely be built at once. Construction costs for the three sites are shown in Table 6-9. While it is likely that the City would see some economic benefit from a public-private partnership for the operation of the farm, it is unknown at this time what the terms of such a deal would be. Therefore, no income from the farm has been assumed here, only an estimation of the construction cost. In addition, the site development cost for Site #3 includes some cost for land acquisition, which does not apply to the other two sites. If additional flow to the Taunton River is approved, none of the sites will be developed, and therefore no cost will be incurred.

Table 6-9
Opinion of Costs for Groundwater Discharge Sites

Site	Site Development	Pump Station[1]	Force Main	Projected Cost	Discharge Capacity (GPD)
Site #1 - TMLP Cleary Flood Generating Station	$ 6,000,000	$ 2,000,000	$ 3,000,000	$ 11,000,000	700,000
Site #2 - WWTF	$ 4,000,000	$ 1,000,000	$ 1,000,000	$ 6,000,000	400,000
Site #3 - Mount Hope Farm	$ 5,000,000	$ 2,000,000	$ 9,000,000	$ 16,000,000	700,000
Total:	$ 15,000,000	$ 5,000,000	$ 13,000,000	$ 33,000,000	1,800,000

Notes:

1. Pump Station costs are apportioned among the three sites, but one pump station would be constructed.

6.6 ENVIRONMENTAL PERMITTING

6.6.1 STATE AND LOCAL PERMITS

Construction of the recommended WWTF upgrade and associated groundwater discharge/water reuse facilities will require several state and local permits to be obtained.

6.6.1.1 MASSACHUSETTS PERMITS

The following permits are anticipated to be required by the Massachusetts Department of Environmental Protection:

1. Massachusetts Groundwater Discharge Permit (314 CMR 5)
   A groundwater discharge permit will be required for any discharge of wastewater going into the ground, such as from Sites #1 and #2 as described in Section 6.5.2.
2. Massachusetts Water Reuse Permit (314 CMR 20)
   A water reuse permit (WP 84) will be required if the City decides to construct the tree farm as described in Section 6.5.2.3 above, as irrigation for the trees would be considered water reuse.

3. WP 68 Treatment Works Plan Approval for Groundwater Discharge and Reclaimed Water use Facilities
   A WP 68 is required any time modifications are made to facilities holding a groundwater discharge permit. In this case, this permit will need to be obtained in conjunction with the groundwater discharge permit.
4. WM 16 New/Modified Plan Approval for Surface Water Discharge (NDPES) Facilities
   A WP 16 is required any time modifications are made to facilities holding a surface water discharge permit. In this case, the substantial upgrades to the WWTF will need to be submitted for permitting.

6.6.1.2 LOCAL PERMITS

The following local permits are anticipated to be required for the WWTF upgrade recommended in this report:

1. Conservation Commission
   Since some construction will take place in close proximity to the Taunton River and the Three Mile River, a notice of intent will be filed with the Taunton Conservation Commission.
2. Trench Permit (Jackie's law)
   In accordance with 520 CMR 14.00, contractors are required to obtain trench permits from the City prior to excavation of any trenches.

6.6.2 MITIGATION

The following summarizes proposed mitigation measures for the expected construction impacts. The City and the contractor will be responsible for implementing the proposed mitigation measures for the projects. The contractor will coordinate with the City of Taunton and other authorities such as MassDEP as necessary for implementation of the measures. It will be the responsibility of the City to ensure that the contractor is carrying out the proposed mitigation measures. The construction projects will include the services of an engineering consultant and a resident engineer at the project sites, who will act on behalf of the City to make sure that the contractor adheres to the project design and specifications. The resident engineer will monitor the mitigation measures implemented by the contractor and advise the City if they are not adequate.

Air Quality

Impacts to air quality during construction will be mitigated to the maximum extent through various measures incorporated into the project design. To reduce dust during construction activities, open cuts, and exposed areas shall be backfilled and stabilized as soon as each segment of pipe is installed, and at the same time, non-backfill material shall be removed from the site and transported to an appropriate disposal location; any stockpiled material that must remain on-site for more than 24 hours shall be covered. Exposed surfaces will be wetted and stabilized to minimize dust generation. All trucks for transportation of construction material will be fully covered and street sweeping will occur as needed. All motor vehicles and construction equipment shall comply with all pertinent local, state, and federal regulations regarding exhaust emissions, including the diesel retrofit program. Construction equipment not in use and trucks that are idling while waiting to load or unload material will be turned off.

Water Resources and Water Quality

Impacts to water bodies will be mitigated through the use of BMPs for construction projects. Activities will also be coordinated with the City's local NPDES Phase II Stormwater Management Plan

and the Conservation Commission. Erosion and sedimentation control measures shall be installed and functional before excavation operations begin and shall be properly maintained throughout the construction period. Staked and entrenched straw bales and/or silt fence shall be installed along wetland resource areas to prevent erosion into streams and wetlands. All control measures shall be checked weekly and after each rainfall. Excavated material shall be placed on the upslope side of the trench to permit any erosion from the material to be captured by the trench. Grading activities shall be avoided during periods of high rainfall. Construction shall be staged in sections. Areas disturbed for each section shall be stabilized immediately upon completion of the section. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and run-off and/or repaving cuts in roadways or sidewalks.

Construction dewatering from open cuts and trenches shall be routed through appropriately designed sediment basins or traps and discharged through a pipe or lined channel to a stream or other surface water body (under an applicable construction dewatering permit), unless such dewatering can be handled in another manner not requiring discharge to a water body.

Maintenance, repair, and fueling of equipment shall be confined to areas specifically designed for that purpose. These areas will have adequate waste disposal receptacles for liquid and solid waste. Waste oil shall be removed to designated waste oil collection areas for recycling. No potential pollutants shall be allowed to drain into catch basins, streams, or other water bodies.

When using fertilizer to establish areas of new vegetation for soil stabilization, mulches shall be used to prevent fertilizer nutrients from washing off the vegetated areas. Fertilizer shall not be applied if there is likelihood of a significant rainstorm. Fertilizer shall not be applied unless there is adequate protection of surface water, groundwater, and pipeline systems.

Noise

Measures to minimize noise from construction activities will be incorporated into the construction plans. Where practical, construction will occur during daytime hours (7:00 AM to 3:00 PM), excluding weekends. Construction equipment will have appropriate mufflers to minimize noise and idle equipment will be shut off.

Transportation

Truck routing to the project areas will utilize connectors and major routes. No trucking will be allowed to approach the site using local roads through neighborhoods unless necessary for access. Truck traffic will vary throughout the construction period, depending on the activity.

Police details will be stationed along the project site to coordinate traffic flow and assist in pedestrian direction. Truck routing and traffic management plans will be reviewed and coordinated with the Taunton DPW. For work in state roads, construction activities and traffic management will adhere to the permit issued by the MHD. Street sweeping will be performed as required and daily during all heavy trucking periods.

Disposal of Excess Material

The contractor will be directed to reuse suitable excavated material to the greatest extent feasible. Excess soil that cannot be reused on-site will be transported in covered trucks to an approved disposal site. If contaminated soils are encountered through subsurface exploration during the project design or during construction, they will be managed and disposed of at an approved facility according to MassDEP regulations.

Wetlands and Floodplains

Wetland resource areas and their associated buffer zones will be clearly marked as off-limits to construction equipment and materials storage. Excavated material will not be placed between the excavation and a wetland resource area. Excavations shall be promptly backfilled and stabilized to reduce the risk of erosion. Stockpiled soil shall be located away from streams and drainage ways so that runoff cannot carry sediment downstream.

Vegetated Areas

Clearing and grubbing shall be held to a minimum, as necessary for grading and equipment operation and construction shall be sequenced to minimize the exposure time of cleared surface areas. Soil will be stabilized with perennial vegetation as soon as possible after final grading. All cuts, fills, and disturbed areas adjacent to paved areas and roadways shall be stabilized with appropriate temporary or permanent vegetation.

Adjacent Land Use

The project will not impact adjacent land use such as protected open space, parks, or recreational areas.

Historic Resources

The proposed construction will occur within the confines of disturbed/developed properties. Pipeline construction will not proceed onto private properties. Once adequate construction plans and details are developed, the City will provide this information to the MHC to determine what effect the project will have on identified resources. The design will include preparation of a Project Notification Form for submittal to the MHC as necessary, and will coordinate with the determination made by the MHC on the project.

7.0 Financing And Implementation

7.1 Introduction

This chapter outlines the recommended plan, presents a proposed schedule for implementation and discusses the financial impacts and other necessary institutional considerations for the plan. The goals of the recommended plan are to:

- Potentially extend sewer service to areas where on-lot disposal systems no longer represent an effective means of wastewater disposal;
- Upgrade the Taunton Wastewater Treatment Facility to abate the CSO and accommodate future flows;
- Improve the level of treatment (total nitrogen removal) at the facility to improve water quality in the Taunton River, Mount Hope Bay, and Narragansett Bay;
- Provide a framework and long term plan for future work to mitigate economic impacts that may result from its implementation.

All costs presented in this chapter are in 2020 dollars.

7.2 Summary of Recommended Plan

7.2.1 Improvements to Existing Collection System

As discussed in Section 2.4, ongoing improvements to the existing collection system and pumping stations are required. Improvements to the collection system are anticipated to be an ongoing project undertaken on an annual basis, with an expected annual investment of $3.3M for upgrading and rehabilitating pipes and manholes. In addition, six pump stations were identified during the 2017 inspections that require significant capital upgrades. Three of the identified stations have already received upgrades (South St, Spring St, and Industrial Park). The remaining three stations (Myles Standish, Fairview Ave, and King James) are anticipated to cost about $1.5M in total to upgrade. Pump stations will continue to be inspected every 1-2 years to identify necessary capital improvements.

7.2.2 Sewer System Expansion

The recommended plan to expand the wastewater collection system involves construction of approximately 26 miles of sewers and 1 new pumping station to serve 9 identified needs areas. The needs areas in Taunton were evaluated and described in Chapters 3 and 4 of this report. Sewer construction in the needs areas will proceed over the entire planning area. Needs areas A, C, L, Q, and R are the most likely to have sewers constructed by 2027. The collection system may be expanded to serve the other needs areas in future years. In particular, Needs Area C contains residential areas that are under an administrative consent order to stop using their existing septic systems. The exact schedule will be determined by the City and its residents based on financing and severity of need. It is likely that sewer extensions to several of the lower priority needs areas will not be completed within the planning period of the CWMP. However, for the purposes of this planning report, it will be assumed that all recommended Needs Areas will be sewered by the end of the planning period in 2037.

Based on the conceptual designs of sewer systems, it is estimated that the cost to install sewers in all Needs Areas is approximately $59.3M. An estimate of projected costs and their impacts on property owners is shown in Table 7-1.

City of Taunton policy is for new sewer extensions and connections to be 100% reimbursed through betterment assessments. For this reason, sewer extensions are normally constructed only when a significant number of property owners request sewer service for their area. While the City will incur the initial debt burden by constructing and funding projects through the Massachusetts Clean Water Trust, the capital cost of projects of this type do not affect sewer user rates.

7.2.3 Wastewater Treatment Facility Upgrades

Plans to upgrade the wastewater treatment facility (WWTF) are outlined in detail in Chapter 6. As discussed, the selected alternative for total nitrogen removal is Alternative 1 – Four stage Bardenpho process, utilizing existing tanks. This will require the construction of a new biological treatment tank, along with mechanical, electrical, and other upgrades. Additional improvements to increase treatment capacity, and provide general facility upgrades are also planned and detailed in Chapter 6. Due to the size and complexity of the upgrades, the urgency of addressing solids handling issues, and the necessity of managing additional flow prior to upgrading treatment level, the upgrades will be phased into three projects. The three projects and their costs are as follows:

Solids Handling Improvements:	$6M
Phase I (Capacity and General Improvements):	$22.5M
Phase II (Nutrient Removal:	$31.5M
Total:	$60M

These costs are inclusive of construction, administration, contingency, and owner's project manager costs.

7.2.4 Groundwater Disposal/Water Reuse Sites

As discussed in Section 6.5, the City has evaluated three potential sites for groundwater disposal or water reuse if no additional flow beyond the current permitted average daily flow of 8.4 is allowed to be discharged to the Taunton River. The City will conduct an antidegradation analysis to evaluate impacts on the river from additional flow. If the antidegradation analysis indicates no adverse impacts from additional flow, then the City may be able to discharge additional flow to the river and avoid construction of groundwater disposal sites. However, since the analysis has not yet been performed, the potential financial impact of the sites is presented here. The three sites are the TMLP Cleary Flood property, the WWTF property, and Mt. Hope Farm. If necessary, the TMLP Cleary Flood site would be developed first; other sites may be developed as necessary to accommodate flows. Estimated costs for developing the three properties total $33M, and are shown in Table 6-9.

7.3 Planned Implementation Schedule

7.3.1 Improvements to Existing Collection System

As discussed in section 7.2.1, improvements to the existing collection system are being made on an ongoing basis. Annual projects are undertaken to upgrade the collection system pipes and manholes. The three remaining pump stations requiring significant capital upgrades are expected to be completed within the next five years. As additional inspections identify necessary pump station upgrades, they will be designed and completed. Given the number of pump stations in the City, it is anticipated that 1-2 stations per year will require upgrades. The City may choose to do some of this work through its operation and maintenance contract with Veolia Northeast.

7.3.2 Sewer System Expansion

There is no defined schedule for expanding the sewer system into the defined needs areas. Rather, these areas are identified as candidates for sewer expansion if the residents of those areas decide to request sewers. Since sewer expansion is largely paid for by betterment assessments on properties serviced by the new sewers, it is incumbent upon property owners in the areas to petition the City for sewer expansion. Capacity at the upgraded WWTF will be reserved in anticipation of sewering some or all of the identified areas. The one exception to this is Needs Area C. Due to the MassDEP Administrative Consent Order issued to the two mobile home parks located within this area, it is anticipated that at least a portion of the area will be sewered within the next 3-5 years.

7.3.3 Main Lift Pumping Station and Wastewater Treatment Facility Upgrade

Construction of the new Main Lift Pump Station began in April 2019 and is expected to be complete by the end of 2021. The Wastewater Treatment Facility upgrade is currently in design, in conjunction with this report. Design of the WWTF is expected to be complete by the end of 2020, and construction of the first phase of the upgrade is anticipated to be complete by the end of 2022. A timeline showing the schedule for completing upgrades to the Main Lift Pumping Station and WWTF is shown in Figure 7-1.

7.3.4 Groundwater Disposal/Water Reuse Sites

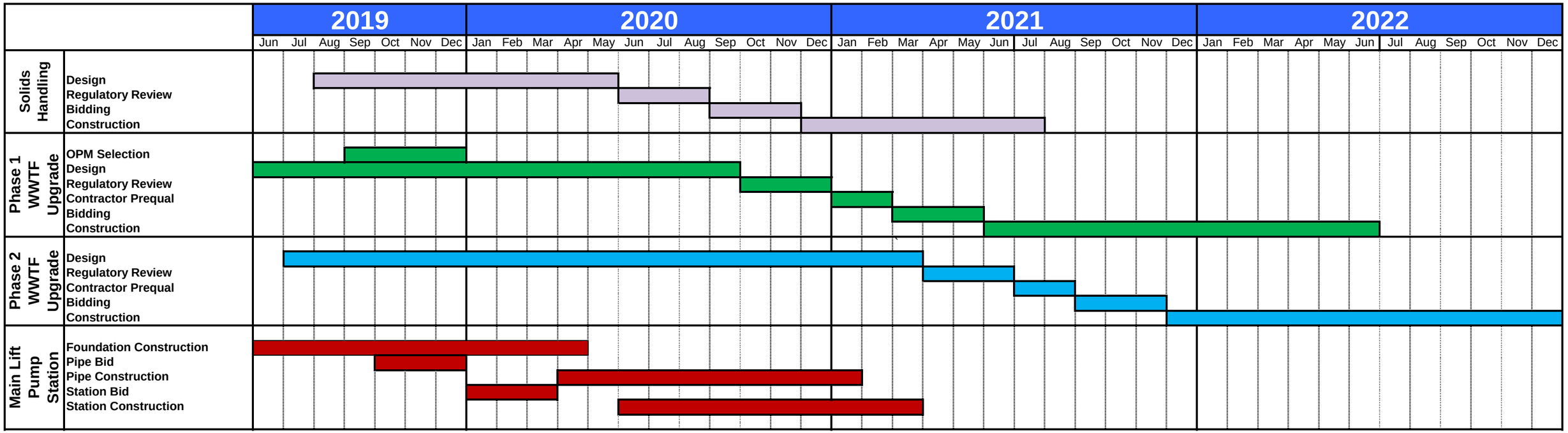
The three identified groundwater discharge sites are considered a contingency plan in the event that additional flow to the Taunton River is not permitted, and are not planned for construction unless necessary. In the event that they become necessary, they have been prioritized based on capacity, external factors (other construction, commercial interest), and need.

The first contingency groundwater disposal site will be Site #1 at the TMLP property. This site would be developed first for multiple reasons. First, it has the largest potential disposal capacity of the three sites at 0.7 MGD. Second, construction of solar panels at the disposal site and a bike path along the force main route may drive development of the site.

The second contingency groundwater discharge will be the Mt. Hope Farm site. While this site is the most expensive of the three to develop, it has the potential to generate a valuable commodity in the form of wood products. It also has a significant potential for disposal capacity, estimated at approximately 0.7 MGD (seasonally). It is hoped that through an arrangement with a site manager, the City may recoup much of the development costs for the site through fees or a percentage of profits from the final product.

Lastly, the City may develop Site #2 for groundwater disposal near the WWTF. This site has the advantage of already being under City ownership, and is the closest to the WWTF. However, it also has the lowest capacity of the three sites (0.4 MGD), and has significant challenges with utilities (both overhead and buried), making it the last site to be developed.

FIGURE 7-1
MAIN LIFT PUMP STATION AND WASTEWATER TREATMENT FACILITY UPGRADES
IMPLEMENTATION SCEHEDULE



BETA
IMPROVING COMMUNITIES TOGETHER

7.4 FINANCING PLAN

Funds to finance construction of wastewater infrastructure are commonly raised from four principal sources:

- Low-interest Loans from the Clean Water State Revolving Fund (CWSRF)
- General Obligation Bonds.
- Sewer Rates (retained earnings)
- Inter-municipal Agreement (IMA) communities

The Clean Water State Revolving Fund (CWSRF) is a loan program established by the U.S. EPA that allows individual states to make low-interest loans to cover the cost of wastewater improvement projects. Based on demonstrated project need, loans are made available to finance up to 100-percent of engineering and construction costs. Loans typically have a payback period of 20 years and carry an interest rate of 2%[1] (30 year financing is sometimes available at a higher interest rate). Funded projects usually include treatment facilities, interceptors, force mains, pumping stations and sewer extensions. It is anticipated that most of the proposed work will be eligible and will utilize SRF funding. As such, debt service for construction projects has been estimated using the 2% interest rate associated with that funding. In addition, projects for Nutrient Removal and meeting certain requirements are eligible for 0% loans under the Massachusetts SRF statute (310 CMR 44.00). The City has met all of the requirements to qualify for this financing for the WWTF upgrade, which will result in significant long-term cost savings for the project. Cost estimates in this report assume that the nitrogen removal portion of the WWTF upgrade will be eligible for 0% financing under this program.

For SRF-ineligible items such as design, general obligation bonds may be used to finance construction projects. General obligation bonds are certificates of debt issued by the City guaranteeing payment of the money borrowed plus interest, and generally carry a higher interest rate than SRF funding.

In addition to bonds and loans, projects may sometimes be undertaken with the proceeds from sewer rates. Sewer rates are calculated based on assumptions of number of customers, collection rate, and operation and maintenance costs for the system. If collections exceed expenses, excess funds are kept in an account as retained earnings. These retained earnings may then be used for capital projects.

The City of Taunton has Inter-municipal Agreements (IMAs) with the towns of Raynham, Norton, and Dighton. Under these agreements, they are required to pay for a portion of capital improvements to the "common sewer", i.e., any part of the sewer system that their flow passes through. This will naturally include the Main Lift Pump Station and WWTF, since all flow in the system passes through these two facilities. Raynham's IMA allows them to discharge 1.3MGD to the system, Norton's IMA allows them to discharge 0.052MGD, and Dighton's IMA currently allows them to discharge 0.6MGD to the system. Between the three communities, these allowances account for approximately 23.2% of the permitted flow to the WWTF. In accordance with their agreements, the towns will pay for their portion of the capital improvements in proportion to their flow contribution. Changes to the permitted flow to the WWTF or the agreements will affect this percentage.

[1] As a designated Housing Choice community, in 2019 Taunton qualified for a reduced interest rate of 1.5% on SRF loans. Since it is unknown whether this program will continue, or if Taunton will continue to qualify, loans have been assumed at 2% for this report.

7.4.1 Sewer System Expansion

Sewer system expansion projects are typically constructed using CWSRF loans, and costs for gravity and low-pressure sewers are reimbursed to the city through the assessment of betterments on the properties serviced by the project. The cost for pump stations and associated force mains are financed through debt service and are not reimbursed through betterments. As a result, there is minimal long-term impact on the City's debt, and these projects have a small impact on sewer user rates. However, capital projects extending sewers to neighborhoods can have significant costs for those properties serviced by the project. For this reason, the City does not typically proceed with sewer extensions except by request of the residents of the area to be serviced by the extension. Estimated financial impacts on the property owners in each of the Needs Areas is shown in Table 7-1.

Costs presented in Table 7-1 are relative conceptual costs based on typical unit costs for installing sewers. Detailed investigation is required on each area to determine accurate costs. Items such as bedrock, presence of other utilities, and high groundwater can significantly impact the costs of sewer construction in a particular area.

7.4.2 Wastewater Treatment Facility Upgrade

As with sewer expansion, financing of the capital improvements to the wastewater treatment facility recommended in this plan are anticipated to be done through the CWSRF, with a payback period of 20 years. Currently, certain categories of work, including nutrient removal projects, are eligible for a 0% interest rate on CWSRF financing. Since an upgrade of the WWTF for total nitrogen removal fits within that category, it is probable that a significant portion of the project will be financed at this interest-free level.

7.4.3 Operations and Maintenance

Expansion of the sewer system and upgrading the WWTF are anticipated to result in increased Operations and Maintenance (O&M) costs. Unlike capital costs, O&M costs are paid on an annual basis through fees paid by sewer users. Increased O&M costs at the WWTF include increased power consumption due to larger horsepower motors on blowers and pumps, increased chemical costs due to higher flows, increased solids disposal costs due to higher sludge production, and general increased costs due to inflation. It is estimated that O&M costs at the WWTF will increase by approximately $500K, while O&M costs resulting from sewer system expansion will be approximately $325K (assuming all needs areas are sewered).

Table 7-1
Financial Impacts of Sewering Needs Areas

Needs Area	Gravity Pipe Length (LF)	Low Pressure Pipe Length (LF)	Pump Stations	Force Main Length (LF)	Projected Cost	# of Connections	Cost per Connection
Q	0	4,800	0	0	$ 1,600,000	59	$ 27,119
L	18,600	21,050	0	0	$ 14,800,000	464	$ 31,897
A	0	15,000	0	0	$ 4,900,000	176	$ 27,841
X	11,800	0	0	0	$ 5,100,000	151	$ 33,775
C	24,500	6,700	1	6,000	$ 17,600,000	512	$ 30,859
M	4,300	0	0	0	$ 1,900,000	47	$ 40,426
R	4,800	4,600	0	0	$ 3,600,000	184	$ 19,565
V	3,100	2,800	0	0	$ 2,300,000	92	$ 25,000
E	16,200	1,600	0	0	$ 7,500,000	230	$ 32,609
Total:	83,300	56,550	1	6,000	$ 59,300,000	1915	$ 30,026

7.4.4 Financial Impact Analysis

When recommending improvements, it is important to consider the financial impacts on the users in the system. Capital projects incur debt which needs to be repaid, and construction of additional infrastructure results in higher O&M costs. Taunton bills sewer use in two parts – fixed fee and volumetric use charges. Fixed fees are based on the size of the water meter, while volumetric use charges are based on actual amount of water used. The vast majority of properties paying sewer bills in Taunton are single family homes with a 5/8" water meter. This financial impact analysis is based on impacts on a single-family home using an average of 76 HCF/year of water[2]. Due to varying water meter sizes and usage rates, impacts are standardized according to 5/8" meter equivalents. For example, a 1" meter is counted as 1.4 "equivalents", since it is capable of using a higher quantity of water than a 5/8" meter.

The financial impacts of the recommended plan will be borne by users in Taunton, and in the other communities that contribute wastewater to the Taunton system. In accordance with their Inter-Municipal Agreements (IMAs), the towns of Raynham, Dighton, and Norton will be responsible for a

[2] 76 HCF/yr is the calculated average water use in Taunton for a single-family home in 2016.

proportionate share of the cost for constructing WWTF upgrades (including potential groundwater discharge sites) and, work on the "common sewer". Common sewer is that portion of the sewer through which outside communities' flow passes, including the Main Lift Pump Station. Based on current WWTF permit flow limits and IMAs, Raynham will be responsible for 15.5% of costs, Dighton will contribute 7.1%, and Norton 0.6%, for a total contribution of 23.2% from IMA communities.

A financial impact analysis was performed to determine the increase in sewer rates for users in Taunton. Financial impacts from the recommended plan on a typical single-family home in Taunton are shown in Table 7-2. Note that while this estimate shows the estimated cost incurred by a single-family homeowner as a result of recommended activities, it does not include current costs – this represents the increase that a ratepayer can expect. In addition, it assumes that all needs areas will be sewered, but that contingency groundwater disposal sites will not be required.

Table 7-2
User Fee Impacts – Average Single Family Taunton Residence in Year 2026

	Debt Service		Operations and Maintenance		
Project	Annual Debt Service[1]	Debt Impact on User Fee[5]	Annual O&M Cost	O&M Impact on User Fee	Total User Fee Impact[5]
Improvements to Existing Sewers and Pump Stations[2]	$1,008,000	$ 82	$ -	$ -	$ 82
Sewer System Extension - Needs Areas[3]	$ 323,000	$ 26	$ 325,000	$ 26	$ 52
WWTF Upgrade[4]	$2,734,000	$ 221	$ 384,000	$ 31	$ 252
Total:	$4,065,000	$ 329	$ 709,000	$ 57	$ 386

Notes:

1. Debt Service for sewer extensions is reimbursed through betterments EXCEPT for pump station and force main for Needs Area C
2. Cost through 2026, assumes annual project with construction cost of $3M and design of $300K
3. O&M costs for sewer extensions are proportional based on increase of the size of the collection system
4. WWTF Upgrade debt service assumes 0% financing for nutrient removal, and 23.2% reimbursement from IMA communities
5. Impact is for a single family home with a 5/8" water connection, using 76 HCF/year, assuming a future total of 12,346 equivalent meters (80% connection rate in Needs Area C, 25% connection rate in all other needs areas)

8.0 RESPONSE TO COMMENTS

When the Draft Environmental Impact Report was submitted in 2009, several comments were submitted. Those comments have been addressed in this Final report. The purpose of this chapter is to outline the responses to each individual comment. What is shown below is a summary of each comment; the complete comments are attached to this report as Appendix B.

8.1 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION

8.1.1 COMMENTS

MassDEP submitted several comments:

Comment: Expand discussion of financing plan for proposed future nutrient work at WWTF to include Section 5 of Chapter 312 of the Acts of 2008 (the O'Leary Bill)

Response: Referenced law introduces 0% financing for certain projects under CWSRF. Discussion of this financing option is discussed in Chapter 7.

Comment: The City should develop a Section 61 finding that addresses the measures it will implement to limit sewer developments within identified needs areas

Response: Section 61 findings are addressed in Section 4.7 of this report

Comment: Construction activities may disturb one or more acres of land and therefore require a NPDES Stormwater permit for Construction.

Response: Permits, including the NPDES construction permit, are addressed in Section 4.6.1. Mitigation of impacts of construction are addressed in Section 4.7.2

Comment: Construction activities may encounter contamination.

Response: The City has encountered contaminated soil and groundwater on several previous projects, and is aware of reporting and permitting requirements. The City will continue to monitor and test soils from its excavations and file proper permits when necessary.

Comment: Include a history of sewer construction in the City of Taunton, and a history of permitting requirements

Response: Section 1.5 of this report includes a history of sewer construction in Taunton

Comment: Include a detailed Needs Analysis, Alternatives Analysis, evaluation of environmental impacts, and description of the preferred alternative

Response: Chapter 3 is the Needs Analysis for the Collection system, Chapter 4 is the recommended plan for the collection system, Chapter 5 is the Needs Analysis for the WWTF, and Chapter 6 is the recommended plan for the WWTF.

Comment: Address measures to reduce wastewater volume, including water conservation and I/I removal

Response: See Section 2.1 and 2.3 of this report.

Comment: Evaluate options, including Title 5.

Response: See Section 3.4 of this report.

Comment: Preferred Alternative plan chapter must include all mechanisms for implementation, and include an analysis of cost to the average household

Response: Preferred Alternatives are discussed in Chapters 4 and 6. Cost Analysis is in Chapter 7.

Comment: Include a detailed analysis of Taunton's existing wastewater flows and future flows.

Response: A full discussion of wastewater flows is included in Chapter 5 of this report.

Comment: Include a discussion of WWTF expansion and upgrade, including the City's NPDES permit and future nutrient loading and treatment.

Response: Chapter 6 includes an in-depth discussion of the upgrade of the WWTF.

8.2 Massachusetts Board of Underwater Archaeological Resources

Comment: There is the potential for underwater archaeological resources to exist in the vicinity of construction activities, as well as river herring and Native American fish weirs.

Response: Should any of the above referenced items be encountered during construction, proper notification will be made in accordance with the board's *Policy Guidance for the Discovery of Unanticipated Archaeological Resources (2006)*

8.3 Massachusetts Division of Ecological Restoration

Comment: FEIR should consider costs and feasibility of more stringent permit limits than 8 mg/L total nitrogen and no phosphorus limit, including parameters dependent on a dilution ratio which will increase with increased effluent volume.

Responses: Under the 2015 NPDES permit, the Taunton WWTF has a total nitrogen limit of 210 lbs/day, which is equivalent to 3 mg/L at the permitted flow of 8.4 MGD. Discussion of recommended construction to meet permit limits is presented in Chapter 6.

The Taunton River at the point of discharge is classified as a Class SB water, and is tidally influenced. Brackish and saltwater bodies are nutrient limited by Nitrogen, not Phosphorus, so it is unlikely that the Taunton WWTF will ever have, or need, a phosphorus limit.

While flows to the Taunton WWTF will likely increase over time, the discharge from the WWTF to the Taunton river is not anticipated to exceed its permitted average flow of 8.4MGD. A discussion of alternative wastewater disposal and reuse options is presented in Section 6.5

Comment: DEIR indicates that the WWTF will be able to bypass 5 MGD around biological treatment. Design should be adequate to not need to bypass around biological treatment.

Response: Many steps have been taken to avoid discharge of untreated or partially treated wastewater to the Taunton River. The capacity of the Main Lift Pump Station has been increased, which will decrease the frequency and size of discharges from the City's CSO. The design of the upgraded WWTF will increase its full treatment capacity from 22 MGD to 25 MGD. Flows above 25 MGD will be captured by a 2MG holding tank. Only after all of these options are exhausted would any partially treated flow be discharged as a last resort.

Comment: FEIR should include Horsley Whitten's water balance calculations that do not incorporate surface water withdrawals and NPDES discharges. Future groundwater withdrawals needed to meet predicted demands should be included in the assessment of future water balances.

Response: A discussion of the water balance is presented in Section 4.6.

Comment: Ranking system for subareas is vague, and considers keeping water local as "negative". The relationship between wetlands and surface water and on-site systems is more complex than the analysis portrays.

Response: Evaluating needs areas for sewer expansion is a complex (and often inexact) process which takes many factors into account. As the comment points out, the relationship between waterways, wetlands, and septic systems is complex. The ranking system used is an attempt to simplify that relationship somewhat to aid a decision making process.

Use of on-site wastewater systems (i.e., septic systems) does not just introduce water into the ground; it introduces partially treated septage (See Figure 3-3). This includes high levels of Nitrogen and Phosphorus, which have the potential to have significant negative impact on nearby water bodies. As such, it is considered a positive to remove septic systems from areas where their discharge has the potential to cause significant negative impact on water quality.

Comment: More detail on development of costs is needed.

Response: Significant changes to the recommended improvements, both at the WWTF and the sewer expansion, have been made between the draft EIR and this report. Chapter 7 includes a discussion of costs and their development. As a planning document with a 20-year period, precise cost development is impractical. The intent of cost estimating in this document is to give a general idea of what the recommended alternatives would entail.

8.4 Massachusetts Natural Heritage and Endangered Species Program

Comment: Recommended work may occur within Priority Habitat. Non-exempt activities occurring within Priority Habitat require filing to comply with the Massachusetts Endangered Species Act.

Response: A discussion of work in and around Priority Habitat is included in Section 4.4. Most work recommended in this report is anticipated to be exempt as "construction, repair, replacement, or maintenance of… sewer lines, wastewater treatment systems… within existing paved areas and lawfully developed and maintained lawns or landscaped areas.". However, if a situation arises where a non-exempt activity is proposed, the City will file for appropriate permits.

8.5 Massachusetts Historical Commission

Comment: Projects will require the filing of a Project Notification Form with MHC. Submittals should be as early as possible.

Response: The large majority of Taunton's work is funded through the Clean Water State Revolving Fund. A condition of that funding is that a Project Notification Form be filed with MHC. The City will continue to be diligent in coordinating with MHC to avoid conflicts with historical resources.

8.6 Mass Audubon and Taunton River Watershed Alliance

Comment: Wastewater collection system expansion would divert wastewater from groundwater to the WWTF, with likely increases in flow and pollutant loading of the facility's discharge.

Response: Use of on-site wastewater systems (i.e., septic systems) does not just introduce water into the ground; it introduces partially treated septage (See Figure 3-3). This includes high levels of Nitrogen and Phosphorus, which have the potential to have significant negative impact on nearby water bodies. As such, it is considered a positive to remove septic systems from areas where their discharge has the potential to cause significant impact. WWTF discharges to the Taunton river are not anticipated to increase beyond the facility's permitted discharge of 8.4 MGD (See Section 6.5). Additional flows beyond 8.4 MGD will be treated, then re-introduced to groundwater or used for irrigation. See also the Water Balance discussion in Section 4.6.

Comment: Wastewater collection system expansion would encourage development, including within Areas of Critical Environmental Concern.

Response: The defined existing sewer area and needs areas are outlined in Chapters 3 and 4. The intent of defining Needs Areas is to identify areas with existing wastewater problems, not to encourage excessive development within the areas. Boundaries of Needs Areas (See Figures 4-1 through 4-9) have intentionally excluded or divided large parcels to discourage additional development within the Needs Areas. Note also that the 14 areas recommended in the 2006 CWMP have been reduced to 9 areas in this report, in order to only address those areas with the greatest need. Additionally, the City has drafted a Land Use Control regulation which would restrict development and sewer connections

within the sewer area and Needs Areas to further discourage the presence of sewers as a driver for development.

Comment: The FEIR should explain the basis for its estimate of groundwater diversion.

Response: Section 4.5 of this report includes a discussion of the water balance.

Comment: Additional discussion should be included for alternatives to sewer expansion, including innovative or alternative systems.

Response: Section 3.5 of this report includes a detailed discussion of all alternatives considered.

Comment: The DEIR does not provide detailed plans depicting wetland resource areas.

Response: Figures 3-3 through 3-11 depict wetlands, surface water, drinking water, and natural resources areas in and around the Needs Areas.