MILONE & MACBROOM

IN ASSOCIATION WITH

Tighe&Bond

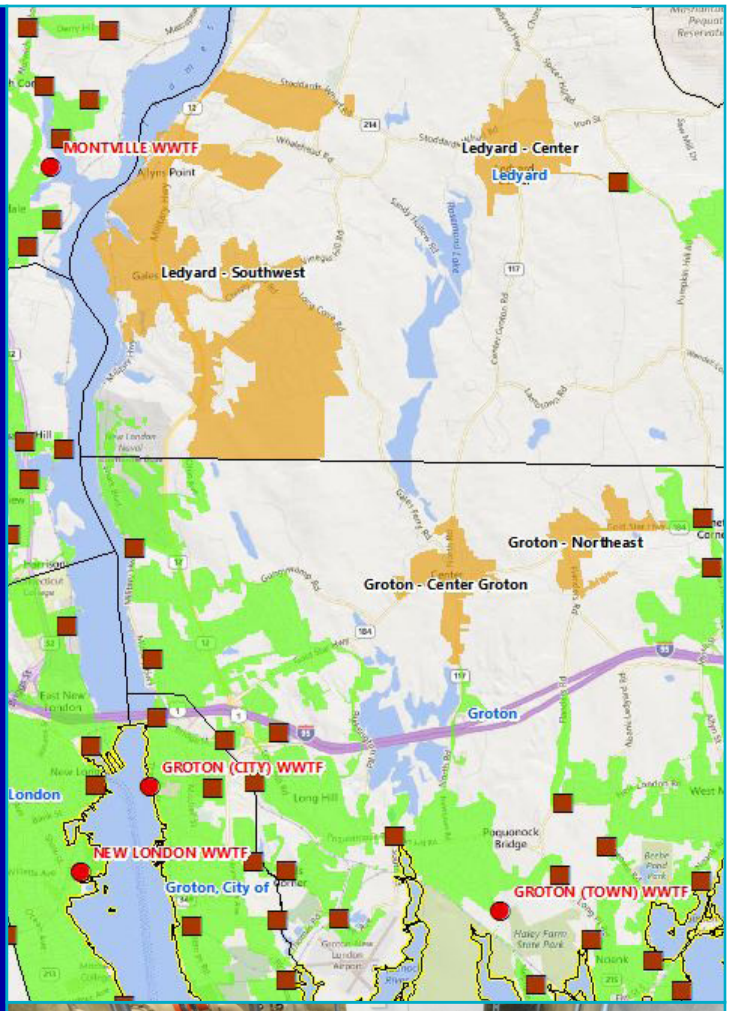
REGIONAL WASTEWATER MANAGEMENT PLAN

JUNE 17, 2019

SCCOG

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

MMI # 3570-12



REGIONAL WASTEWATER MANAGEMENT PLAN

Southeastern Connecticut Council of Governments

5 Connecticut Avenue, Norwich, CT 06360

Certification of Adoption

This plan was adopted at a legally convened meeting of the Southeastern Connecticut Council of Governments on 7/17/2019, 2019.

Tom Sparkman, Chairman

The preparation of this document was financed in part by Regional Services Grant (RSG) funds from the State of Connecticut Office of Policy and Management and by contributions from the member municipalities of the Southeastern Connecticut Council of Governments. The opinions, findings, and conclusions expressed herein are those of the Southeastern Connecticut Council of Governments and do not necessarily reflect the official views or policies of the funding agencies.

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

MUNICIPAL REPRESENTATIVES

Bozrah: Glenn Pianka, First Selectman
Colchester: Art Shilosky, First Selectman, Treasurer
East Lyme: Mark Nickerson, First Selectman, Vice-Chair
Franklin: Charles Grant, First Selectman
Griswold: Todd Babbitt, First Selectman
Groton, City of: Keith Hedrick, Mayor
Groton, Town of: Patrice Granatosky, Mayor
John Burt, Town Manager
Jewett City: Timothy Sharkey, Warden
Lebanon: Betsy Pietre, First Selectwoman
Ledyard: Fred Allyn III, Mayor, Secretary
Lisbon: Tom Sparkman, First Selectman, Chairman
Montville: Ron McDaniel, Mayor
New London: Michael Passero, Mayor
North Stonington: Michael Urgo, First Selectman
Norwich: Peter Nystrom, Mayor
John Salomone, City Manager
Preston: Robert Congdon, First Selectman
Salem: Kevin Lyden, First Selectman
Sprague: Catherine Osten, First Selectwoman
Stonington, Borough of: Jeffrey Callahan, Warden
Stonington, Town of: Rob Simmons, First Selectman
Waterford: Daniel Steward, First Selectman
Windham: Victor Funderburk, Mayor
Jim Rivers, Town Manager

AFFILIATE REPRESENTATIVES

Mashantucket Pequot Tribal Council
Rodney Butler, Chairman
Robert Hayward, State Government Affairs

Mohegan Tribal Council
James Gessner, Jr., Interim Chairman
Chuck Bunnell, External Government Affairs

MILITARY LIAISONS

United States Naval Submarine Base – New London
Capt. Todd Moore, Commanding Officer
Adam Wright, Community Plans & Liaison Officer

United States Coast Guard Academy
Rear Admiral William Kelly, Superintendent
Lt. Tony Gregg, Governmental Affairs Officer

STAFF

James S. Butler, AICP, Executive Director

Samuel Alexander, AICP, Planner II

CONSULTANTS

Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, Connecticut 06410
(203) 271-1773
www.mminc.com

Tighe & Bond, Inc., Middletown, CT
213 Court Street #1100
Middletown, Connecticut 06457
(860) 704-4760
www.tighebond.com

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

TABLE OF CONTENTS (CONTINUED)

LIST OF FIGURES

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF APPENDED FIGURES

LIST OF APPENDICES

LIST OF ACRONYMS

ASRWWA	Atlantic States Rural Water & Wastewater Association
BOD	Biological Oxygen Demand
CDBG	Community Development Block Grant
CDBG-DR	Community Development Block Grant – Disaster Recovery
CGS	Connecticut General Statutes
CIP	Capital Improvement Plan
CIRCA	Connecticut Institute for Resilience and Climate Adaptation
CLEAR	Center for Land Use Education and Research
CSO	Combined Sewer Overflow
CTDEEP	Connecticut Department of Energy and Environmental Protection
CTDPH	Connecticut Department of Public Health
CTOPM	Connecticut Office of Policy & Management
CTSDC	Connecticut State Data Center
CWA	Clean Water Act
CWF	Clean Water Fund
DMR	Discharge Monitoring Report
EB	General Dynamics Electric Boat
EDA	United States Economic Development Administration
EPA	United States Environmental Protection Agency
EWP	Emergency Watershed Protection
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
FPMS	Floodplain Management Services
FY	Fiscal Year
GFDL	Geophysical Fluid Dynamics Laboratory
GIS	Geographic Information System
GNHWPCA	Greater New Haven Water Pollution Control Authority
gpd	Gallons per day
HMGP	Hazard Mitigation Grant Program
HUD	United States Department of Housing and Urban Development
JLUS	Joint Land Use Study
LTCP	Long Term Control Plan
MCP	Municipal Coastal Program
mgd	Million gallons per day
MHHW	Mean Higher High Water
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPU	Norwich Public Utilities
NRCS	Natural Resources Conservation Service
NROC	Northeast Regional Ocean Council
PDM	Pre-Disaster Mitigation
POCD	Plan of Conservation and Development
RWMP	Regional Wastewater Management Plan
SCCOG	Southeastern Connecticut Council of Governments
SCRPA	Southeastern Connecticut Regional Planning Agency
SSDS	Subsurface Sewage Disposal System
STEAP	Small Town Economic Assistance Program
SUBASE	United States Naval Submarine Base New London
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TR-16	Technical Report #16
TSS	Total Suspended Solids
UConn	University of Connecticut
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WPCA	Water Pollution Control Authority
WWTF	Wastewater Treatment Facility

EXECUTIVE SUMMARY

This Regional Wastewater Management Plan has been prepared on behalf of the Southeastern Connecticut Council of Governments in order to meet several regional goals. First, the Plan provides municipalities in southeastern Connecticut with an understanding of current conditions of centralized wastewater treatment and collection systems in the region. Second, the projections in this plan document how wastewater flows may change through 2040, resulting in strain on treatment facility capacity and municipal resources. Third, this Plan identifies certain wastewater infrastructure at risk of climate change such as increased flooding and sea level rise. Finally, the recommendations of this plan identify both local and regional solutions to meeting the region's wastewater needs through 2040.

Existing Conditions

A variety of development trends, coupled with state and federal regulations, led to the development of centralized sewers in the region. While sewers in portions of Groton, Jewett City, New London, and Norwich predate the federal Clean Water Act in 1972, many other systems in the region were formed in response to the pollutant discharge requirements in that Act. This Plan reviews existing service areas, inter-municipal agreements, water quality trends, and land use, with an eye towards developing regional projections for the next 20 years. Current average daily wastewater flows for sewers in the region are approximately 23.0 million gallons per day.

Projected Regional Wastewater Flows

A variety of planning and other municipal documents were reviewed and staff were interviewed related to potential sewer service expansion. Projected needs were also based on municipal facilities plans, known areas of wastewater needs, and population projections adjusted for the proposed expansion at General Dynamics Electric Boat. While the timing of increased wastewater flows will likely depend upon the occurrence of development and municipal decisions regarding expansion, wastewater flows are generally expected to increase in the region by 4.1 million gallons per day by 2030 and 9.5 million gallons per day by 2040. The greatest increase in flows are projected for the wastewater treatment facilities in Norwich and New London. The wastewater treatment facilities in Jewett City, New London, Norwich, Sprague, and Stonington – Mystic may require facilities planning for expansion within this timeframe.

Wastewater Resources at Risk of Climate Change

A total of 109 pumping stations and 11 WWTFs in the SCCOG region appear to not be fully compliant with the new flood mitigation standard enacted with the passage of Public Act 18-82. A total of 33 highest regional priorities are identified for mitigating risk from future flooding or sea level rise.

Recommendations

The most pressing wastewater issues in the region are capacity concerns occurring in East Lyme, the Stonington portion of Mystic, and Sprague. The sewer system in East Lyme has essentially exhausted its capacity allocation negotiated with New London and Waterford. Several regional solutions are considered, including potential connections to send raw wastewater flow to Montville for treatment. The Stonington - Mystic wastewater treatment facility is presently operating over capacity due to wet weather flows. An upcoming project will soon divert up to 0.3 million gallons per day of raw wastewater to the Stonington – Borough facility for treatment and

will address this concern. The Sprague wastewater treatment facility is also operating at capacity, and the Town will soon decide whether to send its wastewater to Norwich for treatment or upgrade the capacity of the plant. Alternatives are also presented for other areas, such as Ledyard and North Stonington, where both towns desire expansion of sewer in certain areas.

The creation of a Regional Wastewater Committee to discuss and address goals and issues common to wastewater systems in the region is recommended. While individual systems will be the final arbiter of all projects and agreements pertinent to meeting system needs, this Plan acknowledges the various types of assistance that may be provided on a regional basis. For example, the Regional Water Committee was very successful in coordinating the development of the regionally interconnected water system in southeastern Connecticut. Finally, the development of more detailed sewer service area maps is recommended for all towns in the region to delineate between where sewer service, decentralized wastewater systems, and private subsurface sewage disposal systems are appropriate.

1.0 INTRODUCTION

1.1 Background

The Southeastern Connecticut Council of Governments (SCCOG) is the regional council of governments for 22 municipalities in the southeastern corner of Connecticut. The planning region comprises all but three municipalities in New London County and includes one town in Windham County. The member communities include: the Town of Bozrah, Town of Colchester, Town of East Lyme, Town of Franklin, Town of Griswold, City of Groton, Town of Groton, Borough of Jewett City, Town of Lebanon, Town of Ledyard, Town of Lisbon, Town of Montville, City of New London, Town of North Stonington, City of Norwich, Town of Preston, Town of Salem, Town of Sprague, Borough of Stonington, Town of Stonington, Town of Waterford, and the Town of Windham. Two federally recognized Native American tribes, the Mashantucket Pequot Tribal Nation and the Mohegan Tribe, are affiliate members of SCCOG. Figure 1-1 presents a location map of the region.

Sewer planning has traditionally been conducted at the municipal and tribal level in the region. The 17 sewer systems and 14 wastewater treatment facilities (WWTFs) in the region are located within, and thereby influence, the location of the region's more densely developed and populated areas. The most extensive sewer systems are located in Colchester, East Lyme, Groton, Jewett City, Mashantucket Pequot Tribal Nation, Mohegan Tribe, Montville, New London, Norwich, Stonington, Waterford, and Windham. Salem presently has no sewer services, while Bozrah, Franklin, Griswold, Lebanon, Ledyard, Lisbon, North Stonington, Preston, and Sprague have limited areas with sewer service. SCCOG estimates that approximately 8% of the region's total land area and 20% of the region's developed land area is served by sewers.[1] Private septic systems are used to treat wastewater where density and land use do not require public sewers.

1.2 Purpose

Back in the 1960s, the former Southeastern Connecticut Regional Planning Agency (SCRPA) – the predecessor agency to SCCOG – determined that regional sewage disposal needs should be investigated. A series of studies was commenced, culminating in the development of a *Recommended Regional Sewerage Plan* in 1969 (the "1969 Plan") which was adopted by SCRPA in 1970. The 1969 Plan predicted that by 1980 there would be 18 WWTFs in the region, but that the number could be reduced to 13 if inter-municipal agreements were used. The 1969 Plan also recommended formation of a regional Water Pollution Control Authority (WPCA), something that did not occur.[2]

Following the completion and adoption of the 1969 Plan, member communities in the former SCRPA region and later SCCOG region relied on the 1969 Plan for guidance in encouraging the development of sewer infrastructure and inter-municipal sewage agreements, leading to the program of sewer management and operations in use in the region today. In recent years, some SCCOG member municipalities began asking for the SCCOG Regional Water Committee to consider taking on the task of providing a dedicated regional forum for discussion and resolution of wastewater issues in the region, including an update to the 1969 Plan. To that end, in 2018 SCCOG appropriated funding from its Regional Services Grant (RSG), from the Connecticut Office of Policy and Management (CTOPM), for this Regional Wastewater Management Plan (RWMP) to be an update to the 1969 Plan.

[1] Southeastern Connecticut Council of Governments. (2017). *Regional Plan of Conservation and Development.*
[2] Metcalf & Eddy, Inc. (1969). *Recommended Regional Sewerage Plan.*

Date Saved: 6/3/2019

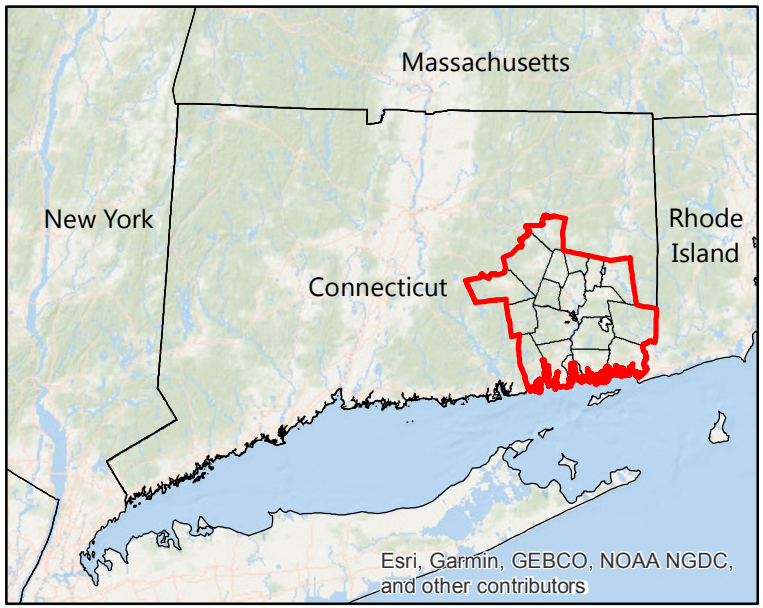
Document Path: Y:\3570-12\Maps\Fig1-1location.mxd

Legend

- SCCOG Region
- Mohegan Tribe
- Mashantucket Pequot Tribal Nation
- State and Town Boundaries

Planning Sub-regions

- Norwich Sub-region
- Northwest Sub-region
- New London Sub-region
- Southeast Sub-region



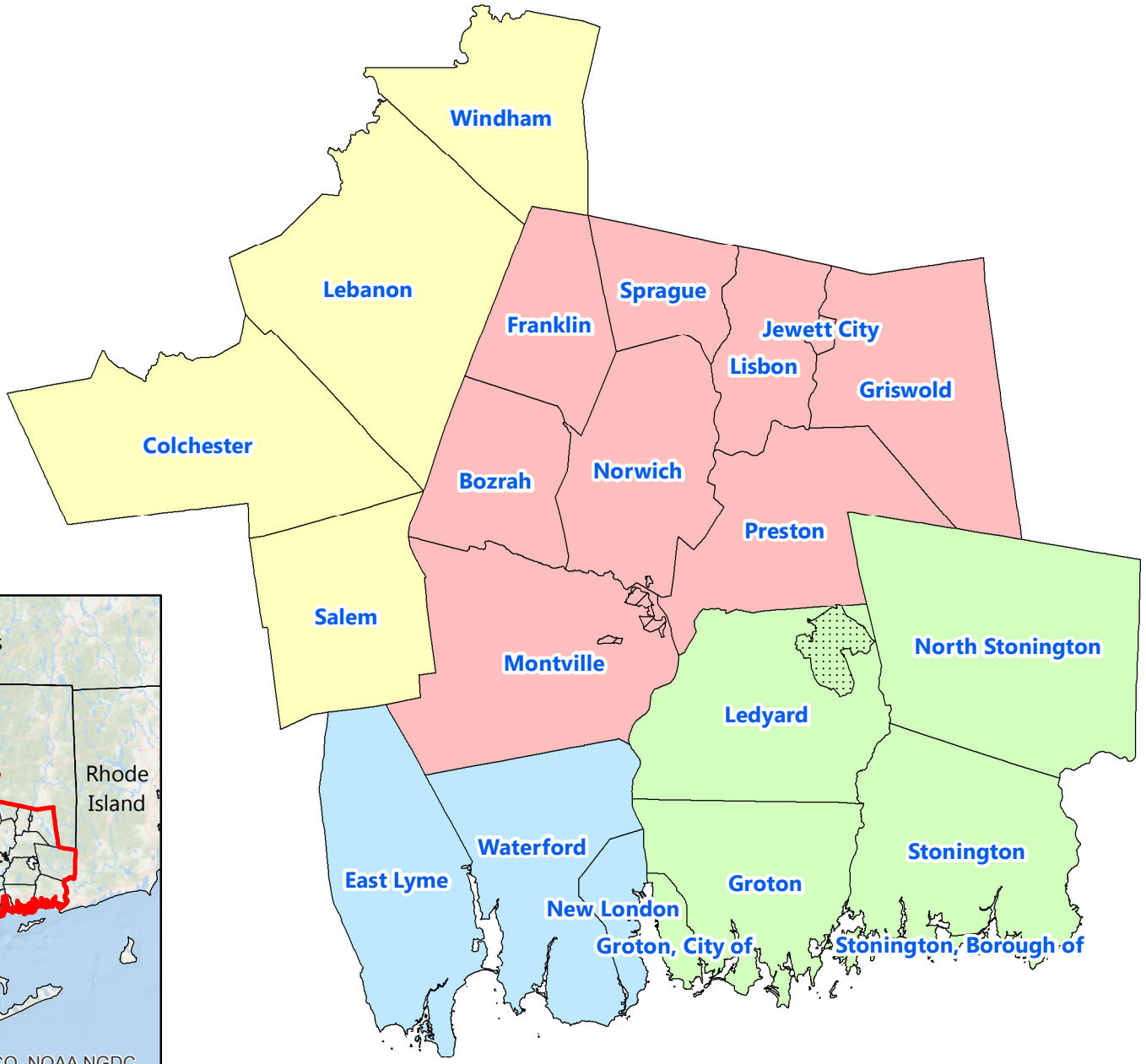


FIGURE 1-1: LOCATION MAP

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

Miles

1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

1.3 Data Collection

SCCOG facilitated data collection for this planning-level study through a review of local planning efforts related to sewer systems, coordinating data collection with member communities and tribes, and by scheduling and hosting four sub-regional planning meetings at the SCCOG office. Sub-regional areas for the four meetings are presented on Figure 1-1 above.

The sub-regional planning meetings were designed to allow for representatives of neighboring sewer systems and health districts to attend to discuss issues common to either the combined inter-municipal system or the sub-regional area, as well as issues for specific systems. Nevertheless, representatives were encouraged to attend any one (or more) of the four meetings as their schedules allowed. The sub-regional planning meetings were held on December 5 and December 6, 2018. A copy of the presentation provided at these meetings and the meeting notes are presented in Appendix A.

While SCCOG was able to solicit a strong response to its data collection request, not all entities participated or were able to provide all of the information requested. This RWMP therefore makes use of the best available information that was able to be provided by SCCOG and its member communities, as well as outlying communities, for the purposes of regional planning. This plan should not be construed as being based on an all-inclusive review of the files of each wastewater system.

1.4 Regional Setting

1.4.1 Topography

Coastal towns in the SCCOG region including East Lyme, Waterford, New London, Groton and Stonington lie almost entirely in the region of Connecticut called the "Coastal Slope," a zone that begins approximately 12 miles north of the coastline and extends toward the continental shelf. In this zone, the plane of hilltop elevation decreases at a slope of about 50 feet per mile, about twice the slope of zones further inland. The topography in the SCCOG region generally increases in elevation moving from the shoreline of Long Island Sound inland to the north. Many areas remain below 200 feet above sea level, while higher hills can reach over 500 feet; the highest point in the region is the peak of Gates Hill in Lebanon at 660 feet. Major rivers, including the Thames, the Quinebaug, and the Shetucket, create further hydrographic divides in the region, necessitating major bridge crossings. These divides have contributed to the development of independent sewer systems in the region.

1.4.2 Major Drainage Areas

All sewage in the region eventually discharges to Long Island Sound except for that portion that is disposed of by subsurface leaching. Major drainage basins in the SCCOG region include the following:

- The Pawcatuck River basin (#1000) drains the southeastern corner of the SCCOG region.
- The Southeast Shoreline (#2000) drains the southern portion of the SCCOG region not lying within another major basin.

- The Thames River major basin (#3000) is the most significant drainage area in the region. It includes the entire area drained by the Thames River and its major tributaries (the Shetucket, Yantic, and Quinebaug Rivers).

- The Connecticut River major basin (#4000) receives flow from the SCCOG region through several of its major tributaries (the Eightmile River and Salmon River), as well as directly receiving outflow from several SCCOG towns via the East Hampton WWTF.

Major drainage basins in the region are depicted on Figure 1-2. Table 1-1 also presents the SCCOG communities that drain to each particular major basin.

Table 1-1
Communities within Major Drainage Basins

Municipality	Pawcatuck River Basin (#1000)	Southeast Shoreline Basin (#2000)	Thames River Basin (#3000)	Connecticut River Basin (#4000)
Bozrah			X	
Colchester			X	X
East Lyme		X		X
Franklin			X	
Griswold			X	
Groton, City of		X	X	
Groton, Town of		X		
Jewett City			X	
Lebanon			X	X
Ledyard		X	X	
Lisbon			X	
Mashantucket Pequot Tribal Nation			X	
Mohegan Tribe			X	
Montville		X	X	
New London		X	X	
North Stonington	X	X	X	
Norwich			X	
Preston			X	
Salem		X	X	X
Sprague			X	
Stonington, Borough of		X		
Stonington, Town of	X	X		
Waterford		X	X	
Windham			X	

1.4.3 Geology and Septic Suitability

Geology is important to determining the viability and effectiveness of subsurface sewage disposal systems, and the ability to extend the coverage of municipal wastewater systems Thus, it is important to understand the surficial geologic setting in the SCCOG region. Geologic information discussed in the following section was acquired in Geographic Information System (GIS) format from the United States Geological Survey (USGS), the Natural Resources Conservation Service (NRCS) and the Connecticut Department of Energy & Environmental Protection (CTDEEP).

Glaciers have formed in the northern hemisphere several times over the past few million years; the most recent glaciation ended approximately 12,000 years ago. The southernmost portion of the more recent glaciations covered the area that is now the SCCOG region. The result of the recent glacial recession is that the SCCOG region is covered by a variety of overburden deposits. As the glaciers receded, mineral deposits were left behind by the melting ice forming glacial till, and meltwaters carved valleys and left stratified drift deposits behind when they receded.

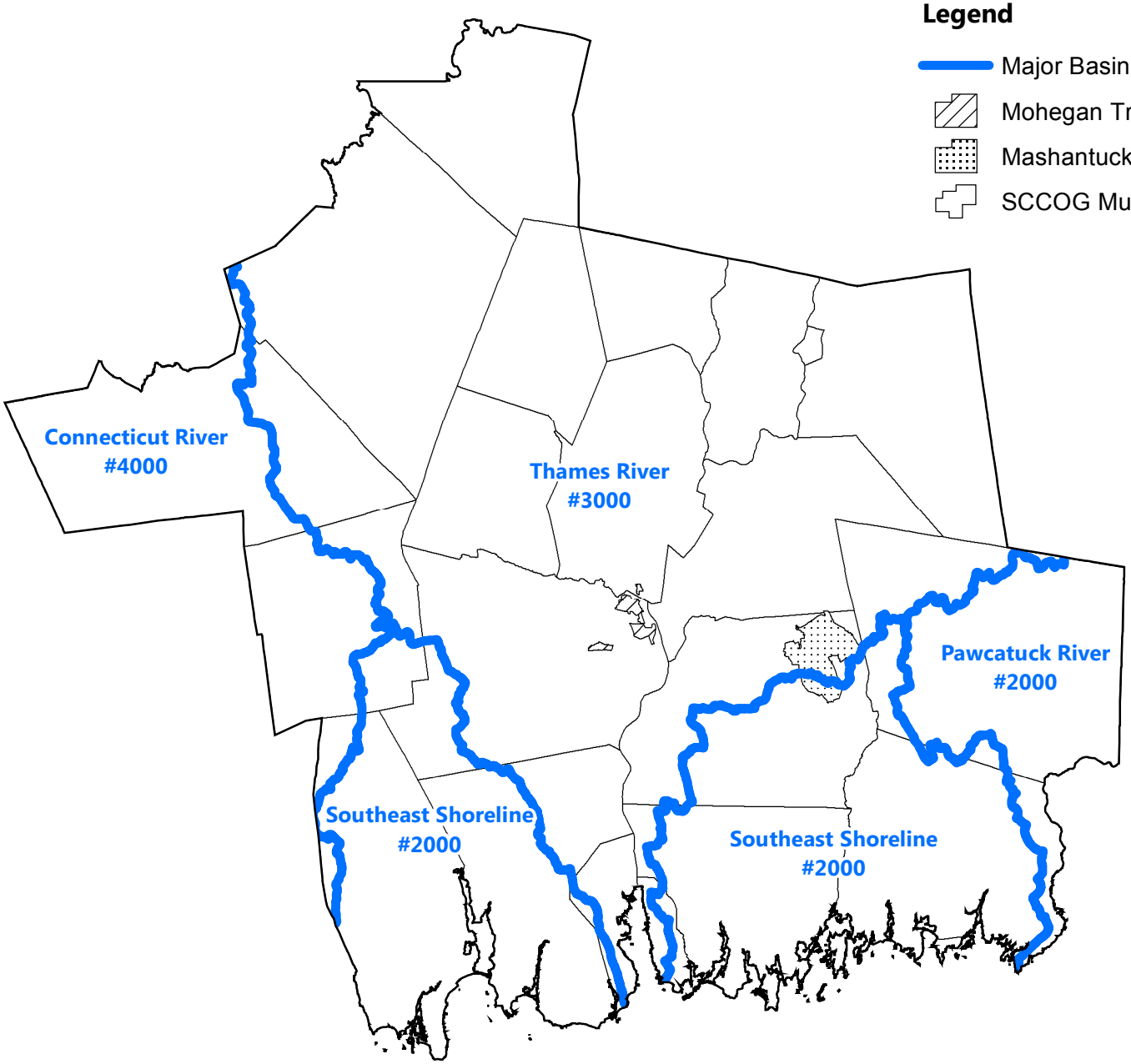


FIGURE 1-2: DRAINAGE BASINS

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5
Miles
1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

Till areas contain an unsorted mixture of clay, silt, sand, gravel, and boulders deposited by glaciers as a ground moraine, while surficial materials in stratified drift areas tend to be better sorted and well drained. Areas of stratified materials are generally coincident with current and historical floodplains. These materials were deposited at lower elevations by glacial streams, and the valleys were later inherited by the larger of our present day streams and rivers. Many such areas were later settled and continue to be developed today. Areas of till typically contain higher amounts of surficial materials that are less susceptible to erosion.

A more detailed understanding of the surficial geography of a site is critical to properly installing any subsurface sewage disposal system (SSDS), also known as a conventional septic system. Soils that are excessively well drained can lack the filtering capacity to properly treat wastewater, while poorly drained soils can back up the leaching field, leading to ponding and failure.

The NRCS rates soils through their Web Soil Survey by their potential to support an effective SSDS.[3] The rating class definitions refer to installation of an SSDS that meets State and local health code regulations. Soils with "high potential" have characteristics that meet the performance standard. The rating system assumes that a typical system in high potential soils can be installed at a cost of "x", which represents the standard cost for installing an SSDS. The actual value of x varies depending upon many factors unrelated to soil properties.

According to the NRCS, the cost of installing a SSDS within a particular soil can be expressed as a multiple of x called the "cost factor". For example, a cost factor of 3x to 3.5x means that the estimated cost of installing a SSDS in that particular soil ranges from 3 to 3.5 times the cost of installing a field in a soil with high potential. The cost factors provide relative estimates of the costs of installing an SSDS.

The soil potential ratings and associated cost factors, assuming a typical system, are defined below. Refer to Figure 1-3 for a generalized depiction of where soils with low subsurface disposal potential lie in the SCCOG region.

High Potential – These soils have the best combination of characteristics or have limitations that can be easily overcome using standard installation practices. The cost factor is 1.0x to 2.0x.

Medium Potential – These soils have significant limitations, such as low percolation rate, that generally can be overcome using commonly applied designs. The cost factor ranges from 2.0x to 2.5x.

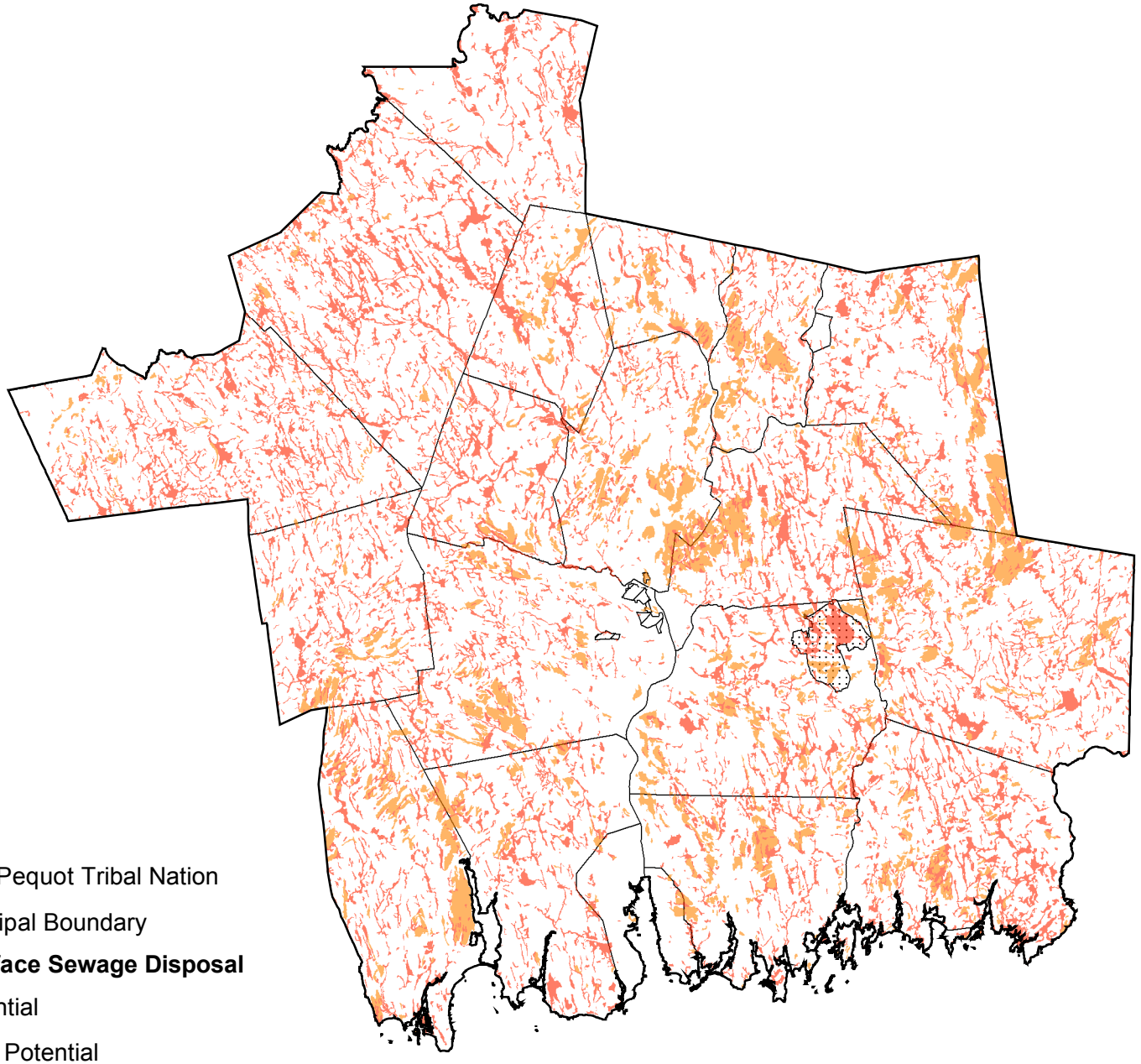
Low Potential – These soils have one or more limitations, such as low percolation rate and depth to seasonal high water table, that require extensive design and site preparation to overcome. The cost factor ranges from 2.5x to 3.5x.

Very Low Potential – These soils have major limitations, such as depth to bedrock, that require extensive design and site preparation to overcome. A permit for an SSDS may not be issued unless the naturally occurring soils meet the minimal requirements outlined in the State health code. It is unlikely that these soils can be improved sufficiently to meet State health code regulations. The cost factor ranges from 4.25x to 6.0x.

[3] National Resource Conservation Service. (2017, August 21). *Web Soil Survey.*

Date Saved: 5/9/2019

Document Path: Y:\3570-12\Maps\Fig1-3septicsuitability.mxd



Legend

- Mohegan Tribe
- Mashantucket Pequot Tribal Nation
- SCCOG Municipal Boundary

Potential for Subsurface Sewage Disposal

- Very Low Potential
- Extremely Low Potential

FIGURE 1-3: SOILS WITH LOW SUBSURFACE SEWAGE DISPOSAL SUITABILITY

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

Miles

1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

Extremely Low Potential – These soils have multiple major limitations, such as flooding and depth to seasonal high water table, which are extremely difficult to overcome. A permit for an SSDS may not be issued unless the naturally occurring soils meet the minimal requirements outlined in the State health code. It is unlikely that these soils can be improved sufficiently to meet State health code regulations.

Not Rated – Areas labeled "Not Rated" have soil characteristics that show extreme variability from one location to another. The work needed to overcome adverse soil properties cannot be estimated. These areas commonly are urban land complexes or miscellaneous areas. An on-site investigation is required to determine soil conditions at the site.

Table 1-2 was developed by using GIS to analyze the subsurface sewage soil suitability layer for the SCCOG region. The table indicates that approximately 65% of the soils in the SCCOG region exhibit demonstrably low potential for subsurface sewage system installation, just over 5% requires further analysis due to variable conditions, and the remaining 30% exhibit medium or high suitability. This data suggests that at the local level, expansion of sewer service may be necessary or preferred in certain areas to serve development on lower density lots with substandard soils for septic.

Table 1-2
Subsurface Sewage Soil Suitability in the SCCOG Region

Subsurface Sewage Disposal Rating Class	Area (square miles)	Percent of Total Area
Not Rated	30.9	5.2%
Extremely Low Potential	89.6	15.0%
Very Low Potential	43.7	7.3%
Low Potential	253.7	42.6%
Medium Potential	48.9	8.2%
High Potential	129.3	21.7%
Total	**596.1**	**100.0%**

Source: NRCS Web Soil Survey

2.0 OVERVIEW AND GOVERNANCE OF CENTRALIZED WASTEWATER SYSTEMS

2.1 State and Federal Requirements for Wastewater Systems

The basis for regulating discharges of pollutants into the waters of the United States was enacted in 1948 as the Federal Water Pollution Control Act. The United States Environmental Protection Agency (EPA) regulates the discharge of wastewater from wastewater treatment facilities under the Clean Water Act (CWA) of 1972, as amended, which established the legislative foundation for wastewater discharge control in this country.[4] The primary objective of the CWA is to 'restore and maintain the chemical, physical, and biological integrity of the nation's waters'. The CWA established a control program for ensuring that communities have clean water by regulating the release of contaminants into waterways. Permits are required under the National Pollutant Discharge Elimination System (NPDES) to ensure compliance with specified limits for discharge of pollutants. These permits require the submission of monthly discharge monitoring reports (DMRs) in order to demonstrate compliance.

Statewide legislative interest in water pollution in Connecticut began in the 1880s. However, it was not until 1967 that water quality conditions were so poor that public outcry and governmental interest resulted in the Connecticut's Clean Water Bill being signed into law, followed by the approval of the Connecticut Water Quality Standards in 1970 by the federal government. The CTDEEP was created in 1971 and charged with regulating municipal wastewater treatment in Connecticut.[5] The Municipal Wastewater section of the CTDEEP also regulates conventional SSDSs with flows greater than 7,500 gallons per day (gpd), sites where multiple small systems on a single lot have a combined flow greater than 7,500 gpd, alternative sewage disposal systems, and community sewage systems (where one SSDS serves two or more residential buildings, regardless of size).[6] The section provides guidance and support for planning, design and construction oversight, maintenance, and permitting efforts related to both municipal and larger private systems.

Municipalities in Connecticut, through their WPCA, are responsible for managing sanitary sewage and other wastewaters generated within their boundaries. For rural towns, this may require only the development and implementation of a local water pollution control plan. The majority of municipalities in the SCCOG region have more complex sanitary sewage and wastewater management needs that require development of a more detailed municipal wastewater facilities plan to guide the conveyance and treatment of wastewater. Such "facilities plans" typically provide a detailed description of existing conditions, identification of problem areas, an analysis of alternatives and costs, and the WPCA's long-term intentions for managing wastewater disposal.

Local health districts in Connecticut are responsible for overseeing conventional SSDSs with flows less than 2,000 gpd, such as SSDSs serving private residences. In the SCCOG region, these health districts include the Chatham Health District, Ledge Light Health District, North Central District Health Department, Preston Health Department, and Uncas Health District. The Mashantucket Pequot Tribal Nation and Mohegan Tribe also have their own health departments for their sovereign nations. The Connecticut Department of Public Health (CTDPH) must approve

[4] United States Environmental Protection Agency. (2019, March 11). *Summary of the Clean Water Act.*

[5] Connecticut Department of Energy & Environmental Protection. (2018, April 25). *Over 50 Years of the Clean Water Act in Connecticut!*

[6] Connecticut Department of Energy & Environmental Protection. (2017, October 12). *Subsurface Sewage Treatment and Disposal Systems (Septic Systems).*

SSDSs with flows greater than 2,000 gpd, but less than 7,500 gpd, which typically include SSDSs serving businesses.[7]

Note that in Connecticut, only CTDEEP can approve the use of advanced treatment systems. According to Ledge Light Health District, use of advanced treatment systems for individual lots is very rare in Connecticut (despite their use being common in other states) because CTDEEP prefers not to regulate SSDSs on individual lots. Thus, advanced technologies are typically only used for larger SSDSs that would already meet another criteria to be regulated by CTDEEP.

2.2 Existing Sewer Service Areas

Existing municipal sewer collection system areas and WWTFs are generally presented for the SCCOG region and associated areas in Figure 2-1. Chapter 103, Section 7-246(b) of the Connecticut General Statutes (CGS) authorizes WPCAs to prepare and periodically update a water pollution control plan that designates and delineates the boundary of (1) areas served by any municipal sewer system, (2) areas where municipal sewerage facilities are planned and in what timeframe, (3) areas where sewers are to be avoided, (4) areas served by any community sewerage system not owned by a municipality, (5) areas to be served by such community sewerage systems, and (6) any areas to be designated as decentralized wastewater management districts. These six items are required on any "sewer service area map" authorized by the statute, and WPCAs are the only municipal entity authorized to develop the sewer service area map.

The goal of identifying specific sewer service areas with the six items defined by statute is to develop a map that all relevant boards and commissions can clearly understand, buy into, and support in the future in their respective land use decisions.[8] Thus, coordination with a variety of stakeholders is key to developing a sewer service area map. Not all communities in the SCCOG region have developed a "sewer service area map" as defined above, although all communities with sewer systems have one or more collection system maps showing existing service areas. Communities in the SCCOG region with sewer service area maps generally consistent with the above statute include Colchester, East Lyme, Groton (City and Town), Ledyard, Montville, North Stonington, Sprague, Stonington, and Waterford.

2.3 Existing Municipal Wastewater Treatment and Collection Systems

Private and investor-owned utilities do not presently own centralized wastewater treatment and collection systems in the region. Instead, SCCOG municipalities typically control sewer service through the oversight of a local WPCA, drawing on the bonding power of the municipality for capital improvements not covered by operations and maintenance costs. The two tribal governments operate in a similar manner to the larger municipalities. A summary of the governance structure for wastewater treatment in the region is presented in Table 2-1.

Wastewater treatment facilities typically have four major components: collection, transport, treatment, and disposal. Wastewater is collected from individual parcels and transported by pipe (via gravity or pumped through a force main) to the treatment facility. The wastewater is treated to the appropriate level at the facility (as

[7] Connecticut Department of Public Health. (2019). *Environmental Engineering - Subsurface Sewage*.
[8] Connecticut Department of Environmental Protection. (2008, November). *Development of a Water Pollution Control Plan and a Sewer Service Area Map.*

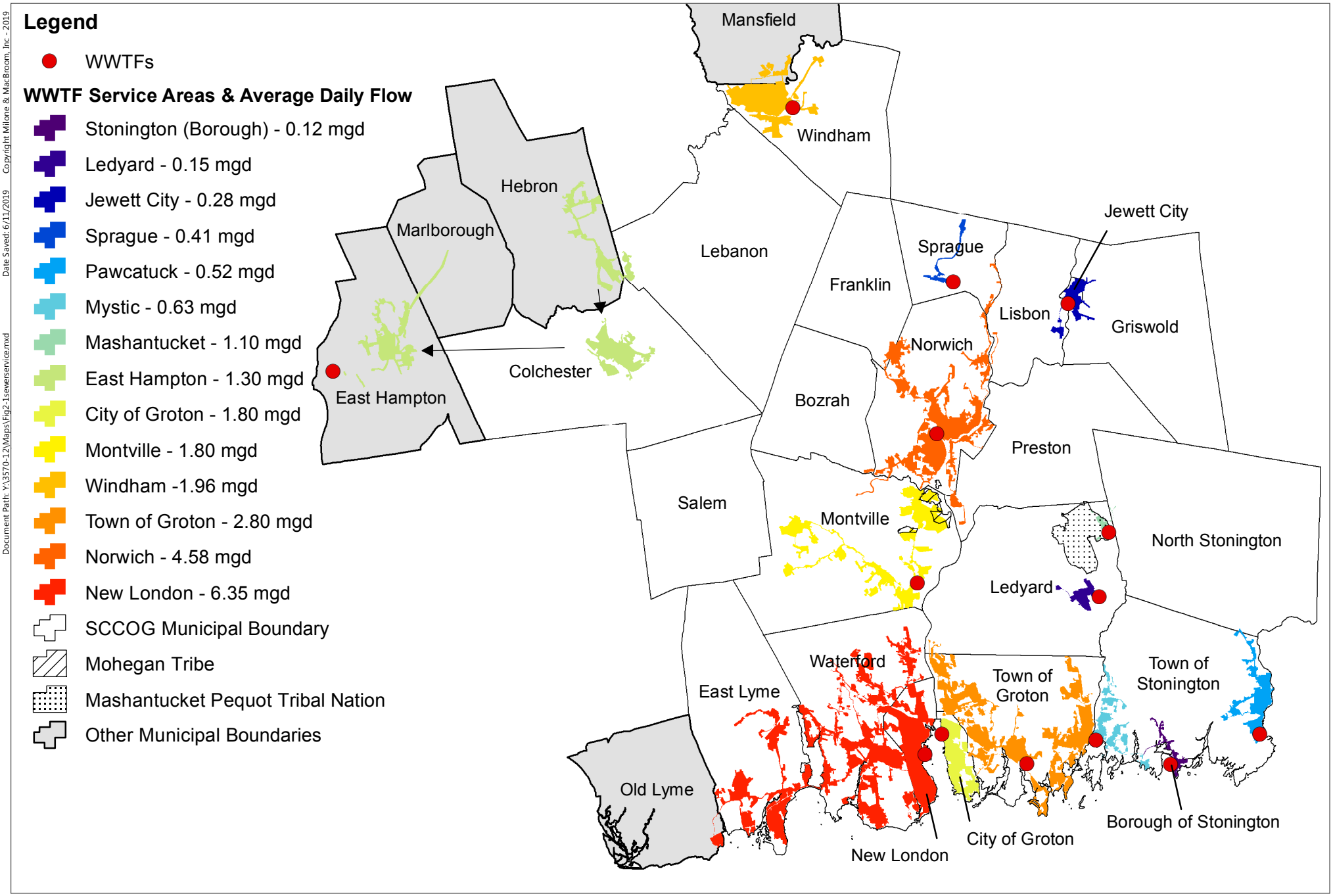


FIGURE 2-1: AREAS WITH MUNICIPAL SEWER SYSTEMS
REGIONAL WASTEWATER MANAGEMENT PLAN
SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5
Miles
1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

determined by the NPDES permit for each WWTF) prior to discharge to the environment. There are typically three main phases of treatment and usually a fourth as described below:

- Preliminary Treatment involves the removal of gross solids and debris that would otherwise cause damage to the system. This often includes grit removal facilities to remove sand and abrasive material that cause wear to system components. Such facilities may be installed at pumping stations or the WWTF.

- Primary Treatment is used to separate heavy solids from liquids, oils, and lighter materials. The separated materials are removed from the top and bottom of a settling tank through mechanical methods and periodic pumping.

- Secondary Treatment utilizes microorganisms to break down the dissolved and suspended waste matter. This process lowers the biological oxygen demand.

- Tertiary Treatment, also known as advanced treatment, can refer to a number of different processes including disinfection and denitrification. This phase commonly relies on biological processes to achieve higher levels of treatment.

Table 2-1
Oversight of Wastewater Treatment in the SCCOG Region

Municipality	Local Managerial and Financial Oversight	Operations and Technical Oversight	Representative Health District or Department
Bozrah	Bozrah WPCA	Contract Operator	Uncas
Colchester	Colchester Sewer & Water Commission	Public Works	Chatham
East Lyme	East Lyme Water & Sewer Commission	Public Works	Ledge Light
Franklin	Franklin WPCA (Board of Selectmen)	Contracted Town Engineer	Uncas
Griswold	Griswold WPCA	Jewett City Dept. of Public Utilities	Uncas
Groton, City of	Groton Utilities	Groton Utilities	Ledge Light
Groton, Town of	Groton WPCA	Public Works	Ledge Light
Jewett City	Board of Warden and Burgesses	Jewett City Dept. of Public Utilities	Uncas
Lebanon	Lebanon WPCA	Contract Operator	Uncas
Ledyard	Ledyard WPCA	Contract Operator	Ledge Light
Lisbon	Lisbon WPCA	Contract Operator	Uncas
Mashantucket Pequot Tribal Nation	Mashantucket Pequot Tribal Nation Utilities	Mashantucket Pequot Tribal Nation Utilities	Mashantucket Pequot Tribal
Mohegan Tribe	Mohegan Tribal Utility Authority	Mohegan Tribal Utility Authority	Mohegan Tribal
Montville	Montville WPCA	Montville WPCA	Uncas
New London	New London Dept. of Public Utilities	Contract Operator	Ledge Light
North Stonington	North Stonington WPCA	None (No Sewer)	Ledge Light
Norwich	Norwich Public Utilities	Norwich Public Utilities	Uncas
Preston	Board of Selectmen	Norwich Public Utilities	Town of Preston
Salem	Board of Selectmen	None (No Sewer)	Uncas
Sprague	Water & Sewer Authority Board	Water & Sewer Authority	Uncas
Stonington, Borough of	Board of Warden & Burgesses / Stonington WPCA	Stonington WPCA	Ledge Light
Stonington, Town of	Stonington WPCA	Contract Operator	Ledge Light
Waterford	Waterford Utility Commission	Waterford Utility Commission	Ledge Light
Windham	Windham WPCA	Windham WPCA	North Central

As discussed in Section 3.3, maintaining water quality downstream of WWTFs is of considerable concern to state and federal agencies as well as the public. Treatment goals include both nitrogen and phosphorus removal as well as disinfection.

2.4 Existing Inter-Municipal Systems and Agreements

At the time of the 1969 Plan there were three municipal sewerage systems in the former SCRPA region. These were located in the City of Groton, New London, and Norwich. The impending CWA legislation spurred the prediction in that plan of 14 wastewater treatment facilities being needed in the former region by 1975, and 18 being needed by 1980. Thus, the 1969 Plan recommended a combination of municipal and inter-municipal treatment facilities in order to reduce the number of needed WWTFs for the former SCRPA region to 13.

Following adoption of the 1969 Plan, municipalities in the SCCOG region opted to maintain local control over infrastructure and treatment facilities within their municipal boundaries. Numerous inter-municipal agreements have been forged between municipalities in order to share costs and more efficiently treat wastewater in the region. As discussed in Section 4.1, the SCCOG region is presently served by 14 WWTFs (including the Town of Windham's, which was not part of the former SCRPA region). The following subsections discuss the current inter-municipal agreements. Sewer infrastructure in the SCCOG region is presented on Figure 2-1 and Appended Figure 1.

2.4.1 Bozrah, Franklin, Norwich, and Preston

The City of Norwich, through Norwich Public Utilities (NPU), has long provided sewer service to the portion of the Stanley Israelite Business Park in southeastern Franklin by agreement. It is believed that these parcels are presently served as direct customers of NPU. The Franklin WPCA may bill these customers directly in the future, following a planned expansion of the sewer system up Route 32 in Franklin. NPU had a similar agreement with the State of Connecticut to provide service to the former Norwich State Hospital in Preston, a site which is proposed for redevelopment.

In 2018, the City entered into an agreement with the Town of Bozrah to provide sewer service along Route 82 to Noble Hill Road to support a senior living development. The Town of Bozrah authorized the purchase of the new sewer mains within Bozrah in May 2019 and recently established a WPCA by ordinance. Flows from both Bozrah and Franklin are directed to the Norwich WWTF for treatment.

NPU is presently working on a common inter-municipal agreement with the municipalities of Bozrah, Franklin, Sprague, and Preston regarding treatment of regional sewer flows. Figure 2-2 presents the regional service area.

2.4.2 Colchester, East Hampton, Hebron, Lebanon, and Marlborough

The Town of Colchester has had a sewer service agreement with the Town of East Hampton since 1978. This agreement was last amended in 2009 and remains in effect through 2077 after which it becomes year-to-year. All sewage flows from Colchester are directed to the WWTF in East Hampton for treatment. The agreement specifies that the Town of Colchester shall share (50%) in the cost of the construction, treatment, operation, maintenance, and repair of WWTF and pertinent system components. The agreement allows for an average daily sewer flow of 1.7 million gallons per day (mgd) to be transferred from Colchester. As flows from Lebanon and Hebron pass through Colchester's system, sewer flow from these two communities counts against the 1.7 mgd limit.

SCCOG Regional Wastewater Plan

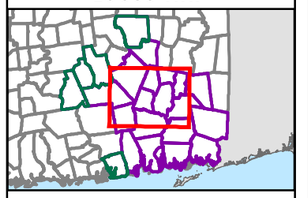
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 6,900

Feet

1:84,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Norwich Sub-Region (2)

June 2019

Figure 2-2

Tighe&Bond

Engineers | Environmental Specialists

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:35:01 AM]

S-5068

Furthermore, the agreement includes a provision for up to 0.2 mgd of future flow from the Lake Hayward area of East Haddam.

The Town of Lebanon has a sewer service agreement with the Town of Hebron. All sewage flows from Lebanon in the vicinity of Amston Lake are directed through Hebron to Colchester and then eventually to the East Hampton WWTF for treatment. Figure 2-3 presents the regional service area.

2.4.3 East Lyme, New London, Old Lyme, and Waterford

The Town of East Lyme, the Town of Waterford, and the City of New London are part of a tri-town sewer service agreement dated January 10, 1991. This agreement remains in effect through January 10, 2021. All sewage flows from East Lyme are directed through Waterford to the New London WWTF for treatment (Figure 2-4). The agreement specifies that the Towns of East Lyme and Waterford shall share in the cost of the maintenance, repair, and operating costs of the New London WWTF and pertinent system components consistent with the ratio of sewage conveyed from East Lyme and Waterford to the total sewage treated at the New London WWTF. The agreement allows for an average daily sewer flow of 1.5 mgd to be transferred from East Lyme, and a total of 3.0 mgd of average daily sewer flow to be transferred from Waterford (not including East Lyme flow). This leaves New London with 5.5 mgd of the 10 mgd capacity of the WWTF.

The East Lyme capacity allocation of 1.5 mgd includes a reservation of 0.475 mgd for the State of Connecticut. The State's capacity allocation is shared between the two prisons (one of which is currently closed), Camp Nett (National Guard base), and reserved for Rocky Neck State Park (presently operates its own SSDS with summertime flows of approximately 0.17 mgd). The Point O' Woods beach community in Old Lyme was connected to East Lyme's sewer system in 2011-2012 by accessing some (0.105 mgd average) of the State's capacity. Flow from Point O' Woods is directed to East Lyme via force main. Agreements were developed between East Lyme and Point O' Woods (2008) and Point O' Woods and the State of Connecticut to facilitate this connection.

The Town of East Lyme is close to exhausting its available sewer capacity through allocations to proposed developments.[9] Potential short-term solutions include renegotiating the 1.5 mgd capacity allocation with New London and Waterford, renegotiating the State's allocation of 0.475 mgd less the 0.105 mgd reserved for Point O' Woods, issuing a moratorium on new developments until existing planned developments are built and sewer flows realized, considering ways to increase capacity by decreasing flows, or seeking another regional solution (Section 6.2.1).

East Lyme, Waterford, and New London are presently in discussion with the Miami Beach Association, Old Lyme Shores Beach Association, and the Old Colony Beach Club Association in Old Lyme regarding options for serving the coastal area, with flow conveyed to the New London WWTF. These beach communities are under a Consent Order with the CTDEEP. Connection to New London via East Lyme and Waterford was identified as the most cost-effective and technically feasible solution to providing wastewater to these areas in an Environmental Impact Evaluation.[10] The total capacity requested to meet current needs is 0.12 mgd, with an additional 0.18 mgd requested to meet future needs. According to the City of New London, its preliminary agreement with the three

[9] Biekert, M. (2019, January 26). With dwindling sewage capacity, East Lyme questions potential for growth. *The Day*.
[10] Connecticut Department of Energy & Environmental Protection. (2014). *Environmental Impact Evaluation - Regional Wastewater Management Project - Miami Beach, Old Lyme Shores Beach and Old Colony Beach Club Associations Wastewater Facilities Plan.*

SCCOG Regional Wastewater Plan

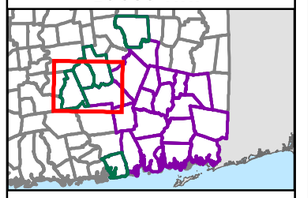
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



0 5,900
Feet
1:72,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Northwestern Sub-Region (1)

June 2019

Figure 2-3

Tighe&Bond
Engineers | Environmental Specialists

S-5068

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:34:10 AM]

SCCOG Regional Wastewater Plan

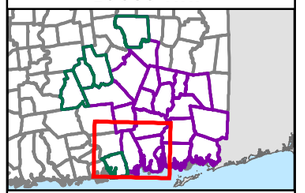
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 6,600

Feet

1:80,400

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

New London Sub-Region (1)

June 2019

Figure 2-4

Tighe&Bond

Engineers | Environmental Specialists

S-5068

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:35:44 AM]

associations states that sewer system construction in Old Lyme must begin within two years or New London will rescind the 0.3 mgd capacity allocation.

The Town of East Lyme has finalized an agreement with the Miami Beach Association, Old Lyme Shores Beach Association, and the Old Colony Beach Club Association, dated July 2018, to allow connection of a new sewer system. Flow will be conveyed to East Lyme via a separate force main from the one conveying flow from Point O' Woods in order for East Lyme to properly track the flows produced under the separate agreements. The sewer treatment capacity for the beach communities is expected to come from New London's WWTF capacity allocation. The Town of Waterford is presently developing a similar agreement with the Town of Old Lyme and the three beach associations.

2.4.4 Griswold, Jewett City, and Lisbon

The Borough of Jewett City is the urbanized core of the Town of Griswold. The Town of Griswold has a sewer service agreement with the Borough of Jewett City dated 1998 that allows sewage flows from Griswold to be directed to the Jewett City WWTF for treatment. This agreement remains in effect until modified. The agreement specifies that the Jewett City Department of Public Utilities shall operate and maintain any sewers in the Town of Griswold, and that rates and fees assigned to users in Griswold shall be the same as those in Jewett City. The agreement allows for an average daily sewer flow of 0.05 mgd to be transferred from Griswold.

In addition to the agreement with the Town of Griswold described above, the Jewett City Department of Public Utilities also has a sewer service agreement with the Town of Lisbon dated 2009. This agreement remains in effect until modified. The agreement specifies that Lisbon shall own and operate any and all sewer lines in Lisbon and any lines in Jewett City needed for connection to the WWTF, and that the Jewett City Department of Public Utilities shall charge rates and fees for users in Lisbon the same as those for users in Jewett City. The agreement allows for an average daily sewer flow of 0.208 mgd to be transferred from Lisbon. Figure 2-5 presents the regional service area.

2.4.5 Mansfield and Windham

The Town of Windham has a sewer service agreement with the Town of Mansfield, dated 2010, which revised a 1972 agreement. This agreement remains in effect on automatically renewing five-year terms until modified. The agreement specifies that Mansfield shall pay a portion of all annual maintenance and operating costs as well as capital improvements to the Windham WWTF. While the Town of Mansfield continues to own its sewer mains within southern Mansfield, the Town of Windham operates and maintains these lines on a contractual basis. The agreement allows for an average daily sewer flow of 0.5 mgd to be transferred from southern Mansfield. Figure 2-6 presents the regional service area.

2.4.6 Mohegan Tribe and Montville

The Mohegan Tribe has an agreement with the Town of Montville to direct all sewage flows from Mohegan Sun and nearby tribal areas into the Town of Montville sewage system for treatment at the Montville WWTF. The allotted capacity to the Mohegan Tribe is 1.6 mgd. Figure 2-7 presents the regional service area.

SCCOG Regional Wastewater Plan

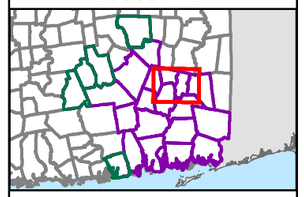
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



0 3,900 Feet

1:48,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Norwich Sub-Region (1)

June 2019

Figure 2-5

Tighe&Bond
Engineers | Environmental Specialists

S-5068

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:34:41 AM]

SCCOG Regional Wastewater Plan

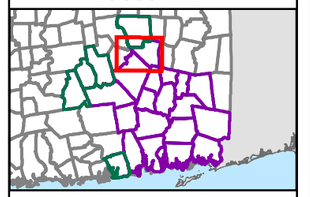
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 3,900
Feet
1:48,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Northwestern Sub-Region (2)

June 2019

Figure 2-6

Tighe&Bond
Engineers | Environmental Specialists

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:34:28 AM]

S-5068

SCCOG Regional Wastewater Plan

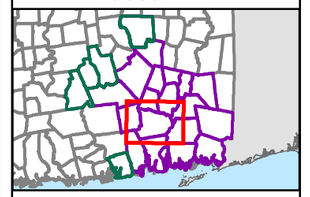
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



0 4,900
Feet
1:60,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Norwich Sub-Region (3)

June 2019

Figure 2-7

Tighe&Bond
Engineers | Environmental Specialists

Colchester
Lebanon
Bozrah
Norwich
Preston
Salem
Montville
Lyme
East Lyme
Waterford
Ledyard
Groton

Norwich WWTF
Montville WWTF
Route 82
Oxoboxo Lake
Preston Riverwalk (Former Norwich State Hospital)
Route 2 (Poquetanuck Cove)
Northwest (Aljen Heights)
Route 12 (Happyland)
Southwest (Gales Ferry)
Ledyard Center
Preston to Norwich
Mohegan Tribe to Montville
Potential Connection from East Lyme to Montville WWTF
Potential Connection from Waterford to Montville WWTF

Deep River Rd, Rathbun Hill Rd, Buckley Rd, Brainard Rd, Witter Rd, Scott Hill Rd, Rattlesnake Ledge Rd, Hellwield Rd, Round Hill Rd, Norwich Rd, Harford Rd, Music Vale Rd, Norwich Tpke, Haddam Tpke, Hartford New London Tpke, Forsyth Rd, State Hwy 11 -Under Construct, Salem Turnpike Rd, Old New London Rd, New London Rd, Lake Rd, Cottage Rd, Bozrah St, South Rd, Caroline Rd, Bishop Rd, Doyle Rd, Norwich Salem Tpke, Rogers Rd, Wawecus Hill Rd, Old Salem Rd, Noble Hill Rd, Leffingwell Rd, Cranberry Pond Rd, Dudley St, Asylum St, Washington St, Broadway, Boswell Ave, Central Ave, Shetucket Tpke, Route 165, Miller Rd, Hamilton Ave, Corning Rd, Brickyard Rd, Gifford St, Shewood Ln, New London Tpke, Main St, Thames St, Laurel Hill Ave, Middle Rd, Eccleston Rd, Route 2A, Route 2 Norwich Westerly Rd, Richard Brown Dr, Parking Lot, Mohegan Sun Blvd, Fort Shantok Rd, Gallivan Ln, Fitch Hill Rd, Cherry Ln, Oxoboxo Dam Rd, Raymond Hill Rd, Meeting House Ln, Simpson Ln, Route 163, Connecticut Blvd, CH Hill Rd, Chesterfield Rd, Black Ash Rd, Oakdale Rd, Lynch Hill Rd, Old Colchester Rd, Gay Hill Rd, Maple Ave, Governor John Davis Lodge Tpke, Norwich New London Rd, Massapeag Rd, Derry Hill Rd, Kittemaug Rd, Lathrop Rd, Moxley Rd, Fire St, Ridge Hill Rd, Turner Rd, Montville Connector, Mohegan Avenue Ext, Hunts Brook Rd, Butlertown Rd, Hartford Tpke, Holmes Rd, Upper Walnut Hill Rd, Walnut Hill Rd, Grassy Hill Rd, Long Cove Rd, Partridge Hollow Rd, Christy Hill Rd, Terry Rd, Whalehead Rd, Vinegar Hill Rd, Sandy Hollow Rd, Stoddards Wharf Rd, Stoddards Warf St, Military Hwy, Route 12, Avery Hill Rd, Colonel Ledyard Hwy

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:35:23 AM]

S-5068

2.4.7 North Stonington and Stonington

An agreement between the Town of Stonington and the Town of North Stonington is being negotiated in order to allow for the conveyance of flow to the Pawcatuck WWTF in the near future. Potential maximum flows of 0.20 mgd are being considered for the agreement, although previous estimated flows from North Stonington for the full build-out through the 50-year planning period were on the order of 0.61 mgd.[11] Figure 2-8 presents the proposed regional service area.

2.4.8 Norwich, Lisbon, and Sprague

The village if Versailles is primarily located in eastern Sprague with a portion located in western Lisbon. The Town of Sprague operates a conveyance system in the village which directs flow to Norwich for treatment. The Sprague Water and Sewer Authority has a sewer service agreement with the Town of Lisbon, dated 2003, to accept wastewater from 17 dwelling units located in the Lisbon portion of Versailles. This agreement pertains to an area that is separate from the sewered part of Lisbon on Route 12 discussed above, and it remains in effect in automatically renewing ten-year periods until written notice is given to cancel the agreement at least one year prior to its expiration. The agreement specifies that Lisbon shall pay Sprague a share of the operating and maintenance costs of any joint facilities commonly used by Sprague (in its Versailles sewer system) and Lisbon to convey flow to Norwich.

The Sprague Water and Sewer Authority has a sewer service agreement with the City of Norwich dated 1990. The agreement allows for an average daily flow of 0.019 mgd and a maximum daily flow of 0.075 mgd to be conveyed from Sprague (in its Versailles sewer system) into the Occum Interceptor in Norwich.

NPU also has a private agreement with the Town of Lisbon to act as its contract operator, maintaining the Town of Lisbon's sewer lines and pumping stations. NPU further has a private agreement with Riley Energy Systems, Inc. (the Wheelabrator facility) to accept wastewater from a power plant in Lisbon at a peak rate of 80,600 gpd. The regional service area was presented on Figure 2-5.

The Town of Sprague has recently expressed an interest in potentially sending all of its wastewater to NPU and abandoning its WWTF. The WWTF serves the villages of Baltic and Hanover in Sprague. The Sprague Water and Sewer Authority has been evaluating this potential alternative, as noted in Section 4.2.20.

2.5 Cost to Provide Sewer Service in the Region

Recent annual operating costs to provide sewer service are enumerated in Table 2-2 and presented in Figure 2-9 and Figure 2-10 where provided by systems. Note that these operating costs may not include all annual expenditures related to providing wastewater services (e.g. debt service and related municipal budgets) and should be considered minimums. In general, the municipalities with the smaller plants (e.g. Ledyard and Jewett City) in terms of average daily flow pay the most to operate on an annual per-gallon basis. The City of New London, which has the most regionalized WWTF and processes the greatest average daily flow volume, pays the second-least to operate on an annual per-gallon basis. The Town of Sprague pays the least to operate on an annual per-gallon basis.

[11] Town of North Stonington. (2012, February 10). Wastewater Flow Projections - Town of North Stonington Sewer District (Draft)

SCCOG Regional Wastewater Plan

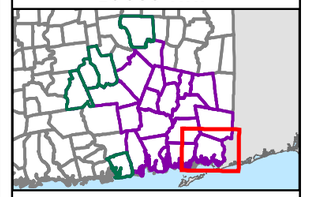
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 4,900

Feet

1:60,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesty of CTECO.

Southeastern Sub-Region (3)

June 2019

Figure 2-8

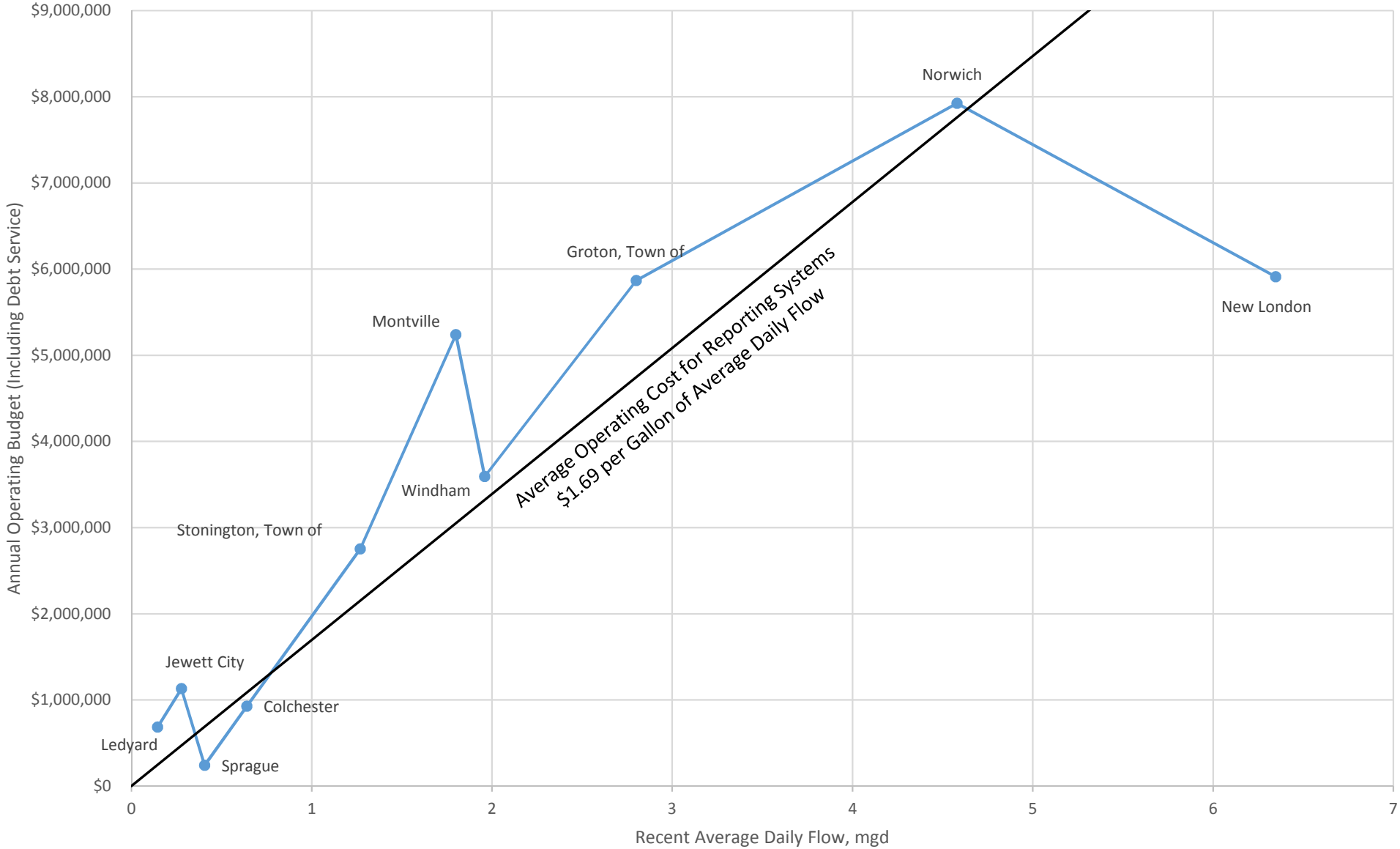
Tighe&Bond

Engineers | Environmental Specialists

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:36:41 AM]

S-5068

Figure 2-9: Cost to Provide Centralized Wastewater Treatment in the SCCOG Region



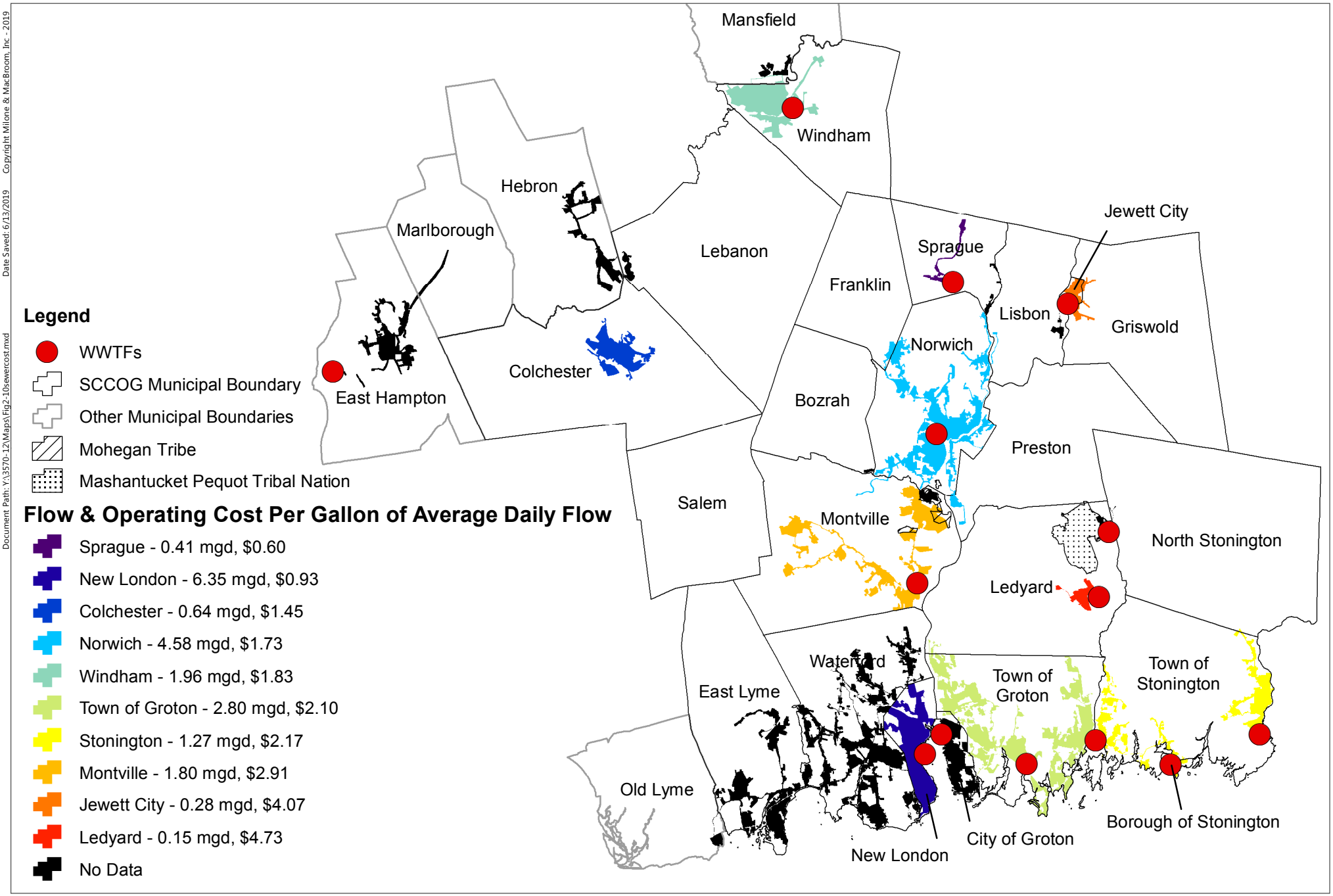


FIGURE 2-10: WASTEWATER OPERATING COSTS

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5
Miles
1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

Table 2-2
Minimum Cost to Provide Wastewater Collection and Treatment in the SCCOG Region

Municipality	Budget Year	Average Daily Flow (mgd)	Recent Annual Operating Budget	Annual Cost Per Gallon of Average Daily Flow
Colchester (includes flow from Hebron and Lebanon, with cost sharing for WWTF)	2017	0.640	$927,551	$1.45
Groton, Town of	2018	2.800	$5,868,582	$2.10
Jewett City (includes flow from Griswold & part of Lisbon)	2018	0.278	$1,132,063	$4.07
Ledyard	2018	0.145	$685,153	$4.73
Montville (includes flow from Mohegan Tribe)	2018	1.800	$5,240,240	$2.91
New London (includes flow from Old Lyme, East Lyme, and Waterford)	2018	6.348	$5,910,770	$0.93
Norwich (includes flow from parts of Sprague, Lisbon, and Franklin)	2018	4.580	$7,924,012	$1.73
Sprague (some flow to Norwich)	2018	0.407*	$242,544	$0.60
Stonington, Town of (3 WWTFs)	2018	1.269**	$2,751,312	$2.17
Windham (includes flow from southern Mansfield)	2018	1.960	$3,594,000	$1.83
Total or Mean for Respondents	**-**	**20.227**	**$34,276,227**	**$1.69**

* Based on nine months of available records. Versailles flow directed to Norwich for treatment.

** Based on 11 months of available records at the three WWTFs. Operating budget does not include debt service payments, capital improvement projects, and certain administrative costs to operate the WPCA.

During the data collection workshop, the Stonington WPCA expressed concerns in operating and maintaining three separate treatment facilities. They suffer from financial pressure and find it difficult to maintain user rates.

2.6 Intra-Municipal Agreements and Potential Alternatives

Local municipal governance of wastewater treatment coupled with the use of inter-municipal agreements is the traditional method of handling centralized wastewater service in the SCCOG region. There are typically three types of Inter-Municipal Agreements: formal written contracts, joint service(s) agreements, and service exchange announcements.[12] Formal written contracts are commonly used in the SCCOG region. For example, New London, Waterford, and East Lyme have a common tri-town agreement, and Norwich, Bozrah, Franklin, Sprague, and Preston are considering a common multi-town agreement at the time of this writing.

While there are both challenges and benefits to constructing and abiding by an inter-municipal agreement, the cost savings resulting from inter-municipal cooperation may be substantial and to mutual benefit. For example, as presented in Section 2.5 New London (which accepts a significant amount of regional sewer flow) has among the

[12] State of Massachusetts. (2017). *Inter-Municipal Agreements: A Best Practice.*

most efficient cost to operate in the region. Nevertheless, other management structures may be appropriate for the region. Examples are presented below.

2.6.1 Regional WPCA District

The creation of a regional WPCA, as recommended by the 1969 Plan, is one method to regionalize wastewater service. Examples of the regional WPCA model in Connecticut include the Metropolitan District Commission, which provides wastewater service to the Greater Hartford area, and the Greater New Haven WPCA (GNHWPCA), which provides wastewater service to the Greater New Haven area. Both entities were established by legislative acts, with the creation of the GNHWPCA being most recent. Thus, some information regarding the GNHWPCA may be helpful to draw comparisons for the SCCOG region.

The GNHWPCA is a regional water pollution authority with a final sewer ordinance adoption date of August 1, 2005. This authority was created under C.G.S. §§ 22a-500-519 (the "Act"), and pursuant to the Act, constitutes public and state subdivisions to ensure necessary public and government function.

The GNHWPCA serves the communities of New Haven, East Haven, Hamden and Woodbridge. As a result of the Authority's formation, wastewater system assets belonging to the constituent municipalities were acquired by the GNHWPCA. These assets included equipment, facilities, and the purchase/and or lease of real estate that would be necessary to the Authority's operations. As of November 2017, the Authority's service area is 53,000 acres with a service population of 200,000. The system treatment and design capacity allow for 40 mgd, which is 6.7 mgd more than the estimated average daily flows from 1997 to 2002.[13]

The business of the GNHWPCA is managed by or under the direction of a nine-member Board of Directors (two from New Haven, two from East Haven, two from Hamden, and one from Woodbridge). The total budget to operate in fiscal year (FY) 2019 is $43,365,567 for an average annual flow of 29 mgd,[14] equivalent to an annual cost per gallon of average daily flow of $1.50.

Prior to the creation of the GNHWPCA, wastewater collection and treatment services were provided by the City of New Haven WPCA. These services were offered on a retail basis to New Haven customers, and on a wholesale basis to the surrounding towns of East Haven, Hamden and Woodbridge. The legislative bodies of each of the four communities authorized the creation of the new Authority in 2005, with the vision "To protect the environment, to serve the public and to maintain a reputation for quality and value". Notably, the operations of the authority have been designed to be "financially self-sufficient", stemming from issues the City of New Haven had in the 1990s and early 2000s with collections from the outlying towns,[15] as well as issues with deferred maintenance in outlying communities.[16]

In the SCCOG region, large-scale regionalization is likely infeasible due to the well-established service areas, the distance and cost involved in consolidating outlying systems, and the long-standing commitment of local governments to providing centralized wastewater service. However, regionalization on a smaller scale could potentially benefit the region in the area served by the New London WWTF. This is because the current tri-town agreement is expiring soon (in early 2021), East Lyme is essentially out of available sewer capacity, and CTDEEP

[13] Greater New Haven Water Pollution Control Authority. (2018). *About GNHWPCA*.
[14] Arcadis and O'Neil Accounting & Consulting, LLC. (2018). *Cost of Service Study for Fiscal Year 2019.*
[15] Carter, A. (2004, September 30). City, Hamden nearly agree on sewer bill. *New Haven Register.*
[16] Harrall-Michalowski Associates, I. (2004). *Hamden Plan of Conservation and Development.*

has identified the New London WWTF as the most environmentally feasible alternative for treating flow from areas of Old Lyme with centralized wastewater need. The creation of a "Greater New London WPCA" could provide an influx of capital for each community (to pay for the assets turned over to the regional authority), and allow for sewer expansions to occur over the sewer service area without specific capacity allocations for each community, at the cost of some local governmental control over the wastewater service and infrastructure. This model should be considered by these communities over the next few years (Section 6.2.1).

2.6.2 Inter-Municipal WPCA Districts

Inter-municipal WPCA districts are similar to regional WPCAs but on a smaller scale. These are formed when two or more communities come together and agree to share responsibility for a common sewer system. This is a slightly more advanced agreement than, for example, East Hampton and Colchester sharing the cost of a WWTF, as it specifies combining the WPCA Boards for each community. In this model, local governments typically retain direct ownership of local infrastructure (as opposed to transferring the ownership to a regional entity) but must implement the decisions of the combined board.

This type of district works best when service area sizes are similar and the two communities share common wastewater and environmental goals. For example, a consolidation of WPCAs for Jewett City and Griswold into a common WPCA district may be appropriate in the future if sewer expands significantly into Griswold. However, at this time the balance of sewer flows in these communities is such that the current inter-municipal agreement structure is appropriate.

3.0 REGIONAL CONDITIONS AFFECTING FUTURE WASTEWATER NEEDS

3.1 Areas Where Sewage Problems May be Expected

At the time of the 1969 Plan, the sewage concerns in the region fell into the following three categories:

- Discharge of raw or inadequately treated domestic sewage and industrial wastes from built-up areas along major streams and coastal areas of the region, thereby causing the pollution of these waterbodies
- Localized development with widely scattered sites throughout suburban and rural areas in the region, where small lot sizes, high population densities, poor soil conditions, or high groundwater levels cause frequent failures of on-lot sewage disposal systems, resulting in the pollution of groundwater and nearby watercourses
- Municipalities having sewerage systems and WWTFs in need of treatment upgrades

Great strides have been made by the region's municipalities in addressing the discharge of raw or inadequately treated sewage being discharged to streams since the 1960s. Sewage concerns today are more aligned with the second category, where failing or substandard SSDSs are causing, or have the potential to cause, detriment to the waterbodies in the region. As such, a discussion of regional water quality as it relates to wastewater (Section 3.3) is appropriate.

All of the municipalities with sewer systems participating in this study identified funding for improvements as one of their greatest challenges, consistent with the third category above. This is discussed in more detail in the next section.

3.2 Known Areas of Sewage Problems or Concerns

Municipal sewer service within the SCCOG region has significantly expanded since the time of the 1969 Plan, with fewer areas of obvious need for sewer expansion identified today than in the 1960s. Furthermore, the technology and infrastructure used to treat raw sewage has greatly improved since the 1960s, including the use of secondary and tertiary treatment techniques to reduce contaminants of concern in wastewater treatment plant outflows.

As part of the effort to prepare this RWMP, the data collection effort included both the collection of wastewater planning documents from each municipality as well as data collection workshops as described in the next section.

3.2.1 Data Collection Workshops

As noted in Section 1.3, four meetings were held with local officials in order to determine current sewer issues and needs in the region. The meetings were held on December 5th and 6th, 2018 at the SCCOG office. Each meeting focused on a specific sub-region of southeastern Connecticut (New London sub-region, southeastern sub-region, Norwich sub-region, and the northwestern sub-region). Meeting minutes are presented as Appendix A.

Two pressing issues were identified in the New London sub-region (Old Lyme, East Lyme, Waterford, and New London):

- Several beach communities in Old Lyme intend to convey wastewater flow through East Lyme and Waterford to the New London WWTF. This connection was found to be the best alternative through an Environmental Impact Evaluation process overseen by the CTDEEP. The three beach communities and the Town of Old Lyme are seeking to secure a total of 0.300 mgd of capacity from New London.

- The Town of East Lyme has essentially exhausted its available sewer capacity to allocate to new developments. The Town has a total of 1.5 mgd of sewer capacity per its agreement with New London, which includes a 0.475 mgd allocation to the State of Connecticut and the Point O' Woods beach community in Old Lyme. This results in a capacity allocation of 1.025 mgd for East Lyme. The combination of existing service and planned developments (which are allocated capacity by the town) has reduced remaining capacity to the point where very little capacity is left to allocate to new developments.

For the southeastern sub-region (Groton, Ledyard, Mashantucket Pequot Tribal Nation, North Stonington, and Stonington), the following major issues were identified:

- As noted in Section 3.4, Electric Boat is expanding by approximately 5,000 employees above its February 2019 workforce and building a new building. This will increase sewer flows both at the site as well as regionally.

- Ledyard has several areas where sewer expansion is desired, including Aljen Heights and Gales Ferry (due to reported substandard SSDSs) and in Ledyard Center (for economic development). Provision of sewer service will be costly given the significant area involved and the projected need to send the majority of the new wastewater flow out of town for treatment.

- Sewer service has been desired by the Town of North Stonington in the southeastern part of town for several decades. Currently only two properties are served by private agreement with the Town of Stonington, with flow directed to Stonington (Pawcatuck system) for treatment. Service would be provided along Route 2 and in the industrially zoned areas east of Route 2 for economic development purposes. As the Town of Stonington has been concerned about encouraging economic development in North Stonington without appropriate compensation, negotiations to expand service are still ongoing. The Kingswood Drive / Meadow Wood Drive subdivision was also noted as an area with substandard SSDSs.

- The Town of Stonington operates three independent sewer systems and WWTFs. The Mystic WWTF is near capacity, while the Borough and Pawcatuck WWTFs have excess capacity. The wet autumn of 2018 and wet spring of 2019 led the Town of Stonington to issue a moratorium on new connections to the Mystic system in June 2019, as the plant has been operating above permitted capacity due to a combination of private sump pump flows and inflow/infiltration from high groundwater. The Town of Stonington has allocated $2 million to connect excess flows up to 0.3 mgd from the Mystic system to the Borough system, and to conduct an inflow/infiltration study.[17]

In the Norwich sub-region (Bozrah, Franklin, Griswold, Jewett City, Lisbon, Mohegan Tribe, Montville, Norwich, Preston, Salem, and Sprague), the following pressing issues were identified:

- Substandard SSDSs were noted in Fitchville and Gilman in northern Bozrah. A study has been performed to estimate potential costs for installing sewers in Fitchville, with flows discharging to the Norwich WWTF.

[17] Daughtry, A. (2019, June 3). Authority imposes moratorium on connections to Mystic treatment plant. *The Westerly Sun*.

- The Jewett City WWTF is floodprone and requires additional floodproofing; this is planned to be addressed in the next few years.

- Norwich continues to implement solutions to address areas of combined sewers in order to mitigate combined sewer overflow (CSO) issues.

Finally, the northwestern sub-region (East Hampton, Colchester, Hebron, Marlborough, Lebanon, and Windham) identified the following major concerns:

- Some force mains in East Hampton are deteriorating due to soil chemistry and require replacement.

- The Middletown Avenue pumping station in East Hampton, which directs all Colchester flow to the WWTF, runs continuously with no downtime. The station requires renovation and needs a larger wet well.

- Hebron (through which sewer flow passes from the Amston Lake area in Lebanon) is considering system-wide improvements, including pump station renovations and lining the collection system.

- Extension of sewer into southern Lebanon (along the Norwich-Colchester Turnpike) may be desirable for economic development purposes within industrially zoned areas in the future. Furthermore, the Red Cedar Lake area nearby is reportedly has substandard SSDSs. A centralized sewer solution may need to build upon any expansion of sewer through Fitchville and Gilman in northern Bozrah. However, given the Town's current goal of sewer avoidance, community SSDSs or localized package treatment plants are likely more appropriate for these areas. Expansion of sewer in Lebanon is not envisioned prior to 2040.

- Funding for improvements is the primary concern.

3.2.2 Charrette Results

As part of the data collection meetings, attendees were asked to participate in a charrette to share their thoughts regarding wastewater management in the region. The charrette asked attendees to provide comments on operational, technical, managerial, financial, and public education aspects of wastewater management, including aspects that are working well (Pros), issues where improvement is needed (Cons), and what opportunities may be available to make such improvements. Results for each category are summarized below.

The Operational aspect addresses staffing and the day-to-day actions involved in running the wastewater system and/or wastewater treatment facility, as presented in Table 3-1.

The Technical aspect addresses having suitable information available for local and regional wastewater planning, and the ability to convey, process, and treat wastewater in accordance with all pertinent laws and regulations as presented in Table 3-2.

The Managerial aspect addresses inter-municipal agreements, the relationship between the WPCA and local governments, and utility management as presented in Table 3-3.

Table 3-1
Operational Pros, Cons, and Opportunities

Pros	Cons	Opportunities
• Good working relationships • Dedicated, competent, skilled staff • Immediate response to local conditions • Highly automated WWTFs promote ease of operation	• Some systems will have staff retiring at the same time, which will lower institutional knowledge. • Insufficient workforce replacements from retirements and transfers. "No one wants to be a WWTF operator". Recruiting and retaining the next generation of operators is difficult. • Municipal restrictions on hiring makes staffing process difficult.	• Regionally sponsored training of wastewater staff • Consolidation of service areas for smaller WWTFs to larger WWTFs • More regionalization and sharing of resources to reduce costs • Construction of a regional biosolids facility

Table 3-2
Technical Pros, Cons, and Opportunities

Pros	Cons	Opportunities
• Regulation and oversight of private septic systems is well managed by local health departments and DPH	• Need for better operations controls and information technology • Training of high-level Class IV operators is difficult • Sharing of technical resources largely is not performed	• Sharing of technical resources could help multiple parties solve problems more efficiently • Generation and maintenance of regional GIS data layers showing infrastructure locations including subsurface disposal system locations, WWTF facilities and outfalls, existing and proposed public water supply service areas and sewer service areas, and private wells

Table 3-3
Managerial Pros, Cons, and Opportunities

Pros	Cons	Opportunities
• Wastewater utility managers are intelligent, dedicated individuals committed to meeting required standards • Town governments realize the need for reliable sewer systems • Wastewater utility managers are efficient, cooperative, and responsive to local priorities	• Substantial uncertainty regarding future multi-town agreements • Future expansion of service into Old Lyme will have unknown impacts on other service towns • Weak WPCA structure and authority leads to conflict with elected officials who may make uneducated or counterproductive decisions • "Home rule" ideology can prevent advanced technology, idea, and resource sharing	• Consider different management structures (regional utility, enterprise fund accounting, etc.) that increases the level of control over the utility in favor of the WPCA or utility manager as opposed to local elected officials, such as to make purchases and hire vendors • Other utilities in the SCCOG region could advise interested WPCAs (e.g. North Stonington) on methods for installing and operating sewer • Leveraging combined clout of SCCOG, secure funding to conduct utility manager training on regulatory pressures and emerging contaminants

The Financial aspect addresses cash flow, user rates, capital improvement costs, assessments, and the ability to access grants as presented in Table 3-4.

Table 3-4
Financial Pros, Cons, and Opportunities

Pros	Cons	Opportunities
• Low maintenance costs with gravity systems • Low, consistent, and predictable user rates • The manner by which revenues are set by WPCA statutes is fair • There is a focus on keeping rates low and maintaining efficiency and the quality of work	• High cost to not utilizing regional resources • High cost of operating multiple WWTFs • Sewer expansions to areas of need are costly and often politically-influenced • Pending retirements may require hiring away experienced staff from other utilities • WWTFs are expensive to operate with limited revenues • Tax-based and subsidized operations are not fully representative of expense and result in too much oversight from Town government • Rate increases can be difficult to perform • Unfunded mandates from regulatory bodies • Federal and state grants tend to go to the biggest utilities leaving little for smaller utilities • Difficult to share costs and associate with other utilities to increase purchasing power • Shared resources (payroll, human resources) can disproportionally benefit the Town over the utility	• Consider infrastructure as a very long term investment rather than a standard capital cost • Increase rates and budget funding for more staff and capital projects

The Public Education aspect addresses user and public perceptions and public outreach efforts, as presented in Table 3-5.

Table 3-5
Public Education Pros, Cons, and Opportunities

Pros	Cons	Opportunities
• Customers are typically satisfied with user rates and levels of service • Municipal website postings are primary means of education • Customers can be reached via social media	• Public and elected officials tend to ignore wastewater issues until there is a problem that affects service. There is little understanding of the impact to them if the system fails • Lack of a formal education plan including educational forums such as at high schools • Public lacks understanding of the damage caused by wipes and grease • Public doesn't understand the wastewater collection and treatment process	• Local public outreach to schools (in grade school) about how wastewater systems work to increase understanding of system and potential future employee interest • Improve utility website management and layouts with more efforts dedicated to public education • Regionally provide information (pamphlets, webpages, bill stuffers, etc.) to educate citizens on the importance of sewers to protect land and water contamination • Regionally conduct public outreach for shared problems (such as flushing of wipes)

3.2.3 Other Areas Needing Sewer Service Based on Local Planning Documents

Based on the review of local planning documents provided by SCCOG, the following additional areas of sewer expansion were identified:

- Additional expansion of sewer to the west along Route 82 in southern Bozrah, as well as extension of sewer along Stockhouse Road in northern Bozrah, is desired for economic development. The latter area is consistent with the Fitchville area described above.
- The Lake Hayward area of East Haddam has 0.2 mgd of capacity reserved through Colchester should sewer be needed in the future.
- East Lyme has several areas of sewer expansion planned to support approved developments that are not yet built.
- Additional expansion of the sewer system in Griswold is proposed to the east and south of Jewett City. This will support economic development.
- The Town of Groton is considering sewer expansion into Center Groton. This is to address areas with small lot sizes as well as to potentially encourage economic development.
- Several areas in southern Preston are proposed for sewer based on small lot sizes and economic development needs. Expansion of sewer may build upon the Preston Riverwalk project.
- Sprague intends to expand sewer as needed west and north of its primary system in existing developed areas, and adjacent to its Versailles system if development occurs. Sprague may also cease using its WWTF and send all of its flow to Norwich for treatment.
- A few minor expansions of sewer in Waterford are desired, including northwest along Route 85 for commercial and industrial needs.
- Windham intends to install sewers south along the Route 32 corridor to support industrial use.

These areas are depicted on the mapping presented on Appended Figure 1.

3.3 Water Quality

The federal government passed legislation in the 1960s requiring that each state adopt water quality standards or have the federal government assign water quality standards. It also required that each state present a plan for implementing and enforcing water quality standards. The State of Connecticut established criteria for classification of its waterways and an implementation schedule in accordance with this law in 1967, with water quality classifications being most recently updated in 2013. These criteria and classification system are applied to all surface water and groundwater resources in the state by the CTDEEP in concert with the principles of the CWA.

Inland Surface Water Classifications

Class AA
Designated uses: existing or proposed drinking water supply, fish and wildlife habitat, recreational use (may be restricted), agricultural and industrial supply.

Discharges restricted to: discharges from public or private drinking water treatment systems, dredging and dewatering, emergency and clean water discharges.

Class A
Designated uses: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural and industrial supply, and other legitimate uses including navigation.

Discharges restricted to: same as allowed in AA.

Class B
Designated uses: recreational use, fish and wildlife habitat, agricultural and industrial supply, and other legitimate uses including navigation.

Discharges restricted to: same as allowed in A and cooling waters, discharges from industrial and municipal wastewater treatment facilities (provided Best Available Treatment and Best Management Practices are applied), and other discharges subject to the provisions of section 22a-430 CGS.

Water quality classifications for the SCCOG region are presented in Figure 3-1. The classifications (see text boxes) establish designated uses for surface and groundwater resources and identify the criteria necessary to support

Date Saved: 5/9/2019

Document Path: Y:\3570-12\Maps\Fig3-1waterquality.mxd

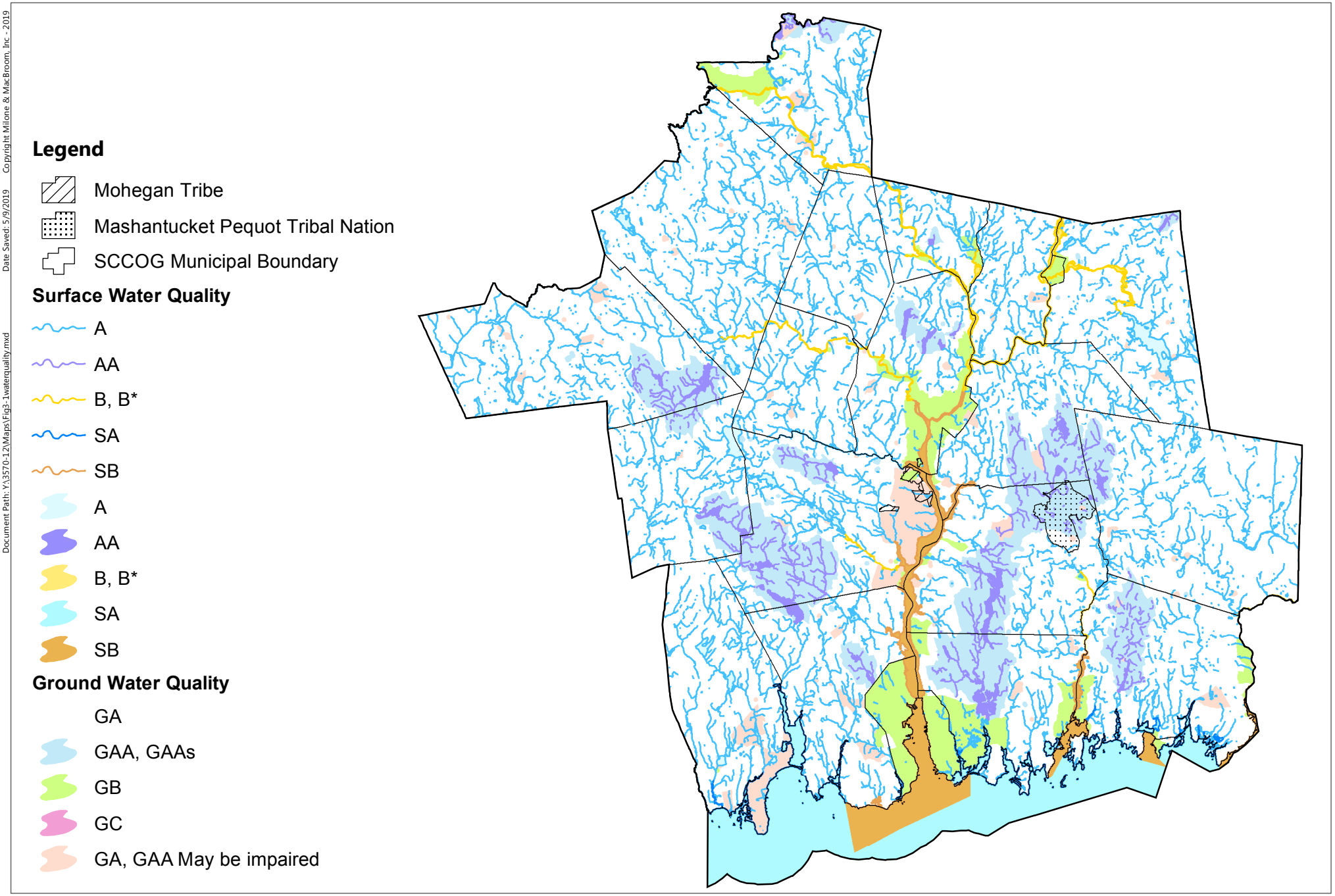


FIGURE 3-1: SURFACE WATER & GROUNDWATER QUALITY

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

Miles

1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

those uses. Criteria have been established with respect to desirable use, anti-degradation, allowable types of discharges, waste assimilation, and a variety of physical and chemical constituents. For example, streams receiving discharges from municipal wastewater treatment facilities are rated Class B and therefore do not meet the criteria to be used for drinking water supply.

Federal law prohibits a state from diminishing surface water quality classifications or standards in order to accommodate new or increased wastewater discharges or land use practices that impact a particular watercourse. Therefore, the state must attain and maintain the most sensitive existing and potential use for a respective water body.

3.3.1 Impaired Water Bodies

The CTDEEP prepares a list of impaired water bodies in the state for the EPA approximately every two years. The most recent update available for this planning process was in 2016. Table 3-6 presents the results of the assessment for water bodies in the SCCOG region where impairment may be potentially related to wastewater treatment, either from illicit discharges, insufficient on-site treatment, or from municipal discharges.

Groundwater Classifications

Class GAA
Designated uses: existing or potential public supply of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

Discharges limited to: treated domestic sewage, certain agricultural wastes, certain water treatment wastewaters.

Class GA
Designated uses: existing private and potential public or private supplies of water suitable for drinking without treatment; baseflow for hydraulically connected surface water bodies.

Discharges restricted to: as for GAA and discharge from septage treatment facilities subject to stringent treatment and discharge requirements, and other wastes of natural origin that easily biodegrade and present no threat to groundwater.

Class GB
Designated uses: industrial process water and cooling waters; baseflow for hydraulically connected surface water bodies; presumed not suitable for human consumption without treatment.

Discharges restricted to: same as for A (Note; same treatment standards apply), certain other biodegradable wastewaters subject to soil attenuation.

Class GC
Designated uses: assimilation of discharge authorized by the Commissioner pursuant to Section 22a-430 of the General Statutes. As an example a lined landfill for disposal of ash residue from a resource recovery facility. The GC hydrogeology and hydrologic setting provides the best safeguard to adjacent resources.

Discharges restricted to: potential discharges from certain waste facilities subject to specific permitting requirements.

Coastal and Marine Surface Water Classifications

Class SA
Designated uses: marine fish, shellfish and wildlife habitat, shell fish harvesting for direct human consumption, recreation and all other legitimate uses including navigation.

Discharges restricted to: same as for AA or A inland surface waters

Class SB
Designated uses: marine fish, shellfish and wildlife habitat, shellfish harvesting for transfer to approved areas for purification prior to human consumption, recreation, industrial and other legitimate uses including navigation.

Discharges restricted to: same as for B inland surface waters.

The 2016 *Integrated Water Quality Report* indicates that the Quinebaug River and Shetucket River are targeted by CTDEEP for Phosphorus Load Reduction to manage cultural eutrophication. The report states that "*Bacterial contamination that poses a risk to human health can originate from…malfunctioning septic systems, private/public sewers, and sewage discharges from watercraft. Potential sources of bacteria are recognized by U.S. EPA as…Nonpoint Source Pollution, Combined Sewer Overflows, and Municipal Point Source Discharges*".[18] These can impact designated uses of a waterbody such as existing or proposed drinking water, recreation, and shellfish harvesting.

[18] Connecticut Department of Energy & Environmental Protection. (2017). *2016 Integrated Water Quality Report.*

Table 3-6
2016 Impaired Waters Potentially Related to Wastewater Treatment

Town	Waterbody Name	Impaired Designated Use	Cause	Potential Wastewater Sources		
				Illicit Discharges	Insufficient On-Site Treatment / Septic Systems	Municipal Discharges
Bozrah	Kahn Brook	Habitat for Fish, Other Aquatic Wildlife and Wildlife; Recreation	Unknown; *E. coli*		X (Septage Lagoons)	
Colchester	Cabin Brook	Habitat for Fish, Other Aquatic Wildlife and Wildlife	Unknown	X		
East Lyme	Latimer Brook	Recreation	*E. coli*	X	X	
East Lyme & Waterford	Niantic River	Habitat for Marine Fish, Other Aquatic Life and Wildlife	Unknown, EB	X	X	
Griswold & Lisbon	Quinebaug River	Habitat for Fish, Other Aquatic Wildlife and Wildlife	Unknown			X
Groton & New London	Thames River	Habitat for Marine Fish, Other Aquatic Life and Wildlife, Commercial Shellfish Harvesting Where Authorized	DOS, EB, FC	X		X
Groton & Stonington	Mystic River	Commercial Shellfish Harvesting Where Authorized	FC			X
Ledyard & Montville	Thames River	Commercial Shellfish Harvesting Where Authorized, Habitat for Marine Fish, Other Aquatic Life and Wildlife	FC, DOS, EB, Enterococcus	X		X
Norwich	Shetucket River	Recreation	*E. coli*	X		X
Norwich	Thames River	Commercial Shellfish Harvesting Where Authorized, Habitat for Fish, Other Aquatic Wildlife and Wildlife, Recreation	FC, DOS, EB, Nutrient / Eutrophication BI, Enterococcus	X	X	X (including CSOs)
Norwich	Unnamed Tributary to Yantic River; Browning Pond	Habitat for Fish, Other Aquatic Wildlife and Wildlife	Ammonia (Un-ionized), DOS, Lead, Nutrient / Eutrophication BI, Organic Enrichment (Sewage) BI			X (Municipal Sewage Disposal)
Stonington & Westerly	Pawcatuck River	Habitat for Marine Fish, Other Aquatic Life and Wildlife	DOS, Nutrient / Eutrophication BI	X		X
Waterford	Stony Brook	Recreation	*E. coli*	X	X	

Notes: BI = Biological Indicators; CSOs = Combined Sewer Overflows; DOS = Dissolved Oxygen Saturation; EB = Estuarine Bioassessments; FC = Fecal Coliform

Source: CTDEEP 2016 Integrated Water Quality Report

Areas with certain impaired water quality conditions may indicate areas where the extension of sewers could mitigate the problem. For example, sewers in aquifer protection areas and reservoir watersheds may be desired in order to prevent groundwater pollution and/or leachate from substandard SSDSs tracking to the drinking water supply sources.

3.3.2 Total Maximum Daily Load Analyses

States are required to develop Total Maximum Daily Load (TMDL) analyses for waters impaired by pollutants for which technology-based controls are insufficient to achieve water quality standards. For example, most streams in Connecticut that receive treated wastewater from a WWTF have had a TMDL analysis performed. Therefore, the TMDL represents the maximum loading that a waterbody can receive without exceeding its established water quality criteria.

Individual TMDL documents are available on the CTDEEP website and provide additional detail on potential areas and causes of water quality impairment.[19] Several TMDL documents identify failing septic systems and sewer system leaks as potential sources of bacteria that may potentially impair water quality to certain water bodies. Recommendations include implementation of programs to evaluate sanitary sewer system lines to reduce leaks (and overflows, where occurring), and developing a system to monitor septic systems through inventories and inspections. Table 3-7 presents impaired segments from TMDL documents where "failing septic systems" were identified (among other causes) as a potential cause of impairment.

The impaired segments from the 2016 Impaired Water Quality List,

Table 3-7
Potential Impairment due to Failing Septic Systems Based on Information in TMDL Documents

Town	Impaired Segment Name	Impaired Segment
East Lyme & Waterford	Niantic River (mouth)	CT-E1_020
Waterford	Niantic Bay (East)	CT-E1_013
East Lyme	Niantic Bay (West)	CT-E1_014
East Lyme	Bride Brook	CT-E1_022
Preston	Broad Brook	CT-3716-00_01
Ledyard	Flat Brook	CT-3000-08_01
Montville	Oxoboxo Brook	CT-3004-00_01
Groton	Inner Beebe Cove (Mystic Harbor)	CT-E1_009 LIS EB
Groton	Inner Palmer Cove	CT-E1_010 LIS EB
Groton	Inner Mumford Cove	CT-E1_011-SB LIS EB
Groton	Inner Poquonnock River (Mouth)	CT-E1_012 LIS EB
Groton	Inner Baker Cove	CT-E1_013 LIS EB
Groton & New London	Inner Thames River (Mouth)	CT-E1_014-SB LIS EB
New London & Waterford	Inner Alewife Cove	CT-E1_017 LIS EB
Groton	Shore West Cove (Groton Long Pt.)	CT-E2_006 LIS EB
Groton	Shore Outer Mumford Cove	CT-E2_007 LIS EB
Groton	Shore - Bluff Point	CT-E2_008 LIS EB
Groton & Stonington	Midshore Mystic River	CT-E3_003 LIS EB
Groton, Ledyard, Montville, New London, Norwich, Preston	Midshore Thames	CT-E3_004 LIS EB
New London / Waterford	Fenger Brook	CT-2000-30_01
North Stonington	Shunock River	CT-1004-00_01
Stonington	Inner Wequetequock Cove	CT-E1_003 LIS EB
Stonington	Inner Stonington Harbor	CT-E1_005 LIS EB
Stonington	Inner Quiambog Cove	CT-E1_006 LIS EB
Stonington	Shore - Stonington Point	CT-E2_002 LIS EB
Stonington	Shore - Outer Quiambog Cove	CT-E2_003 LIS EB
Stonington	Shore - Wilcox Cove (Mason Is.)	CT-E2_004 LIS EB
Groton & Stonington	Shore - Mouth Mystic River	CT-E2_005 LIS EB
Stonington	Pawcatuck River	CT-1000-00_01
Stonington	Lewis Brook	CT-1000-01_01
Stonington	Lassell's Brook	CT-1000-03_01
Stonington	Kelly Book	CT-1000-04_01
Stonington	Hyde Brook	CT-1000-05_01
Stonington	Iron Brook	CT-1000-00_trib_01
Stonington	Pawcatuck River	CT-E1_001SB
Stonington	Pawcatuck River	CT-E1_002SB
Stonington	Wequetequock Cove	CT-E2_001
Stonington	Midshore - Stonington	CT-E3_001
Windham	Shetucket River	CT-3800-00_05

[19] Connecticut Department of Energy & Environmental Protection. (2019, March 22). *The Connecticut Total Maximum Daily Load (TMDL) Program*.

and the impaired segments from the individual TMDL documents related to potentially insufficient on-site treatment or SSDSs, are presented in comparison to existing sewer coverage and septic suitability for the related watershed in Table 3-8. The estuaries were omitted as the majority of these coastal areas are sewered and the potential impairments could come from a variety of sources, such that an appropriate analysis was beyond the scope of this study. Furthermore, substandard SSDSs are identified adjacent to many of these estuaries in other planning documents, so information is available from other sources. Thus, this TMDL analysis focuses on inland areas.

To appropriately utilize the available information for a planning-level analysis, this study assumes that areas with a greater amount of sewer coverage are more likely to have leaky sewer pipes as a contributing factor to impairment, whereas areas with lower sewer coverage are more likely to have substandard SSDSs as a contributing factor. Furthermore, impaired segments with extensive coverage of soils with very low or extremely low potential septic suitability were considered to be more likely to result in a noticeable impairment of the downstream waterbody. Note that each related impaired segment may also have site specific factors causing impairment that is not directly related to sewer coverage and septic suitability.

The above considerations are compiled in Table 3-8. Based on the information in Table 3-8, some areas may be appropriate for sewer extension, while other areas may benefit from an inspection of sewer mains for leaks.

Table 3-8
Impaired Segments in Comparison to Sewer Coverage and Septic Suitability

Town	Impaired Segment Name	Impaired Segment	Existing Sewer Coverage in Related Watershed	Coverage of Very Low or Extremely Low Potential for Subsurface Sewage	Comments
Bozrah	Kahn Brook	CT-3900-07_01	None	Moderate	Large egg farm in watershed, brook near proposed sewer area
East Lyme	Latimer Brook	CT-2202-00_01	Minor	Moderate	Impairment extends into Montville without septic concern
Ledyard	Flat Brook	CT-3000-08_01	Minimal	Moderate	Impairment extends into sewered area of Groton. Area proposed for sewer
Montville	Oxoboxo Brook	CT-3004-00_01	Significant	Minor	Developed areas sewered, potential for impairment to extend upstream beyond assessed area
New London & Waterford	Fenger Brook	CT-2000-30_01	Significant	Minor	Developed areas sewered except Pepperbox Road
North Stonington	Shunock River	CT-1004-00_01	Minimal	Minor	Watershed to segment includes identified potential problem area (Kingswood Drive / Meadow Wood Drive). Lower reach area proposed for sewer
Preston	Broad Brook	CT-3716-00_01	None	Minor	Rural watershed, development outside of areas of poor septic suitability
Stonington	Pawcatuck River	CT-1000-00_01	Moderate	Minimal	Impairment may begin in upstream reaches in Rhode Island. Part of segment in North Stonington largely undeveloped but proposed for sewer

Table 3-8
Impaired Segments in Comparison to Sewer Coverage and Septic Suitability

Town	Impaired Segment Name	Impaired Segment	Existing Sewer Coverage in Related Watershed	Coverage of Very Low or Extremely Low Potential for Subsurface Sewage	Comments
Stonington	Lewis Brook	CT-1000-01_01	None	Minor	Rural watershed, Interstate 95 passes upstream of impaired segment
Stonington	Lassell's Brook	CT-1000-03_01	Minor	Minimal	Golf course in upper reaches of watershed, significant un-sewered residential areas but very few homes in areas of poor septic suitability
Stonington	Kelly Book	CT-1000-04_01	Moderate	Minor	Developed areas sewered, golf course in upper reaches of watershed
Stonington	Hyde Brook	CT-1000-05_01	Significant	Minor	Most developed areas sewered. Homes on septic outside of areas of poor septic suitability
Stonington	Iron Brook	CT-1000-00_trib_01	Moderate	Minor	Most developed areas sewered. Nearby evidence of settling ponds (industrial?). Industrial parcels in North Stonington not sewered but proposed for sewer
Waterford	Stony Brook	CT-2204-03_01	Minor	Moderate	Rural watershed in upper portion, Route 1 (and nearly all developed area) sewered.
Windham	Shetucket River	CT-3800-00_05	Minimal	Minimal	Segment downstream of Windham WWTF, industrial and residential zoning, Route 32 proposed for sewer

Coverage: None = 0%, Minimal = 0% to 20%, Minor = 20% to 40%, Moderate = 40% to 60%, Significant = 60% to 80%, Nearly All = 80% to 100%

For the purposes of this RWMP, the areas in Table 3-8 with limited sewer coverage and moderate or greater coverage of soils with poor suitably for SSDSs are most at risk for pollution from wastewater systems. The following actions should be considered by the region's municipalities:

- Connection of the Flat Brook area in Ledyard to the nearby Town of Groton sewer system may be appropriate. Sewers could potentially be installed along Baldwin Hill Road and Long Cove Road to provide service to a more limited area than presently proposed by the Town in Gales Ferry.
- Extension of sewers or development of a localized treatment system at the Kingswood Drive / Meadow Wood Drive area of North Stonington is recommended. This area was noted as a potentially desirable area for wastewater service by the Town (Section 3.2).
- Sewer lines nearby Oxoboxo Brook in Montville, nearby Fenger Brook in New London and Waterford, and nearby Hyde Brook and Kelly Brook in Stonington should be surveyed for leaks.

3.3.3 Other Analyses

Several other planning documents in the region present discussions and recommendations related to water quality and wastewater:

- The Town of East Lyme Plan of Conservation and Development (POCD) recommends the extension of sewer service to coastal areas of Golden Spur and Saunders Point to help alleviate potential increased nutrient loading in the Niantic River from reportedly substandard SSDSs in the area. The POCD specifically identifies Camp Niantic (now named Camp Nett) and Three Belle's Marina as having large subsurface disposal systems that may contribute to water quality issues in Smith Cove and the Niantic River.[20]

- The Town of Preston 2014 POCD identifies substandard SSDSs in the vicinity of Aljen Heights (Ledyard) and Happyland (Preston) affecting water quality in Poquetanuck Cove. Sewers are presently proposed in these areas. The POCD also suggests that phosphorus loading to Amos Lake is occurring due to residential density.[21] This area is remote from existing and proposed sewer areas and a localized solution (such as a package treatment plant) may be appropriate here.

- The 2014 draft Municipal Coastal Program (MCP) planning document for Groton recommends development of a program to test shoreline septic systems in existing developments to determine if any are substandard and contributing to water quality impairment of any of the coves. The plan recommends that regular septic system checks become standard procedure along the shoreline.[22]

- CSOs from sewers in Norwich potentially impairing the Thames River estuary are of concern.[23] The City's CSO program is addressing these overflows and is expected to improve water quality over time. The City's CSO program is described in more detail in Section 4.1.17.

3.4 Land Use

The total area of the region is 616.6 square miles based on GIS town boundary data available from the CTDEEP. Nearly 83% of the SCCOG area is undeveloped or managed as agricultural land, active recreation land, or preserved open space. Table 3-9 presents the 2015 land cover data for the SCCOG region as prepared by the University of Connecticut's (UConn) Center for Land Use Education and Research (CLEAR).

The majority of region's land cover is deciduous forest, with developed areas accounting for the next largest percentage of land cover. State forests are found throughout the region and include the Pachaug State Forest in Griswold and North Stonington, the Salmon River State Forest in Colchester, and Rocky Neck State Park and Nehantic State Forest in East Lyme. Figure 3-2 presents generalized land cover based on the 2015 CLEAR land cover data. Areas shown as turf and grass are maintained grasses such as residential and commercial lawns or golf courses.

Table 3-9
2015 Land Cover in the SCCOG Region

Category	Area (acres)	Percentage
Agricultural Field	32,481.3	8.2%
Barren	3,397.1	0.9%
Coniferous Forest	14,608.8	3.7%
Deciduous Forest	207,865.5	52.7%
Developed	61,753.5	15.6%
Forested Wetland	20,378.3	5.2%
Non-Forested Wetland	2,299.8	0.6%
Other Grass	10,008.2	2.5%
Tidal Wetland	1,447.9	0.4%
Turf & Grass	24,217.0	6.1%
Utility Right of Way	2,006.8	0.5%
Water	14,179.9	3.6%
Total	**394,644.1**	**100.0%**

Source: UConn CLEAR

[20] Town of East Lyme. (Amended 2010). *Plan of Conservation and Development 2009.*
[21] Town of Preston Planning and Zoning Commission. (2014). *Town of Preston Plan of Conservation and Development.*
[22] Milone & MacBroom, Inc. (2014). *Town of Groton Municipal Coastal Program Update (Draft).*
[23] Connecticut Department of Energy & Environmental Protection. (2015). *Environmental Impact Evaluation - Combined Sewer Overflow Long Term Control Plan - Norwich Department of Public Utilities.*

Date Saved: 6/5/2019
Document Path: Y:\3570-12\Maps\Fig3-2landcover.mxd

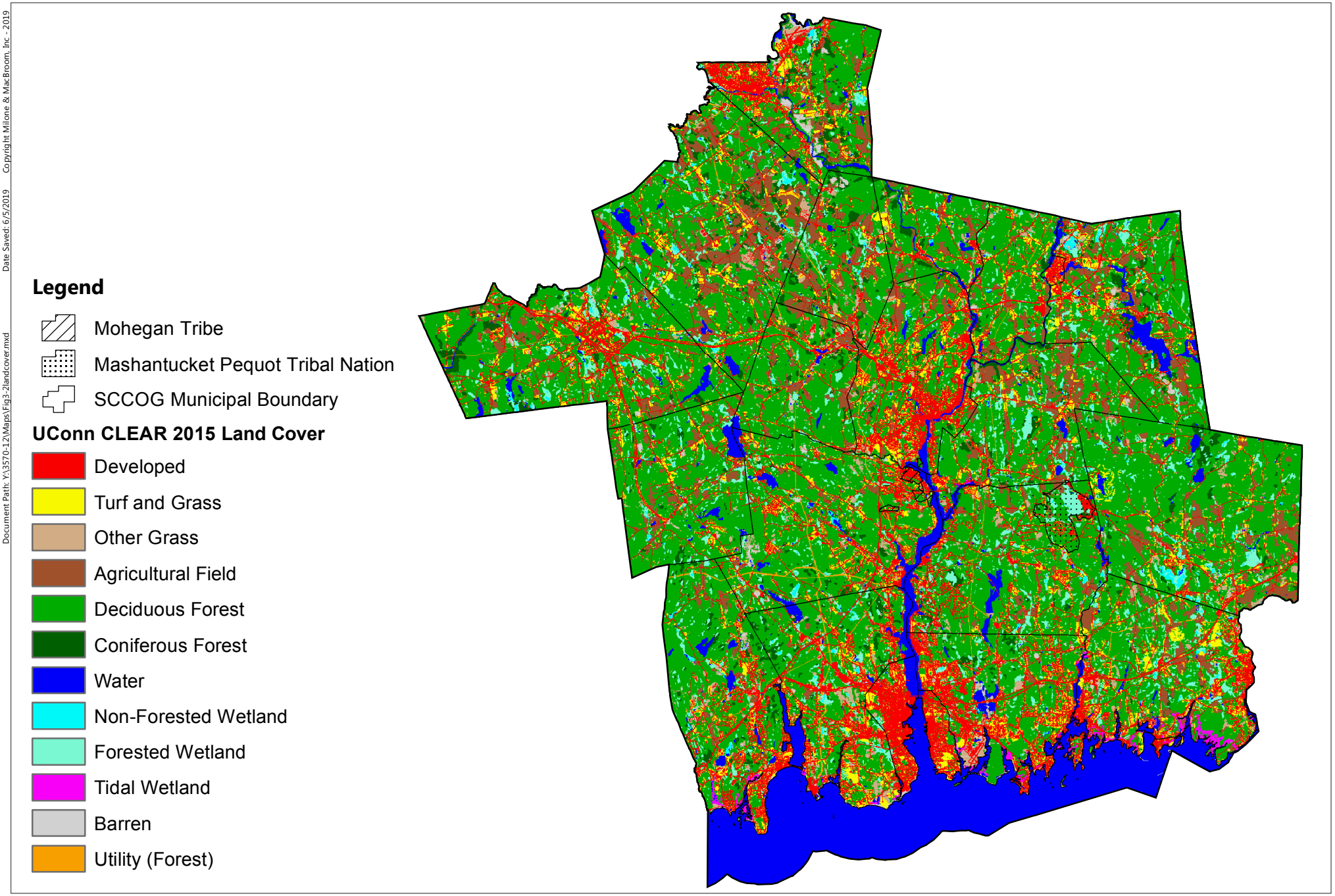


FIGURE 3-2: 2015 LAND COVER
REGIONAL WASTEWATER MANAGEMENT PLAN
SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5
Miles
1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

SCCOG gathered information about current land uses by individual property parcels in 2016 as part of its analysis to prepare its 2017 Regional POCD. Figure 8 from the regional POCD is reprinted here as Figure 3-3.[24] This information reports actual current uses as of 2016 and not potential use assigned by local zoning. As noted in by Figure 3-3, approximately 23% of the region consists of residential development, approximately 7% is commercial, industrial, or institutional, and approximately 7% of land is allocated to transportation or utility purposes. Just under half (42%) of the region's land area is considered undeveloped, with the remaining land split into developed (37%) and open space and agricultural use (20%). Tribal land makes up the remaining 1%.

Figure 3-3
2016 Land Use in the SCCOG Region

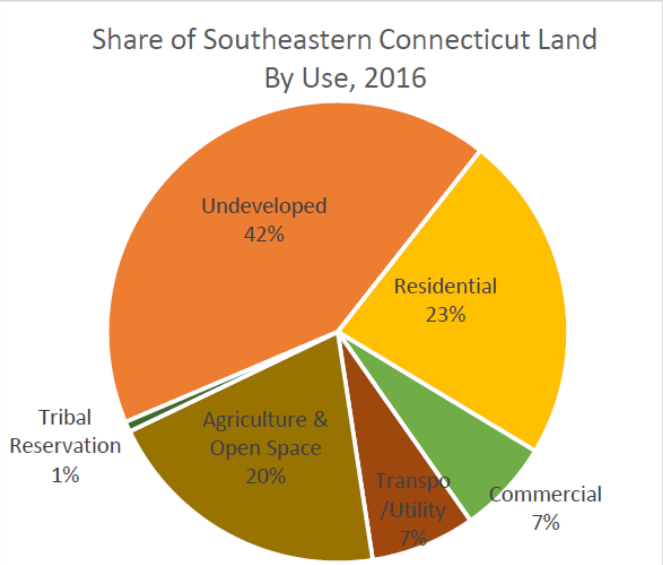


Figure 8. Share of Land by Use, 2016.
Source: SCCOG Land Use Data.

Figure 3-4 presents the 2016 land use mapping developed by SCCOG for the region.[25] The highest developed density in the region is located along the Quinebaug River and the Thames River corridor. Jewett City, Norwich, New London, and the City of Groton are the municipalities with the highest development density in the region, although Windham also has a heavily developed section in Willimantic. The coastal areas and regions adjacent to major watercourses are predominantly developed, whereas the outer regions are characterized by single-family homes interspersed with mixtures of forest, wetland, and agriculture.

In general, the amount of developed land and designated open space in the SCCOG region have been steadily increasing over the last three decades, while the amount of undeveloped land has been steadily decreasing over the same period. These trends are expected to continue into the future, with more acreage of undeveloped land being converted into developed areas for residential, commercial, or industrial use. This development is expected to occur to support population growth and the need and/or desire for economic development in the region.

3.4.1 Development Trends

As noted above, development in the SCCOG region is concentrated near major rivers and Long Island Sound, with several of the highest population densities occurring near the mouth of the Thames River (New London and the City of Groton). The more densely populated and developed areas near Long Island Sound and the Thames River comprise the commercial and industrial center of the region, while residential uses are spread in various densities throughout the remaining SCCOG communities.

The rate of housing construction in southeastern Connecticut appears to have leveled off following the recent economic downturn. As shown in Figure 3-5, the recent economic downturn resulted in a reduction of housing

[24] Southeastern Connecticut Council of Governments. (2017). *Regional Plan of Conservation and Development.*
[25] *Ibid.*

Date Saved: 6/5/2019

Document Path: Y:\3570-12\Maps\Fig3-4landuse.mxd

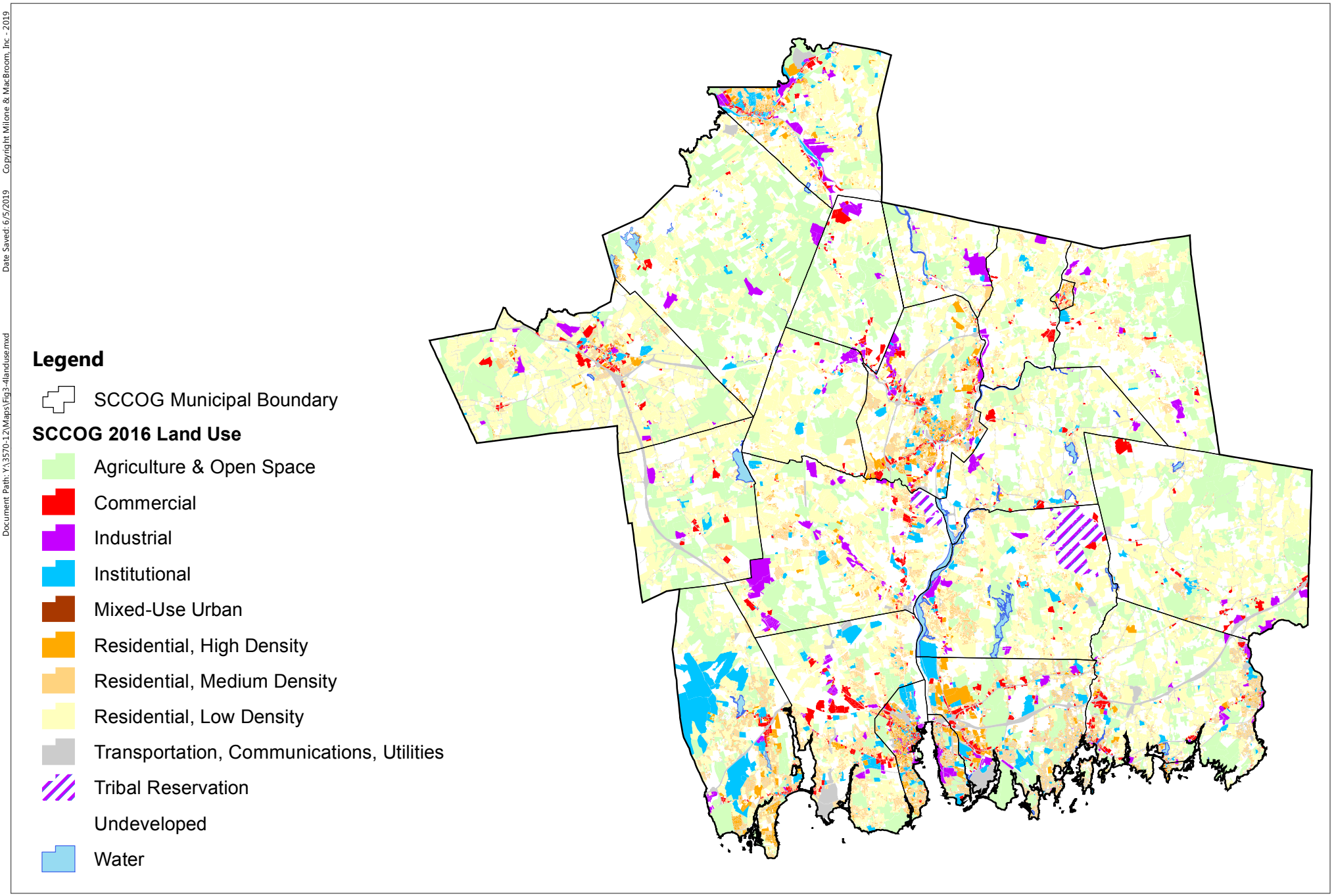


FIGURE 3-4: 2016 LAND USE

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

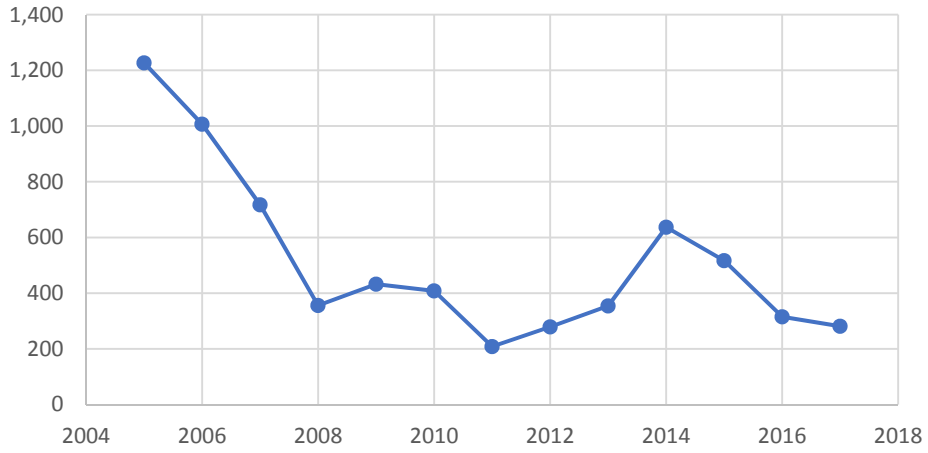
Miles

1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

Figure 3-5
Housing Permits in the SCCOG Region



Source: Connecticut Department of Economic and Community Development

permits following 2005, and housing permits have continued to be relatively level since 2008.[26]

Nevertheless, the southeastern Connecticut region has a strong economic base for commercial and industrial development that includes the information technology, healthcare, biotechnology, marine research, and tourism industries. Examples of some of the larger employers in the region include the Foxwoods Resort Casino, General Dynamics Electric Boat ("Electric Boat" or EB), Mohegan Sun Casino, Pfizer, Lawrence & Memorial Hospital, William W. Backus Hospital, Millstone Power Station, Connecticut College, Mystic Seaport Museum, United States Coast Guard Academy, and York Correctional Institution. Connecticut Department of Labor projections for employment suggest an increase of approximately 8,000 jobs in eastern Connecticut through 2024,[27] which does not include the recently announced expansion at EB (see discussion below).

Tourism plays a large role in the region's economy. Major commercial developments that have a significant impact on the regional economy include Foxwoods Resort Casino in Mashantucket, the Mohegan Sun Resort in Mohegan, and the Mystic Seaport, Mystic Aquarium, and Olde Mistick Village in Stonington. Other tourist attractions in the region include the Nautilus Memorial/Submarine Force Library and Museum in Groton, the Lyman Allyn Art Museum in New London, the Slater Memorial Museum in Norwich, the Eugene O'Neill Theater Center in Waterford, and the Mashantucket Pequot Museum in Mashantucket. New commercial developments have been limited in recent years due to the economic downturn of 2008-2009, and new industrial development has been negligible.

One of the critical employers in the region is EB, which as of February 2019 employs approximately 10,000 people between facilities in Groton, New London, and North Stonington. A Joint Land Use Study (JLUS) was recently completed for the U.S. Naval Submarine Base New London (SUBASE New London) in Groton, and the follow-up implementation effort for that study suggests that approximately 5,000 additional workers above February 2019 workforce levels will be needed by 2030 at EB to support the construction of submarines. Furthermore, due to an aging workforce, retirements are expected to require EB to replace an additional 10,000 workers by 2030. The associated population increase in the region as a result of this expansion and retirements is expected to lead to additional demand in existing sewered areas and potential expansion of sewer to other areas, as new employees move to the region while retirees remain in the region. This is discussed in more detail in Section 3.5.2.

[26] Connecticut Department of Economic & Community Development. (2019). *Export, Housing, and Income Data*.
[27] Connecticut Department of Labor. (2019, May 16). *Eastern Workforce Development Area - State of Connecticut*.

Despite the presence of sewers, on-site SSDSs remain an important method of sanitary waste disposal in the region. SSDSs that serve most of the low-density, seasonal residences on the coast discourage further development in these areas. On Black Point in East Lyme and Mason's Island in Stonington, where traditionally seasonal residences are now being occupied year-round, SSDSs are reportedly becoming overwhelmed more often than before, and expansion of sewers in these areas are one potential solution that could also lead to increased development density[28].

3.4.2 Areas Sensitive to Development

A variety of areas within the SCCOG region are considered to be sensitive to development. While development is not expressly prohibited in such areas, a variety of mitigating factors are applied either formally (through regulation) or informally during the development process. These sensitive areas include, but are not necessarily limited to:

- Aquifer Protection Areas delineating areas of contribution and recharge to public water supply wells drawing water from the glaciofluvial stratified sand and gravel aquifer. Such areas are mapped by water companies serving more than 1,000 people. In the SCCOG region, these areas are delineated in Colchester, East Lyme, Griswold, Ledyard, North Stonington, Sprague, and Stonington.

- Natural Diversity Database areas depicting buffered locations where endangered, threatened, or special concern species have been sited or are likely to occur. These areas exist throughout the region.

- Open space areas mapping large contiguous parcels of permanently protected lands. These areas exist throughout the region.

- Prime farmland soils suitable for agricultural use and which should be preserved for such use. These areas exist throughout the region.

- Reservoir watersheds delineating drainage areas to surface water impoundments used for public water supply. In the SCCOG region, these areas are delineated in Colchester, Griswold, Groton, Lebanon, Ledyard, Montville, New London, North Stonington, Norwich, Salem, Sprague, Stonington, Waterford, and Windham.

- Special Flood Hazard Areas delineating areas with a 1% annual chance of flooding. These occur throughout the region along watercourses and waterbodies.

- Wetland areas dominated by aquatic plants and that provide habitat for water-dependent species. These are mapped throughout the region.

Although the presence of sewers is typically associated with development, in some cases sewers may be desired to protect sensitive areas from existing development. For example, the Town of Ledyard desires to see sewers installed within the Ledyard Reservoir watershed in order to prevent reservoir contamination from substandard SSDSs. The paradox is that sewer installations are typically not cost effective in relatively rural watershed areas,

[28] Milone & MacBroom, Inc. (2017). *Multi-Jurisdiction Hazard Mitigation Plan Update.*

and unless installation is aimed at addressing an existing water quality concern, the funding of such systems is difficult.

3.4.3 Areas with Public Water Service

Public water supply service areas are often partially coincident with sewer collection systems in the region. The public water supply service areas are typically more extensive than sewer collection systems. The presence of both sewer and water systems typically indicates areas of higher-density development. Figure 3-6 presents areas of public water service in the region in relation to sewer service.

3.4.4 Future Land Use Plan

SCCOG prepared a proposed development map as part of its 2017 Regional POCD. The future land use data created by SCCOG for this map is presented as Figure 3-7.[29] The map shows that future urban/high-intensity uses are expected to continue to be concentrated along the Thames and Yantic Rivers, the shoreline of Long Island Sound, the Pawcatuck River, downtown Colchester, Jewett City, and Willimantic. Low and medium-density suburban uses will abut the urban uses and branch out along established State and local primary roads. Many areas, particularly along inland watercourses, are denoted as proposed conservation areas.

The 2017 Regional POCD also notes that approximately one-third of the SCCOG region is served by public water supplies, supplying water to approximately 75% of the region's population. SCCOG further estimates that approximately 8% of the region's total land area and 20% of the region's developed land area is served by sewers. The existing sewer service area is shown by the black hatched area on Figure 3-7. The presence of sewers and water systems can serve as a predictor of growth patterns in rural and suburban areas; where sewers are built, development typically follows. The absence of public water and sewer systems is considered by SCCOG to be a major factor in the dispersed development patterns seen in the region.

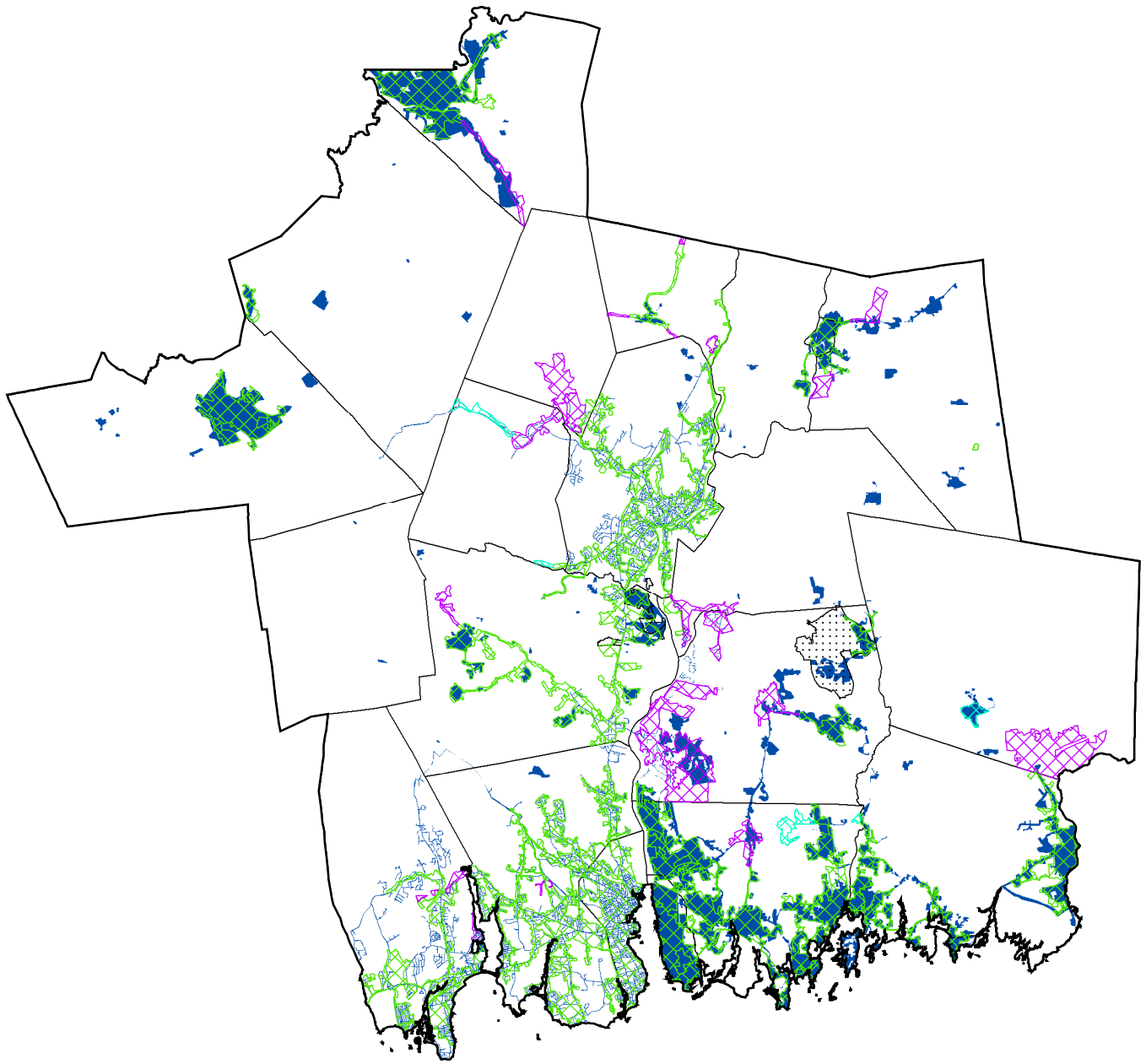
Based on the future land use plan in the 2017 Regional POCD, 12% of the total land area of the region is proposed for high-intensity or urban uses. These areas are expected to have greater than three homes per acre, a range of densities that includes small-lot, single-family homes and multi-family apartments, multi-story commercial buildings, and large regional destinations such as major shopping centers. A total of 14% of the overall land area of the region is proposed for suburban or medium-intensity uses under the future land use plan. These areas are expected to include moderate density housing between one and three units per acre including single-family homes and townhouses, apartments with dedicated open space, scattered commercial and neighborhood shopping centers, and historic village centers of appropriate density. Sewer service is generally considered to be appropriate in these areas.

As shown on Figure 3-7, existing sewer service in the SCCOG region generally occurs within urban, high-intensity land use areas and developed tribal or institutional areas. Areas proposed for sewer are generally within areas of suburban or medium-intensity land uses. An exception appears in southern Windham, where sewer is proposed for industrial zoned areas that are largely undeveloped.

[29] Southeastern Connecticut Council of Governments. (2017). *Regional Plan of Conservation and Development.*

Date Saved: 6/7/2019

Document Path: Y:\3570-12\Maps\Fig3-6watersewer.mxd



Legend

- Community Water Systems
- Mohegan Tribe
- Mashantucket Pequot Tribal Nation
- SCCOG Municipal Boundary

Sewer Collection System Areas

- Existing
- Proposed
- Desired

FIGURE 3-6: PUBLIC WATER SERVICE AREAS VS. SEWER COLLECTION SYSTEM AREAS

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

Miles

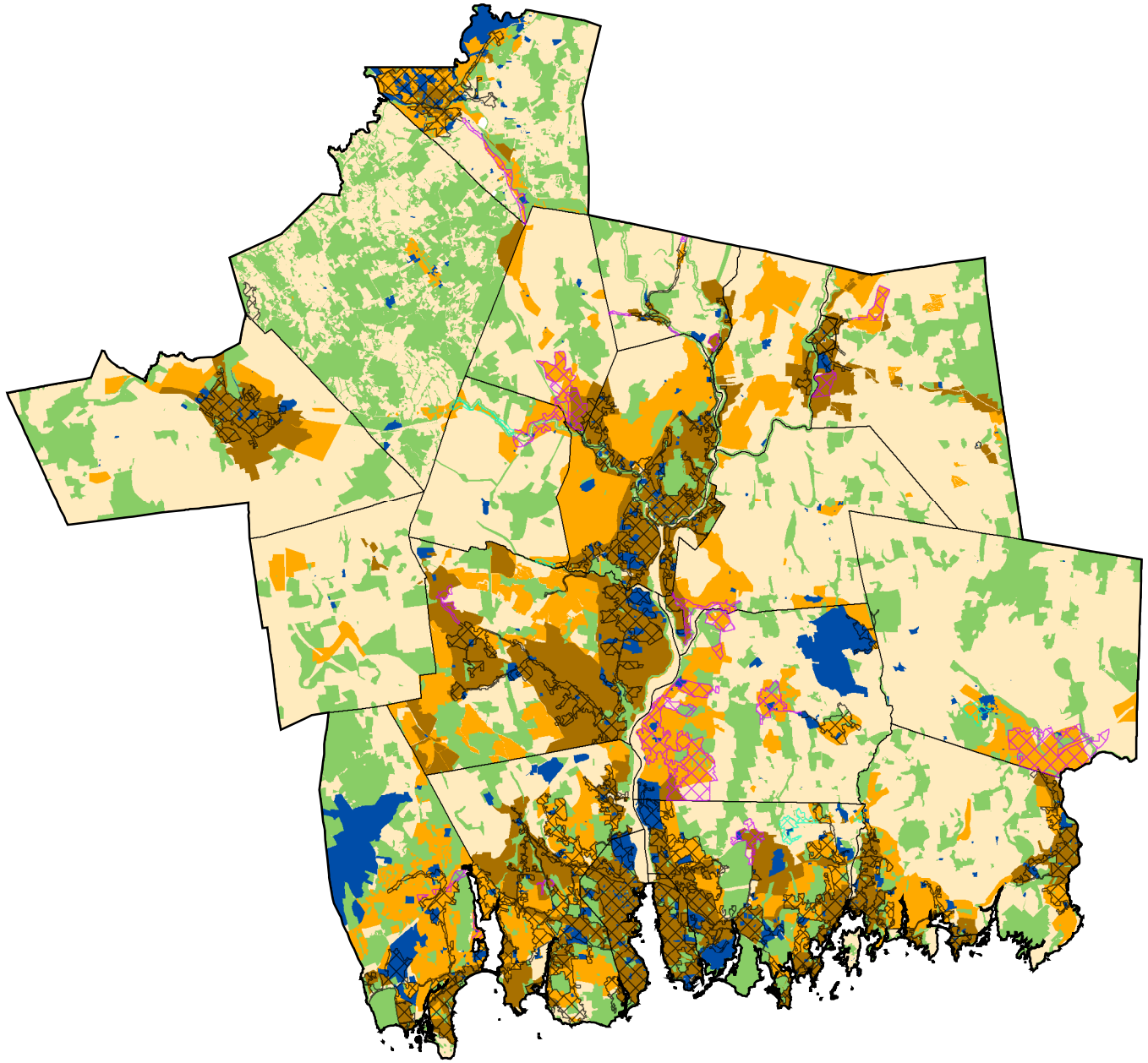
1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

Date Saved: 6/7/2019

Document Path: Y:\3570-12\Maps\Fig3-7futurelanduse.mxd



Legend

SCCOG Municipal Boundary

Sewer Collection System Areas

Existing

Proposed

Desired

SCCOG Future Land Use

Recreation/Open Space/Conservation

Rural/Low-Intensity

Suburban/Medium-Intensity

Urban/High-Intensity

Institutional/Tribal

FIGURE 3-7: SCCOG 2016 FUTURE LAND USE VS. SEWER COLLECTION SYSTEM AREAS

REGIONAL WASTEWATER MANAGEMENT PLAN

SOUTHEASTERN CONNECTICUT COUNCIL OF GOVERNMENTS

0 2.5 5

Miles

1 in = 5 miles

N

MILONE & MACBROOM
99 Realty Dr
Cheshire, CT 06410
203-271-1773

The 2017 Regional POCD recommends only limited expansion of sewer service areas. One of the strategies identified in the 2017 Regional POCD is for SCCOG to support the use of small, "community" on-site wastewater treatment systems or package treatment plants in the region. Examples where such systems may be appropriate include outlying areas with potentially substandard SSDSs, such as near Red Cedar Lake in Lebanon, the Kingswood / Meadow Wood Drive neighborhood in North Stonington, and Amos Lake in Preston. Refer to Appended Figure 1 for these and other suitable areas. A method envisioned in the 2017 Regional POCD to accomplish this strategy was to advocate for a clearer and more streamlined state permitting process for such systems.

SCCOG is further encouraged to consider working with local municipalities to develop sewer service areas maps addressing all of the specific elements in CGS Section 7-246(b) discussed in Section 2.2. More precise delineation of the centralized sewer service district, areas where decentralized sewer collection systems are encouraged, and sewer avoidance areas (including community septic system avoidance) will help communities to set expectations for developers regarding potential sewer service options for a particular property. Furthermore, the 2017 Regional POCD advocates for protecting wastewater treatment sites from flooding risks (Section 5.0).

3.5 Population

According to the 2010 U.S. Census, the population of the SCCOG region is 287,058 persons, an increase of 16,736 over the 2000 U.S. Census count of 270,322 persons. Table 3-10 presents the 2000 and 2010 U.S. Census populations for the SCCOG region, the 2010 land area of each jurisdiction based on U.S. Census Bureau, and the resulting 2010 population density for each jurisdiction.

Table 3-10
2000-2010 Population of the SCCOG Region

Geographic Area	2000 Population	2010 Population	Population Change	% Change	Land area (sq. mi., 2010)	Population Density per square mile of land (2010)
Bozrah	2,357	2,627	270	11.5%	19.96	131.61
Colchester	14,551	16,068	1,517	10.4%	48.98	328.05
East Lyme	18,118	19,159	1,041	5.7%	34	563.50
Franklin	1,835	1,922	87	4.7%	19.49	98.61
Griswold	7,754	8,464	710	9.2%	34	248.94
Groton, City of	10,010	10,389	379	3.8%	3.08	3,373.05
Groton, Town of	29,897	29,726	-171	-0.6%	27.95	1,063.54
Jewett City	3,053	3,487	434	14.2%	0.7	4,981.43
Lebanon	6,907	7,308	401	5.8%	54.1	135.08
Ledyard	14,687	15,051	364	2.5%	36.05	417.50
Lisbon	4,069	4,338	269	6.6%	16.29	266.30
Mashantucket Pequot Tribal Nation	325	299	-26	-8.0%	2.17	137.79
Mohegan Tribe	2	48	46	2300.0%	0.79	60.76
Montville	18,546	19,571	1,025	5.5%	41.16	475.49
New London	25,671	27,620	1,949	7.6%	5.62	4,914.59
North Stonington	4,991	5,297	306	6.1%	54.25	97.64
Norwich	36,117	40,493	4,376	12.1%	28.06	1,443.09
Preston	4,688	4,726	38	0.8%	30.82	153.34
Salem	3,858	4,151	293	7.6%	28.92	143.53

Table 3-10
2000-2010 Population of the SCCOG Region

Geographic Area	2000 Population	2010 Population	Population Change	% Change	Land area (sq. mi., 2010)	Population Density per square mile of land (2010)
Sprague	2,971	2,984	13	0.4%	13.25	225.21
Stonington, Borough of	1,032	929	-103	-10.0%	0.35	2,654.29
Stonington, Town of	16,874	17,616	742	4.4%	38.31	459.83
Waterford	19,152	19,517	365	1.9%	32.77	595.58
Windham	22,857	25,268	2,411	10.5%	26.7	946.37
Total SCCOG	**270,322**	**287,058**	**16,736**	**6.2%**	**597.77**	**480.21**

Notes: Individual areas do not necessarily add to totaled value due to rounding. Subset area populations subtracted out of overall town populations.

Source: U.S. Census Bureau

These figures include all municipalities falling within the boundaries of the SCCOG region, as well as the relatively small permanent populations of the Mohegan Tribal Nation and Mashantucket-Pequot Tribal Nation. The City of New London has the highest population density of the region's independent municipalities (while the borough of Jewett City has the highest population density of any SCCOG jurisdiction).

3.5.1 Connecticut State Data Center Population Projections

Population data and population projections published by the Connecticut State Data Center (CTSDC) for the SCCOG region is presented in Table 3-11.[30] Geographic areas were divided into three classifications (urban, suburban, or rural) based on population density as presented in Table 3-10 above. The general approach used in the municipal classification system is as follows: (1) urban – greater than 1,000 persons per square mile, (2) suburban – between 100 and 1,000 persons per square mile, and (3) rural – fewer than 100 persons per square mile. For purposes of trend analysis, municipalities are not shifted between classifications based on slight changes in density.

The CTSDC projects that the population of the SCCOG region will increase by 4.1% through 2030 and by 4.8% through 2040. The population of the rural areas is expected to decline by 7.4% through 2030 and by 17.2% through 2040, while the population of the urban areas is expected to increase by 9.6% through 2030 and by 12.8% through 2040. The population of the suburban communities is projected to increase slightly through 2040, with projections for towns such as Colchester, East Lyme, Ledyard, Stonington, and Waterford showing significant decreases in population through 2040, while projections for towns such as Griswold and Windham show significant population increases. The population increases projected for Norwich and Windham are substantial and may be optimistic for these communities.

Population growth or declines in a community will not necessarily have a one-to-one impact on sewer services except in urban communities like New London where nearly every parcel has access to sewer. In many communities, the majority of population increases may occur in outlying areas with larger lot sizes suitable for conventional SSDSs.

[30] Connecticut Data Collaborative. (2017). *Raw Data*.

Table 3-11
Connecticut State Data Center Population Projections for SCCOG Region

Geographic Area	Classification	2010 U.S. Census Population	CTSDC 2015 Population Estimate	CTSDC 2030 Population Projection	CTSDC 2040 Population Projection
Bozrah	Suburban	2,627	2,714	2,983	3,089
Colchester	Suburban	16,068	16,195	16,237	15,925
East Lyme	Suburban	19,159	19,233	18,825	18,225
Franklin	Rural	1,922	1,921	1,803	1,661
Griswold*	Suburban	8,464	8,881	9,990	10,300
Groton, City of*	Urban	10,389	10,400	10,400	10,400
Groton, Town of*	Urban	29,726	29,499	29,932	28,222
Jewett City*	Urban	3,487	3,500	3,550	3,600
Lebanon	Suburban	7,308	7,289	6,808	6,317
Ledyard	Suburban	15,051	14,889	14,167	13,315
Lisbon	Suburban	4,338	4,302	4,051	3,730
Mashantucket Pequot Tribal Nation#	N/A	299	300	325	350
Mohegan Tribe#	N/A	48	50	75	100
Montville	Suburban	19,571	19,576	19,168	18,356
New London	Urban	27,620	28,025	30,885	31,875
North Stonington	Rural	5,297	5,288	4,845	4,250
Norwich	Urban	40,493	42,632	50,312	54,765
Preston	Suburban	4,726	4,656	4,262	3,898
Salem	Suburban	4,151	4,157	3,826	3,454
Sprague	Suburban	2,984	2,988	3,007	2,928
Stonington, Borough of*	Urban	929	915	900	885
Stonington, Town of*	Suburban	17,616	17,386	15,698	14,339
Waterford	Suburban	19,517	19,341	17,621	15,996
Windham	Suburban	25,268	26,086	32,463	38,255
Totals	**SCCOG**	**287,058**	**290,223**	**302,133**	**304,235**
	Rural	**7,219**	**7,209**	**6,648**	**5,911**
	Suburban	**166,848**	**167,693**	**169,106**	**168,127**
	Urban	**112,644**	**114,971**	**125,979**	**129,747**

* Resident population projections for the City of Groton, Jewett City, and Borough of Stonington estimated by Milone & MacBroom, Inc. based on historic trends. These projections were subtracted from the CTSDC population projections for the Town of Groton, Griswold, and Town of Stonington, respectively.

\# Resident population projections for the two tribes were estimated by Milone & MacBroom, Inc. based on historic trends.

Source: U.S. Census Bureau 2010; Population Projections published in 2017 by CTSDC

3.5.2 SUBASE Joint Land Use Study and Proposed Electric Boat Expansion

The population projections in Section 3.5.1 do not account for proposed expansion of workforce at EB. According to the JLUS Implementation project currently in progress by SCCOG, EB expects to have a 5,000-person headcount growth by 2030 and the company expects to hire 15,000 people to achieve that growth as many current employees are reaching retirement age. The present estimate provided by SCCOG is that the number of EB employees in Groton (both City and Town) could increase by 3,100, in New London by 1,700, and in North Stonington by 200.

Given the significance of these numbers, it made sense to evaluate potential sewer demands related to the increased workforce (and its effect on nearby communities) as part of this regional planning effort. However, it should be noted that many assumptions were used in order to generate a reasonable estimate of potential population adjustment that may affect sewer demand (Table 3-12). These include the following:

- While the expansion is expected to attract workers in the region presently working for other employers, the overall impact to employment at other businesses was assumed to be neutral to simplify the analysis. Secondary growth of area businesses was not considered.

- Employees moving into the region to work at EB were assumed to bring a population of 1.5 per employee (including the employee) by 2030. This is because some of the employees will have spouses and/or families, although the majority would be single, low-level or entry-level employees. The assumed population per employee would increase to 2.0 per employee (including the employee) by 2040 as many of the 2030 employees gain spouses and/or families.

- Two-thirds (10,000) of the new EB employees were assumed to come from population presently living outside of the SCCOG region who move into the region. The remainder (5,000) were assumed to be drawn from the workforce presently living inside of the region (and therefore already included in the population projections).

Table 3-12
Estimated Town Population Increase Due to Electric Boat Expansion

Geographic Area	2030 Population Increase	2040 Population Increase
Bozrah	273	364
Colchester	80	107
East Lyme	844	1,125
Franklin	273	364
Griswold	80	107
Groton, City of	563	750
Groton, Town of	985	1,313
Jewett City	80	107
Lebanon	80	107
Ledyard	1,407	1,875
Lisbon	80	107
Montville	844	1,125
New London	562	750
North Stonington	273	364
Norwich	273	364
Preston	844	1,125
Salem	273	364
Sprague	80	107
Stonington, Borough of	45	60
Stonington, Town of	923	1,231
Waterford	844	1,125
Windham	80	107
SCCOG Region	**9,786**	**13,047**
Out of Region	5,214	6,953
Total	**15,000**	**20,000**

- As not all of the 10,000 new employees (or their immediate families) presently outside of the region would ultimately live in the SCCOG region, commuting data for the Town of Groton was used to estimate how far away from Groton employees would settle. Current commuting data suggests that approximately 15% of commuters into Groton have a maximum 10-minute commute, 60% have a maximum 20-minute commute, 80% have a maximum 30-minute commute, 95% have a 50-minute commute, and 5% have a longer commute.[31] These commute times were assumed for the new Electric Boat employees[32].

Table 3-12 presents the projected population increases in the SCCOG region related to the proposed expansion at Electric Boat and the assumptions above. For the purposes of this study, the expected population of the SCCOG region may increase by approximately 9,800 people through 2030 and 13,000 through 2040 as a result of the expansion at Electric Boat. These population changes are likely to have corresponding effects on sewer flows in each community absent expansion to serve new developments. In addition to the increased septic or sewer

[31] Groton Economic Development. (2019). *Groton Community Profile*.
[32] Although not all Electric Boat employees will commute to Groton, it was assumed that they would to simplify the analysis.

demand expected in each community from residential and commercial needs, the expansion of the workforce in three communities will result in increased sewer demand on the City of Groton sewer system from workforce activities, and slight increases in sewer demand in New London and Stonington (Pawcatuck).

Furthermore, some expansion at the SUBASE New London in Groton is expected. Preliminary estimates provided by SCCOG developed during the JLUS Implementation Study suggest that approximately 500 additional sailors will be onsite concurrent with the workforce expansion at EB. Similar to the EB employees, it is assumed that a small number will have spouses and/or families. The same ratios of population per employee were used for the SUBASE sailors as for the EB employees. Assuming that these sailors and their families will live in base housing or nearby Navy housing developments, the sewer service population of the SUBASE area would increase by an additional 750 people through 2030 and 1,000 people through 2040, with a corresponding increased sewer demand on the Town of Groton sewer system.

3.5.3 Summary of Population Projections

Table 3-13 presents the estimated combined population projections for each SCCOG community based on the Connecticut State Data Center population projections and the estimated population settling in each community due to the Electric Boat expansion. The estimated population increases were used in coordination with projected flows from various facilities plans or other estimates to determine potential projected wastewater flows within each SCCOG community. Projected sewer flows based on these data are presented throughout Section 4.0.

Table 3-13
Estimated Population Projections from Connecticut State Data Center and Due to Electric Boat & SUBASE Expansion

Geographic Area	Estimated 2030 Population	Estimated 2040 Population
Bozrah	3,256	3,453
Colchester	16,317	16,032
East Lyme	19,669	19,350
Franklin	2,076	2,025
Griswold	10,070	10,407
Groton, City of	10,963	11,150
Groton, Town of	31,667	30,535
Jewett City	3,630	3,707
Lebanon	6,888	6,424
Ledyard	15,574	15,190
Lisbon	4,131	3,837
Mashantucket Pequot Tribal Nation	325	350
Mohegan Tribe	75	100
Montville	20,012	19,481
New London	31,447	32,625
North Stonington	5,118	4,614
Norwich	50,585	55,129
Preston	5,106	5,023
Salem	4,099	3,818
Sprague	3,087	3,035
Stonington, Borough of	945	945
Stonington, Town of	16,621	15,570
Waterford	18,465	17,121
Windham	32,543	38,362
SCCOG Region	**312,667**	**318,282**

3.6 Summary of Identified Regional Needs Pertinent to this Plan

Based on the information discussed throughout Section 3.0, there are areas in the region with small lot sizes or substandard SSDSs that could benefit from centralized sewer service. Many of these areas are identified in local wastewater management plans or other planning documents provided by local utilities. Others are farther afield and have yet to be studied.

Some of the region's wastewater treatment infrastructure is aging and requires potentially costly upgrades, but securing funding sources for large capital projects is a primary concern for most system managers. Local wastewater management plans and capital improvement plans provide significant information regarding potential infrastructure needs. SCCOG should attempt to assist individual utilities or groups of utilities to secure funding sources for multiple systems or items of regional concern.

Finally, this RWMP acknowledges the opportunity for local wastewater managers to reconsider the current system of local government and WPCA oversight, as well as inter-municipal agreements used to allocate capacity for certain systems. Some systems may benefit from a regional approach, while others may benefit from changing their internal financial management structure and/or their managerial relationship with their local government.

3.7 Other Issues Identified for Future Study

Many of the concerns and opportunities identified during the charrette and this study are beyond the scope of this RWMP update. SCCOG, through its Regional Water Committee or another dedicated wastewater group, may provide the appropriate forum to discuss and potentially address many of these concerns, or they may be addressed through future updates to this RWMP:

- Utility managers are particularly concerned about the need to replace staff in the next few years. The Regional Water Committee (or equivalent) may be able to assist by preparing recruitment information for utilities to use to attract new talent, and leverage SCCOG to secure funding for regional training opportunities for utility staff.

- The Regional Water Committee (or equivalent) may provide an appropriate forum for discussion and consideration of biosolids, metals, and emerging contaminants. In particular, biosolids are of concern as incinerators are shutting down because emissions are not compliant with the Clean Air Act. There may therefore be a need for a regional biosolids processing facility.

- The sharing of technical and managerial resources may be possible for one or more systems. For example, the preparation of shared public outreach materials (such as regarding fats, oil, and grease or the flushing of sanitary wipes) could be performed by SCCOG in coordination with the Regional Water Committee (or equivalent). It may also provide the appropriate forum for education of staff from communities looking to develop sewer systems, and to discuss combining financial resources to increase purchasing power.

- For smaller utilities, some positions are not full time and could be filled with staff from other utilities on a part-time or contract basis to allow for some cost sharing.

While GIS data layers related to existing sewer collection areas were generated as part of this study, SCCOG should consider generation and maintenance of these and other related data layers for regional use. Not all digitization activities may need to be conducted directly by SCCOG. For example, digitization of private wells has been identified as a state-wide need in the 2018 *State Water Plan* and the 2018 *Coordinated Water System Plans* for Connecticut, so there may be a push at the state level for such digitization to occur.[33] [34]

[33] CDM Smith and Milone & MacBroom, Inc. (2018). *Final Report - Connecticut State Water Plan.*
[34] Milone & MacBroom, Inc. (2018). *Coordinated Water System Plan - Eastern Connecticut Public Water Supply Management Area.*

4.0 STATUS & PROJECTIONS FOR CENTRALIZED WASTEWATER NEEDS

4.1 Municipal Wastewater Infrastructure

Major infrastructure in the region is shown on Appended Figure 1 as well as maps throughout this document, including existing WWTFs and pump stations, existing and proposed sewer service areas, and proposed sewer expansion routes. This information was developed in GIS, shared electronically with SCCOG, and used to conduct the regional wastewater analysis presented herein.

4.1.1 Existing Wastewater Flows to Wastewater Treatment Facilities

There are 14 WWTFs serving the SCCOG region. A total of 13 of these WWTFs lie within the region, while wastewater from the SCCOG communities of Colchester and Lebanon is treated at the East Hampton-Colchester Joint WWTF located in East Hampton (outside of the SCCOG region). In addition, certain municipalities located outside of the SCCOG region send wastewater flows into the region. Table 4-1 outlines the permitted, allocated, and reported centralized wastewater flows for SCCOG and related municipalities.

Other wastewater systems owned by private entities also exist in the region. This study focuses on the centralized municipal systems serving the region such that these private systems are only discussed where consolidation may be appropriate.

4.1.2 Future Wastewater Flows

Future flows were determined for each WWTF based on information provided by SCCOG and the municipalities providing wastewater service in the region. Flow projections are limited to an increase in flow due to proposed sewer expansion and 2040 population projections. Wastewater flows were estimated using the following assumptions:

- Five-year average people per home for each city or town.[35]
- Planned wastewater expansion areas and/or service boundaries as shown on Appended Figure 1.
- Where sewer flows were not previously estimated, full build-out of the potential sewer areas commensurate with the applicable local zoning requirements[36].
- Increase in flows (due to infill or expansion) based on the population increases noted in Table 3-13.

[35] United States Census Bureau. (2017). *American Fact Finder*.

[36] To determine growth in proposed areas of sewer expansion where previous flow estimates were not available, local zoning regulations were used to determine the type of development expected in each area, the maximum number of potential lots for residentially zoned areas, and the total square footage for commercial and industrial zoned land. Reference for average daily wastewater flows: Connecticut Department of Public Health. (2018). *Connecticut Public Health Code: On-site Sewage Disposal Regulations and Technical Standards for Subsurface Sewage Disposal Systems.*

- For residential lots (the maximum number of potential lots)*(150 gpd/person)*(the 5-year average household size (2013-2017) for the community of interest).
- For commercial and industrial lots, the total developable square footage (sq. ft.) was multiplied by (total sq. ft. of industrial zoned land)*(Maximum building coverage determined by local zoning regulations)*(0.10 gpd wastewater/sq. ft. for industrial) or the total sq. ft. of commercially zoned land)*(Maximum building coverage determined by local zoning regulations)*(0.057 gpd wastewater/sq. ft. for commercial).

Table 4-1
Existing WWTF Capacities and Flows

WWTF and Associated Municipal Sewer Systems	NPDES Permitted Capacity	Discharged Flow Location	Allocated Average Day Capacity from Inter-Municipal Agreements	Reported Average Daily Flow	Reported Peak Flow (mgd)
Colchester		Connecticut River	1.7 mgd	0.48 mgd	N/A[2]
East Hampton*[1]			1.7 mgd		
Lebanon			See Colchester		
Hebron			See Colchester	0.16 mgd	0.25 mgd
Marlborough			See East Hampton		
WWTF Total	**3.9 mgd**		**3.4 mgd**	**1.3 mgd**	**N/A**
Groton, City of*	3.1 mgd	Thames River	None	1.8 mgd	N/A
Groton, Town of*	7.5 mgd	Thames River	None	2.8 mgd	10.0 mgd
Griswold		Quinebaug River	0.050 mgd		
Jewett City*			0.842 mgd		
Lisbon (East)			0.208 mgd		
WWTF Total	**1.1 mgd**		**1.1 mgd**	**0.28 mgd**	**0.67 mgd**
Ledyard*	0.26 mgd	Infiltration Bed (Whiting Brook)	None	0.15 mgd	0.65 mgd
Mashantucket Pequot Tribal Nation*	N/A[3]	Infiltration Bed (Lantern Brook)	None	1.1 mgd	N/A
Mohegan Tribe		Thames River	1.6 mgd	0.8 mgd	0.85 mgd
Montville*			2.9 mgd	1.0 mgd	11.15 mgd
WWTF Total	**4.5 mgd**		**4.5 mgd**	**1.8 mgd**	**12.00 mgd**
East Lyme		Thames River	1.025 mgd		
New London*			5.500 mgd		
Old Lyme[4]			0.105 mgd		
State of Connecticut[5]			0.370 mgd		
Waterford			3.000 mgd		8.0 mgd
WWTF Total	**10.0 mgd**		**10.0 mgd**	**6.4 mgd**	**12.7 mgd**
Bozrah		Thames River		N/A	N/A
Franklin				0.002 mgd	0.08 mgd
Lisbon (Versailles)			See Sprague	N/A	N/A
Norwich*					
Preston				N/A	N/A
Sprague (Versailles)			0.019 mgd		
WWTF Total	**8.5 mgd**		**8.5 mgd**	**4.6 mgd**	**20 mgd**
Sprague*	0.4 mgd	Shetucket River	None	0.4 mgd	0.7 mgd
North Stonington[6]		Pawcatuck River	Private Connections		
Stonington (Pawcatuck)*					
WWTF Total	**1.3 mgd**		N/A	**0.52 mgd**	**1.99 mgd**
Stonington (Borough)*	0.66 mgd	Stonington Harbor	None	0.12 mgd	0.24 mgd
Stonington (Mystic)*	0.80 mgd	Mystic River	None	0.63 mgd	0.88 mgd
Mansfield (Southern)		Shetucket River	0.5 mgd		
Windham*			5.0 mgd		
WWTF Total	**5.5 mgd**		**5.5 mgd**	**1.96 mgd**	**4.20 mgd**

[1] Communities with asterisks denote WWTF locations
[2] N/A indicates information was not provided during data collection for this report
[3] Design capacity is reportedly 3.6 mgd (Wescor Associates, Inc. Case Study, 7/9/2013)
[4] Point O' Woods Association
[5] State of Connecticut allocation within East Lyme as discussed in Section 2.4.3
[6] Presently only two connections (by private agreement) in North Stonington

In terms of future sewer service areas, for the purposes of this RWMP these areas have either been identified as "proposed" or "desired". Proposed areas were either previously detailed in one or more planning documents and/or have had a planning study conducted that presents a layout and potentially proposed flows. Desired areas were identified by local, health district, or regional staff as areas suitable for centralized sewer service. Estimates of planning-level probable construction costs are provided where sufficient information is available to assess a particular project. Table 4-2 presents the associated flow projections for each proposed sewer service area and the proposed discharge location.

Table 4-2
Flow Projections[1] for Proposed Sewer Areas or General Expansion

Community	Proposed Area	Percent Build-Out[2] by 2030	Short Term (2030) Flow Projection (mgd)	Long Term (2040) Flow Projection[3] (mgd)	Assumed WWTF Location[4]
Bozrah	Fitchville / Stockhouse Road	70%	0.19	0.27	Norwich
Bozrah	Route 82 extension	0%	0.00	0.01	Norwich
Bozrah	Gilman	0%	0.00	0.10	Norwich
East Haddam	Lake Hayward	0%	0.00	0.09	East Hampton
East Lyme	Golden Spur	0%	0.00	0.03	New London
East Lyme	Oswegatchie Hills	40%	0.06	0.16	New London
East Lyme	Gateway	100%	0.02	0.02	New London
East Lyme	Saunders Point	0%	0.00	0.10	New London
East Lyme	Costco	100%	0.01	0.01	New London
Franklin	Lower Route 32	100%	0.16	0.16	Norwich
Franklin	Future Phase of Route 32	20%	0.02	0.10	Norwich
Griswold	Business Park & Heritage Areas	20%	0.38	0.77	Jewett City
Groton	SUBBASE Expansion	75%	0.06	0.08	Groton (Town)
Groton	Groton Center	50%	0.12	0.23	Groton (Town)
Groton	EB Expansion (Workers)	100%	0.05	0.05	Groton (City)
Hebron	Sewer District Growth	40%	0.00	0.01	East Hampton
Ledyard	Northwest (Aljen Heights)	0%	0.00	0.07	Groton (Town)
Ledyard	Ledyard Center	20%	0.08	0.38	Groton (Town)
Ledyard	Southwest (Gales Ferry)	20%	0.06	0.31	Groton (Town)
Montville	Oxoboxo Lake	0%	0.00	0.02	Montville
North Stonington	Southeast Industrial Area	33%	0.07	0.20	Stonington - Pawcatuck
Old Lyme	Shoreline Areas	40%	0.12	0.30	New London
Preston	Route 2	0%	0.00	0.25	Norwich
Preston	Route 12 (Happyland)	20%	0.01	0.04	Norwich
Preston	Preston Riverwalk	50%	0.50	1.00	Norwich
Sprague	Northern, Western, Southern	20%	0.01	0.04	Sprague
Sprague	Versailles	20%	0.03	0.15	Norwich
Stonington	Perkins Farm	100%	0.04	0.04	Stonington - Mystic
Stonington	Mystic Sewer District Growth	50%	0.13	0.26	Stonington - Mystic
Waterford	Moderate Sewer District Growth	50%	0.48	0.96	New London
Windham	South Windham	20%	0.10	0.52	Windham
Total			**2.68**	**6.70**	

1. Wastewater flows based on flows in local planning documents or build-out commensurate with the applicable zoning requirements and design guidelines from Connecticut Public Health Code, On-Site Septic Disposal Regulations and Technical Standards, 2018
2. Fraction build-out by 2030 based on existing conditions, project timing, assumptions regarding extension of service, and information provided by municipalities. 20% was used as a default when limited information was available.
3. Assumes 100% buildout by 2040.
4. Proposed discharge location based on closest WWTF or existing inter-municipal agreements.

Based on these projections, the SCCOG region is anticipated to experience an additional 6.7 mgd of wastewater flow from proposed sewer expansion by 2040. These flows are expected to be located throughout the region.

Based on the population growth analysis presented in Section 3.5, estimated centralized wastewater flows were developed for each SCCOG community to account for projected residential growth outside of the areas presented in Table 4-2. These are presented in Table 4-3. In total, an additional 2.77 mgd of wastewater flow is expected from population growth and nominal non-residential infill growth within existing sewer systems in the region.

Table 4-3
Flow Projections for Population Growth and Other Infill in Sewer District

Community	Population Projection Through 2040	Percentage of Population Growth Assumed to be on Sewer	Projected Long Term (2040) Residential Flow Increase (mgd)	Nominal Non-Residential Expansion in Sewer District	Comment
Bozrah	+739	0%	0.000	0.000	Included in Table 4-2 projections
Colchester	-163	0%	0.000	0.017	Assumes nominal infill/expansion
East Lyme	+117	0%	0.000	0.054	Included in Table 4-2 projections
Franklin	+104	0%	0.000	0.000	Included in Table 4-2 projections
Griswold	+1,526	40%	0.036	0.003	Estimated residential needs beyond Table 4-2 projections
Groton, City of	+750	100%	0.042	0.097	City nearly 100% served
Groton, Town of	+1,036	100%	0.078	0.151	Estimated residential needs beyond Table 4-2 projections
Jewett City	+207	100%	0.016	0.007	Borough nearly 100% served
Lebanon	-865	0%	0.000	0.000	Assumes Amston Lake is built out
Ledyard	+301	0%	0.000	0.008	Assumes nominal infill/expansion in Highlands system, residential included in Table 4-2 projections
Lisbon	-465	0%	0.000	0.005	Assumes nominal infill/expansion
Mashantucket Pequot Tribal Nation	+50	0%	0.000	0.059	Tribal residential areas believed to be on septic systems
Mohegan Tribe	+50	0%	0.000	0.043	Tribal residential areas believed to be direct Montville customers
Montville	-95	0%	0.000	0.054	Assumes nominal infill/expansion
New London	+4,600	100%	0.345	0.183	City nearly 100% served
North Stonington	-674	0%	0.000	0.000	Included in Table 4-2 projections
Norwich	+12,497	75%	0.703	0.242	City is largely served by sewer
Preston	+367	0%	0.000	0.000	Included in Table 4-2 projections
Salem	-339	0%	0.000	0.000	No sewers
Sprague	+47	0%	0.000	0.022	Assumes nominal infill/expansion beyond Table 4-2 projections
Stonington, Borough of	+30	100%	0.002	0.006	Borough nearly 100% served
Stonington, Town of	-1,816	0%	0.000	0.028	Assumes nominal infill/expansion in Pawcatuck system
Waterford	-2,220	0%	0.000	0.108	Assumes nominal infill/expansion
Windham	+12,276	40%	0.368	0.097	Assumed majority of optimistic population growth would occur outside of sewer service area
Total	**+28,060**		**1.590**	**1.184**	

Note: Total may not add exactly from individual totals due to rounding.

The analysis is based on the following assumptions:

- For many communities, some or all of the population growth will occur away from sewer systems. Thus, a percentage of the population growth in each community was estimated to be connected to wastewater collection systems. This will either be due to the population growth occurring on an infill parcel, in a new development within an unserved part of the sewer district, or an area where expansion of the collection system may occur.
- In some cases, it was assumed that all population increases would be accounted for within the proposed sewer areas identified in Table 4-2. For example, proposed residential developments in East Lyme are expected to add population commensurate with the expected population growth.
- Note that for communities where population losses are projected, it was assumed that flows would not decrease in order to provide a conservative analysis.
- Nominal infill (1/4 of 1% annual growth) within the existing service area was estimated for non-residential uses where appropriate.

4.1.3 Future Wastewater Treatment Plant Capacity

Based on the existing wastewater capacities in Section 4.1.1, and the projected wastewater flows in Section 4.1.2, Table 4-4 shows the treatment capacity evaluation for each WWTF. The treatment capacity evaluation was limited to a high-level overview that compares forecasted wastewater flows for year 2040 to treatment facility permitted capacities.

The 14 WWTFs associated with the region reported a total combined average daily wastewater flow of 23.9 mgd in 2018. By 2040, this flow is anticipated to increase to approximately 33.4 mgd. Based on existing flow patterns and the most direct sewer connections for proposed sewer areas, the five WWTFs projected to experience the greatest increase in flow include Norwich (an additional 3.0 mgd), New London (an additional 2.3 mgd), the Town of Groton (1.3 mgd), Windham (an additional 0.98 mgd), and Jewett City (an additional 0.83 mgd).

The expected wastewater flow analysis in Table 4-4 projects that the Sprague WWTF and the Stonington – Mystic WWTF will be over 90% capacity in 2030. As noted in Section 4.1.1, the Sprague WWTF is already operating at capacity, and as noted in Section 3.2.1, the Mystic WWTF is currently under a moratorium on new connections. Through 2040, the Jewett City, New London, Norwich, Sprague, and Mystic WWTFs will all be either operating at, near, or above capacity such that facilities planning (triggered at the 90% capacity level) is expected.

- *Jewett City* is currently permitted to treat 1.1 mgd. The projected total flow by 2040 is 1.10 mgd. The most recent facilities plan for Jewett City was completed in 1999. A new study is recommended to determine the long-term operational reliability and ability to maintain compliance with permitted effluent limits at the Jewett City WWTF. The study should be performed as large developments in Griswold come online, or by 2030.
- The *New London WWTF* is expected to approach 90% capacity by 2040 due to a combination of both local and regional flows.
- The *Norwich WWTF* is expected to reach approximately 90% capacity by 2040 due to a combination of both local and regional flows. Note that some flow reduction may occur through the elimination of combined sewers (Section 4.2.17). However, planning for WWTF expansion may nevertheless be prudent given the variety of developments and the potential abandonment of the Sprague WWTF (below).

Table 4-4
WWTF Capacities for Projected Flows

WWTF	NPDES Permitted Capacity or Agreement Limit	Short Term (2030) Projected Average Flow Increase from Present (mgd)	Short Term (2030) Projected Average Flow (mgd)	Short Term (2030) Percentage of Existing Capacity	Long Term (2040) Projected Average Flow Increase from Present (mgd)	Long Term (2040) Projected Average Flow (mgd)	Long Term (2040) Percentage of Existing Capacity
East Hampton (Colchester)[1]	1.70	0.013	0.653	38%	0.117	0.757	45%
Jewett City	1.10	0.416	0.686	62%	0.832	1.102	100%
Groton (City)	3.10	0.115	1.915	62%	0.184	1.984	64%
Groton (Town)	7.50	0.424	3.224	43%	1.302	4.094	55%
Ledyard	0.26	0.004	0.154	59%	0.008	0.158	61%
Mashantucket Pequot	3.60	0.030	1.030	29%	0.059	1.059	29%
Montville	4.50	0.049	1.849	41%	0.117	1.917	43%
New London	10.00	1.036	7.536	75%	2.265	8.765	88%
Norwich	8.50	1.380	5.980	70%	3.025	7.625	90%
Sprague	0.40	0.018	0.418	105%	0.057	0.457	114%
Stonington - Mystic	0.80	0.170	0.780	98% (60%)	0.300	0.910	114% (76%)
Stonington - Pawcatuck	1.30	0.080	0.600	46%	0.228	0.748	58%
Stonington - Borough	0.66	0.004	0.124	19% (64%)	0.008	0.128	19% (65%)
Windham	5.50	0.336	2.296	42%	0.981	2.941	53%
Total	**48.92**	**4.072**	**27.242**	**-**	**9.475**	**32.645**	**-**

Note: Cells over 80% capacity are highlighted. At 90% capacity, NPDES permits require facilities planning for upgrades. Figures in parentheses represent benefit of transferring 0.3 mgd or raw wastewater flow from the Mystic WWTF to the Borough WWTF.

1. For Colchester, WWTF capacity was assigned 1.7 mgd based on current agreement with East Hampton.

- *Sprague* reported an average flow for 2018 of 0.4 mgd, equivalent to its permitted capacity. Proposed sewer expansion would increase flows by approximately 0.06 mgd. Sprague has expressed interest in developing a regional interconnection with the City of Norwich and abandoning the Sprague WWTF. A new agreement between Sprague and Norwich is currently being developed as noted in Section 2.4.8.
- The *Stonington - Mystic WWTF* is expected to be over capacity in 2040. The Stonington WPCA plans to divert up to 0.3 mgd of raw wastewater from the Mystic WWTF to the Borough WWTF for treatment in the near future. This project will provide additional capacity to the Mystic WWTF such that the used capacity would be expected to be 76% through 2040. The Borough WWTF would be operating at 65% capacity in 2040, with the additional flows from the Mystic WWTF.

Note that the flow estimates in Table 4-4 are based on average flow conditions. During wet-weather, high-groundwater periods, several systems (e.g. Windham) noted that their average flows increase to where their capacity is much closer to the 90% planning level, and flows to the Mystic WWTF were above 100% capacity in 2019 as noted in Section 3.2.1. Thus, facilities planning may be triggered sooner for some systems than presented in Table 4-4.

Also note that the flow estimates in Table 4-4 are based on a series of assumptions regarding the development of agreements with neighboring towns (e.g. North Stonington and Stonington), including those made during previous local planning efforts. As noted in Table 4-4, there are many municipalities in the region that are

projecting available capacity through 2040. Section 4.2 evaluates potential alternatives to access some of this regional capacity.

4.1.4 Future Wastewater Treatment Facility Pollutant Loadings

Table 4-5 shows the projected increase in pollutant loadings at each WWTF by 2040 based on published values for medium strength untreated domestic wastewater.[37] [38] Pollutants evaluated included biochemical oxygen demand (BOD), total suspended solids (TSS), total kjeldahl nitrogen (TKN), total phosphorus (TP), and total solids. The greatest increases in solid loadings are anticipated to be experienced by Norwich (an additional 5,900 pounds per day [lbs/day]) and New London (4,400 lbs/day). These volumes are provided in an effort to inform a future regional analysis to determine the potential benefits of constructing a regional biosolids processing/disposal facility.

Table 4-5
Projected Increased Pollutant Loadings to WWTFs in 2040

WWTF	Projected Flow Increase by 2040 (mgd)	BOD (lbs/day)	TSS (lbs/day)	TKN (lbs/day)	TP (lbs/day)	Total Increased Solids Generated at WWTF (lbs/day)
East Hampton (Colchester)[1]	0.12	185	205	39	7	228
Jewett City	0.83	1,318	1,457	278	49	1,622
Groton (City)	0.18	292	322	61	11	359
Groton (Town)	1.29	2,050	2,266	432	76	2,523
Ledyard	0.01	13	14	3	0	16
Mashantucket Pequot	0.06	93	103	20	3	115
Montville	0.12	185	205	39	7	228
New London	2.27	3,589	3,967	756	132	4,417
Norwich	3.03	4,793	5,298	1,009	177	5,899
Sprague	0.06	90	100	19	3	111
Stonington - Mystic	0.30	475	525	100	18	585
Stonington - Pawcatuck	0.23	361	399	76	13	445
Stonington - Borough	0.01	13	14	3	0	16
Windham	0.98	1,554	1,718	327	57	1,913
Typical Composition of Medium Strength Untreated Domestic Wastewater (1)		**190 mg/L**	**210 mg/L**	**40 mg/L**	**7 mg/L**	**1.95 mg/L[(2)]**

Note: For purposes of this report, projections made assume all flows are medium strength, untreated domestic wastewater.

1. Loading to East Hampton WWTF only represents loading leaving Colchester and not potential loadings from East Hampton or Marlborough.

Sources: (1) WEF Design of Municipal Wastewater Treatment Plants Fifth Edition (2010)
(2) Metcalf and Eddy (1991) - 1.95 lbs dry solids per 1,000 gallons treated wastewater

WWTFs were not evaluated for their ability to meet increased loadings. Facility plan studies are recommended to determine the long-term operational reliability and ability to maintain compliance with permitted effluent limits for each WWTF.

[37] Water Environment Federation. (2010). *Design of Municipal Wastewater Treatment Plans: WEF Manual of Practice No. 8.*
[38] Metcalf & Eddy. (1991). *Wastewater Engineering: Treatment, Disposal, Reuse.*

4.1.5 Pump Station Evaluation

This pump station capacity evaluation is limited to major pump stations, defined here as pump stations that transport a significant portion of sewage to be treated at the WWTF or a pump station that provides a regional interconnection. The analysis was conducted for those pump stations where sufficient information was provided to support analysis, and therefore does not include all major pump stations providing service to the region. Capacities are based on Technical Report #16 (TR-16) guidelines that includes largest pump out of service.[39] Table 4-6 presents the results of the analysis. Some examples of pump stations that should be evaluated for upgrades are presented below:

Table 4-6
Pump Station Capacity Evaluation

Pump Station Name	Owner	Design Capacity (gpd)	Average Flow (gpd)	Peak Flow (gpd)	Adequate Capacity?
Prospect Hill Road	Colchester	1,500,000	500,000	1,000,000	Yes
Middletown Avenue	East Hampton	7,000,000	2,000,000	4,000,000	Yes
Bride Brook	East Lyme	2,880,000	N/A	668,000	Yes
Niantic	East Lyme	6,273,000	N/A	1,823,000	Yes
Pattagansett	East Lyme	5,164,000	N/A	1,096,000	Yes
Burleson	Jewett City	633,600	N/A	N/A	No
Mohegan Brook	Montville	5,760,000	N/A	N/A	Yes*
Avery #1	Montville	3,744,000	N/A	N/A	Yes*
Avery #2	Montville	5,760,000	N/A	N/A	Yes*
Evergreen Avenue	Waterford	10,944,000	3,000,000	16,400,000	No
Rose Alley	Norwich	11,520,000	1,300,000	10,000,000	Yes
Main	Sprague	N/A	N/A	700,000	Yes
Hanover	Sprague	476,000	N/A	24,000	Yes
Ensign Lane	Stonington (Borough)	850,000	N/A	550,000	Yes
Maritime Drive	Stonington (Mystic)	240,000	N/A	"Near Capacity"	No
White Rock Road	Stonington (Pawcatuck)	430,000	N/A	140,000	Yes
Pumping Station No. 3	Stonington (Pawcatuck)	2,160,000	N/A	1,680,000	Yes
Harvey Avenue (Blue Hills)	Waterford	3,744,000	600,000	5,600,000	No
Cracow Avenue	Windham	18,000	9,000	9,000	Yes
George Street	Windham	22,000	11,000	11,000	Yes

*Based on assumed maximum flow to WWTF by 2040
Note: Design capacity based on TR-16 guidelines assuming largest pump out of service

- Most of *Norwich's* pump stations lack redundancy. Of the six major pump stations considered, five stations only have two pumps, and only one station has flow monitoring. While the stations may be able to handle current flows, without flow monitoring it is unclear if they will be able to handle future flows.
- Pump stations in Stonington were not able to be evaluated due to the lack of flow monitoring. The *Maritime Drive Pump Station* that moves flow to the Mystic WWTF was reported by the Town to be near capacity.
- The *Evergreen Avenue Pump Station* in Waterford has peak flows significantly above its design capacity. The design capacity for Evergreen Pump Station is approximately 10.9 MGD compared to a reported peak flow of 16.4 MGD. This station pumps nearly the entire flow from Waterford, East Lyme, and Old Lyme to New

[39] New England Interstate Water Pollution Control Commission. (2011, revised 2016). *TR-16: Guides for the Design of Wastewater Treatment Works.*

London. Waterford reported plans to install an additional pump at the station which will increase the capacity, but redundancy options should also be explored.

4.1.6 Sewer Interceptor Evaluation

Interceptor sewer capacities were calculated using Manning's open channel flow head loss calculation for wastewater, with the following assumptions:

- All sewers to a WWTF are assumed gravity unless otherwise noted
- Minor loss coefficient = 3
- Manning coefficient (n) = 0.0130
- Diameters provided by SCCOG
- Slopes based on TR-16 Guidelines recommended minimum slopes based on diameter
- Minimum cleansing velocities

Interceptor sewer capacity is presented in Table 4-7. Note that this interceptor sewer capacity evaluation is limited and based on conservative assumptions. The results are for high-level planning purposes only and further engineering analysis of each identified potential flow restriction is recommended. Based on this evaluation, the following areas may pose potential flow restrictions in transporting anticipated wastewater flows:

Table 4-7
Interceptor Capacity Evaluation

WWTF	Interceptor Diameter to WWTF (in)	Name of Interceptor	Estimated Flow[1] at Maximum Capacity (mgd)	Projected 2040 Flow (mgd)	Adequate Capacity?
East Hampton	30	To WWTF	6.87	0.76	Yes
East Hampton	16	Colchester to East Hampton Force Main[2]	2.79	0.76	Yes
East Lyme*	18	Niantic River Crossing Force Main[2]	3.53	1.31	Yes
Groton (City)	24	To WWTF	4.45	1.98	Yes
Groton (Town)	36-42	Poquonnock to WWTF	9.94	4.09	Yes
Groton (Town)	20	Mumford Cove to WWTF	3.21	4.09	Maybe
Jewett City	10	To WWTF	0.81	1.10	No
Ledyard	10	To WWTF	0.81	0.16	Yes
Montville	36	To WWTF	18.8	1.92	Yes
New London	24	To WWTF	4.45	8.77	No
Norwich	28	Yantic Interceptor	6.09	7.63	No
Sprague	10	Force Main To WWTF	1.09	0.46	Yes
Stonington - Borough	24	To WWTF	4.45	0.13	Yes
Stonington - Mystic	30	To WWTF	6.87	0.91	Yes
Stonington - Pawcatuck	24	To WWTF	4.45	0.75	Yes
Windham	54	To WWTF	24.07	2.94	Yes

Notes:
(1) Estimated flow assumes minimum slope to achieve 2 feet/second per TR-16 Guides for the Design of Wastewater Treatment Works (Revised 2016). Maximum capacity for interceptor sewer is 93.82% full.
(2) Not a WWTF connection, but is a major interceptor transporting flow between communities.

- *Jewett City* has a 10-inch gravity sewer leading to the WWTF. The estimated max capacity of this pipe is 0.81 MGD compared to a projected flow by 2040 of 1.10 mgd.
- The *Niantic River Crossing* force main, which runs under the Niantic River and transports flow from East Lyme to Waterford, lacks redundancy. This major interceptor transports all flow west of Waterford. The force main is currently 18 inches in diameter and can transport approximately 3.53 mgd. While future flows from East Lyme and Old Lyme are not expected to reach 2.53 mgd through 2040, redundancy is recommended.
- The interceptor from *Mumford Cove to the Town of Groton WWTF* is a 20-inch line with an estimated max capacity of 3.21 mgd. This interceptor delivers flow from the eastern portion of the Groton system. Consideration should be given to evaluating the capacity of this line if portions of Ledyard sewer flow are ultimately routed through eastern Groton as opposed to along Route 117.
- The interceptor leading to the *New London WWTF* appears to be undersized, as the maximum capacity per this preliminary analysis is 4.45 mgd. However, the WWTF regularly treats average daily flows in excess of this value so it may not be an issue.
- The *Yantic Interceptor* in Norwich is a 28-inch diameter pipe that transports flow to the Norwich WWTF. The estimated max capacity is 6.09 mgd versus a projected 2040 flow of 7.63 mgd.

4.2 Summary of Wastewater Conditions by Municipality

Sections 4.1.1 through 4.1.24 evaluate existing conditions for municipal wastewater treatment and collection systems in the region by municipality or tribal government with regard to capacity and treatment capabilities. Locations of pertinent components and projected wastewater service areas are depicted on Appended Figure 1 and the figures throughout Section 2.4 or herein.

4.2.1 Bozrah

General

The Town of Bozrah is a suburban community located in the north-central portion of the SCCOG region to the west of the Norwich urbanized area. The highest development density is along Stockhouse Road and in Fitchville. The current population is estimated at 2,714 and is expected to increase to 3,256 by 2030 and 3,453 by 2040.

Governance

The Town of Bozrah recently created a WPCA by ordinance consisting of the three selectmen and two appointees. The Bozrah WPCA therefore provides managerial and financial oversight of the Town's recently installed sewer system on Route 82. Technical and day-to-day operational oversight is provided by contract operators at the present time.

Existing Sewerage Facilities

At the time of this report, sewers were recently installed along Salem Turnpike (Route 82) from approximately the Norwich city line to Noble Hill Road in order to serve a senior housing development. The Town approved the purchase of these sewer assets from the developer in May 2019. Sewage will be directed to NPU's WWTF for treatment.

Future Sewerage Plan

The Town of Bozrah 2015 POCD identifies the Stockhouse Road / Fitchville area in the northern part of town and the Route 82 / Salem Turnpike area in the southern part of town as potential sewer service areas. The Fitchville area reportedly has problematic SSDSs.[40] A 2014 study was completed by Woodard & Curran delineating the potential sewer service to Fitchville at a cost of $17.9 million (2014 dollars).

The desired Route 82 / Salem Turnpike service area includes an approximately 3,000-foot section of Route 82 in Bozrah west of Noble Hill Road. This area is being promoted as appropriate for commercial development. Flows would be directed to NPU for treatment.

The Gilman area is also being promoted as appropriate for higher density development. If connection to Gilman (approximately 15,500 feet of new mains from Fitchville) is ultimately pursued, it would provide the Town of Lebanon the option to consider development of sewers along Norwich Turnpike in southern Lebanon (Section 4.2.9).

Projected Wastewater Flows

Projected wastewater flows for Bozrah are presented in Table 4-8. Flows are expected to be directed to the Norwich WWTF for treatment.

Table 4-8
Projected Wastewater Flow Increase for Bozrah

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Conceptual Construction Cost
Fitchville / Stockhouse Road	Proposed	0.19	0.27	$20.3 M
Gilman	Desired	0.00	0.10	$10 M
Route 82 (West of Noble Hill Road)	Desired	0.00	0.01	$2 M
Total Norwich WWTF	**-**	**0.19**	**0.38**	**$32 M**

4.2.2 Colchester (and East Hampton)

General

The Town of Colchester is a suburban community located in the northwestern portion of the SCCOG region. The town consists of a semi-urbanized core surrounded by suburban residential areas. The current population is estimated at 16,195 and is expected to increase to 16,317 by 2030 and decrease to 16,032 by 2040.

Governance

Management and financial oversight of the Colchester sewer system is provided by the Colchester Sewer and Water Commission. Technical and day-to-day operational oversight is provided by staff within the Department of Public Works.

[40] Bozrah Planning & Zoning Commission. (2015). *Plan of Conservation & Development.*

Existing Sewerage Facilities

Colchester sewage is treated at the East Hampton-Colchester Joint Facilities WWTF located in East Hampton as part of their inter-municipal agreement. The WWTF provides secondary disinfection with seasonal dechlorination before discharging into the Connecticut River. The WWTF has a treatment capacity of 3.9 mgd. East Hampton WPCA reported an average flow of 1.3 mgd at the WWTF in 2017. Peak flow information was not available.

Flow from Lebanon and Hebron travels through Colchester to be treated at the East Hampton WWTF and counts against Colchester's contractual flow limit of 1.7 mgd. Average flow from Hebron and Lebanon combined entering the Colchester system was 0.16 mgd in 2018, with a peak flow of 0.25 mgd. The agreement between Colchester and Hebron stipulates that Hebron will participate in upgrades to components in Colchester that convey Hebron flow. The existing service areas and major infrastructure components are located in the downtown area of Colchester as shown on Appended Figure 1.

Prospect Hill is the major pump station in Colchester. It was built in 1982 and upgraded in 2001. According to the Colchester-East Hampton Joint Wastewater Facilities Plan (2005), the station has a capacity of 1600 gpm. This pump station is responsible for pumping all of the wastewater flow from Colchester, Hebron, and Lebanon to East Hampton[41]. There is 8 hours of storage in the force main connecting Colchester to East Hampton due to its length. According to Colchester staff, there are no resulting sulfide problems.

Colchester constructed a pump station on Route 85 at Lake Hayward Road in anticipation of development along Routes 2 and 11. According to the Town, the development fell through and the pump station presently operates an average of 3 hours per week.

Future Sewerage Plan

The Town of Colchester 2015 POCD identifies the Town Center and surrounding neighborhoods as appropriate water and sewer areas. Mixed-use and multi-family development is encouraged in the sewer area, and the POCD encourages sewer expansions to support desired development patterns and intensities. The outlying areas of town are to remain rural and be delineated as sewer avoidance areas.[42] Based on this information, development of an official sewer service area map is recommended.

The area around Route 2 & Route 11 is planned for growth and is currently served by an underutilized pumping station. Development is encouraged in this area.

It is possible that a connection will eventually be developed to serve the Lake Hayward area in East Haddam. A 0.2 mgd allocation is included in the East Hampton and Colchester agreement to allow service to this area. However, a package treatment plant may also be appropriate for this area.

Colchester's primary concern regarding meeting future needs is funding. WWTF upgrades are funded on a cash flow basis, so upgrades from the 2005 Facilities Plan are made when funding becomes available. According to Colchester and East Hampton, the municipalities purchase nitrogen credits at under $20,000 per year. The low cost of credits does not provide a financial incentive to upgrade the WWTF to meet treatment goals. A new

[41] Earth Tech. (2005). *Wastewater Facilities Plan for Colchester-East Hampton Joint Facilities.*
[42] Town of Colchester. (2015). *Plan of Conservation and Development.*

facilities plan should be developed to determine the improvements necessary at the WWTF to meet specific treatment goals and prepare for future growth in the region. Colchester also needs to monitor and address sewer inflow and infiltration issues.

The Middletown Avenue pumping station in East Hampton conveys all of the combined flows to the WWTF. It has an undersized wet well and runs continuously with no downtime, although the pumping capacity is appropriate for current and future flows. The station needs to be upgraded with increased storage to allow for appropriate pumping cycles.

Additional flows are possible in the future from Hebron as noted in Section 4.2.9, but are expected to be in line with the existing agreement.

Projected Wastewater Flows

Projected wastewater flows for Colchester are presented in Table 4-9. Flows are expected to be directed to the WWTF in East Hampton. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF in East Hampton based on these projected flows. These increases do not include the effect of additional sewer expansion or development in East Hampton or Marlborough.

Table 4-9
Projected Wastewater Flow Increase for Colchester

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Conceptual Construction Cost
Colchester System Growth	-	0.01	0.02	By Developer
East Haddam (Lake Hayward)	Proposed	0.00	0.09	By Others
Hebron System Growth	-	0.00	0.01	By Others
Lebanon System Growth	-	None	None	By Others
Total to East Hampton WWTF		**0.01**	**0.12**	**-**

4.2.3 East Lyme (and Old Lyme)

General

The Town of East Lyme is a suburban coastal community located in the southwestern portion of the SCCOG region. The town consists of a semi-urbanized area in Niantic in the southeastern part of town surrounded by suburban residential areas. The current population is estimated at 19,233 and is expected to increase to 19,669 by 2030 and decrease to 19,350 by 2040.

Governance

Management and financial oversight of the East Lyme sewer system is provided by the East Lyme Water and Sewer Commission. Technical and day-to-day operational oversight is provided by staff within the Department of Public Works.

Existing Sewerage Facilities

According to the Town's website, the East Lyme sewerage system was completed in 1991 and consists of approximately 2,800 sewer connections. The service area is not as extensive as that of the water system. The primary service area is along Route 156 and the area south of Route 156, as well as most of the area extending north along Route 161 as far as Interstate 95. The system consists of gravity sewers, force mains, and 21 pump stations with flow pumped through Waterford and then to New London for treatment. The existing service areas and major infrastructure components are shown on Appended Figure 1.

East Lyme is allotted 1.5 mgd of the 10 mgd permitted capacity of the New London WWTF, which includes 475,000 GPD allocated to the State of Connecticut and the Point O' Woods Association in Old Lyme (see Section 2.4.3 for details regarding the allocation agreements). The *Wastewater Collection System Capacity Analysis Planning Report* reports an average daily flow of 1.0 mgd and a peak flow of 1.2 mgd during wet weather months in 2004.[43]

The three major pump stations include Niantic, Pattagansett, and Bride Brook. According to the 2007 *Wastewater Collection System Capacity Analysis Planning Report* the three major pump station capacities, accounting for the largest pump offline, are as follows:

Niantic Pump Station	6.27 mgd
Pattagansett Pump Station	5.16 mgd
Bride Brook Pump Station	2.88 mgd

The report also states that the Niantic pump station discharges an average of 1.1 mgd to the force main below the Niantic River to the Town of Waterford. The Bride Brook Pump Station is essential for directing flow from Old Lyme to Waterford. The Town anticipates improving its major pump stations listed above. The Niantic and Pattagansett pump station improvements are considered major projects by the Town.

The Town expressed concerns about the force main beneath the Niantic River at the Niantic River crossing. The force main, which is essential for delivering flow to Waterford, is over 25 years old and lacks redundancy. The Town is interested in building a parallel force main; however, a planning study has not been initiated at the time of this report.

Future Sewerage Plan

The 2007 *Wastewater Collection System Capacity Analysis Planning Report* states that full build-out of the sewer district would result in approximately 3.6 mgd of wastewater flow. The Town of East Lyme 2010 POCD encourages expansion of sewer to meet projected growth goals provided that it promotes protection of the Town's aquifers and other local and regional natural resources. The POCD encourages expansion of sewers to potential industrial sites, including the area north of Interstate 95 off Exit 74. Other priorities for sewer service include areas with existing pollution problems along the shoreline and in highly developed commercial and residential areas. These include coastal areas of Golden Spur and Saunders Point to help alleviate potential increased nutrient loading to the Niantic River from potentially substandard SSDSs. The Town of East Lyme subsequently considered extension

[43] Fuss & O'Neill, Inc. (2007). *Wastewater Collection System Capacity Analysis Planning Report - Town of East Lyme, Connecticut.*

into Saunders Point, and concluded that due to excessive assessment costs the project was not financially viable in the immediate future. Finally, the POCD notes that a greater capacity allocation from New London is needed.[44]

The 2017 SCCOG *Multi-Jurisdictional Hazard Mitigation Plan* identifies Black Point as an area where traditionally seasonal residences are now being occupied year round such that SSDSs are reportedly being overwhelmed more often than before. The plan recommends expansion of sewer in this area while implementing controls to prevent increased development density.[45] The Town of East Lyme reports that expansion of the sewer system in this area is not considered viable at this time; this area is therefore not included in Table 4-2 or Table 4-10.

Flow from the Point O' Woods Association in Old Lyme is conveyed through East Lyme for eventual treatment at the New London WWTF. It is anticipated that additional flows from Old Lyme will be conveyed through East Lyme per the discussion in Section 2.4.3.

The 2010 POCD also encourages the Town to target areas for implementation of an inflow/infiltration reduction program; this would help increase sewer capacity.[46]

The Bride Brook Pump Station needs upgrades and is also floodprone. The Town wants to move it to a new location. This pump station conveys all current and future wastewater flow from Old Lyme so it is of regional concern. The Niantic and Pattagansett pump stations also need major upgrades that will occur by 2020.

The Niantic River force main delivers all flow into Waterford and is 25 years old. The Town of East Lyme wants to build a parallel force main. It is recommended that a planning study be completed in the short-term planning period (by 2030) for construction by 2040.

Projected Wastewater Flows

Projected wastewater flows for East Lyme are presented in Table 4-10.

Table 4-10
Projected Wastewater Flow Increase for East Lyme and Old Lyme

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Costco	Proposed	0.01	0.01	By Developer
Gateway	Proposed	0.02	0.02	By Developer
Golden Spur	Proposed	0.00	0.03	$2.0 M
Oswegatchie Hills	Proposed	0.06	0.16	By Developer
Saunders Point	Proposed	0.00	0.10	$7.0 M
East Lyme System Growth	-	0.03	0.05	By Developer
Total for East Lyme	**-**	**0.12**	**0.37**	**$9.0 M**
Old Lyme (Except Point O' Woods)	Proposed	0.12	0.30	By Others
Total Directed to Waterford	**-**	**0.24**	**0.67**	**-**

[44] Town of East Lyme. (Amended 2010). *Plan of Conservation and Development 2009.*
[45] Milone & MacBroom, Inc. (2017). *Multi-Jurisdiction Hazard Mitigation Plan Update.*
[46] Town of East Lyme. (Amended 2010). *Plan of Conservation and Development 2009.*

4.2.4 Franklin

General

The Town of Franklin is a rural community located in the north-central portion of the SCCOG region to the northwest of the Norwich urbanized area. The highest development density occurs along the Route 32 corridor in the southern part of town. The current population is estimated at 1,921 and is expected to increase to 2,076 by 2030 and decrease to 2,025 by 2040.

Governance

Management and financial oversight of the future Franklin sewer system is provided by the Franklin WPCA whose membership is presently the Board of Selectmen. Technical and day-to-day operational oversight is not yet needed as the system is in the later planning stages. It is expected that an agreement will be developed to govern the conveyance of flow from Franklin to Norwich.

Existing Sewerage Facilities

According to the CTDEEP, the majority of the Town of Franklin receives wastewater treatment from on-site SSDSs. Many of the SSDSs were built in the 1980s or earlier and are nearing the end of their projected service lives.[47]

A small portion of the Town's sewerage in the industrial park area in southern Franklin is directly served by NPU. The existing service areas and major infrastructure components are shown on Appended Figure 1.

Future Sewerage Plan

The Town of Franklin 2013 POCD identifies the need for sewers along Route 32 in southern Franklin. The Town of Franklin has sought to install sewers in the southern part of town for several years, with flows to be directed to Norwich for treatment.[48] The proposed work will include the installation of a sanitary sewer system from the Norwich town line along a portion of Old Route 32, and north on Route 32 to the intersection of Murphy Road. The Environmental Impact Evaluation discusses Franklin's plans to expand the existing sewerage system and enter into a new inter-municipal agreement with NPU to discharge wastewater to the NPU collection system. The proposed project includes constructing approximately 7,500 feet of gravity sewers, one pumping station, and approximately 1,000 feet of sanitary sewer force mains at an estimated cost of $5 million.[49] The project went out to bid in the spring of 2019.

Projected Wastewater Flows

Projected wastewater flows for Franklin are presented in Table 4-11.

[47] Connecticut Department of Energy & Environmental Protection. (2017). *Environmental Impact Evaluation - Franklin Sanitary Sewer & Water Main Extension Project.*
[48] Franklin Planning & Zoning Commission. (2013). *Town of Franklin Plan of Conservation and Development.*
[49] Connecticut Department of Energy & Environmental Protection. (2017). *Environmental Impact Evaluation - Franklin Sanitary Sewer & Water Main Extension Project.*

Table 4-11
Projected Wastewater Flow Increase for Franklin

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Route 32 (Southern)	Proposed	0.16	0.16	$3.7 M
Route 32 (Northern)	Proposed	0.02	0.10	$1.3 M
Total for Norwich WWTF	**-**	**0.18**	**0.26**	**$5.0 M**

4.2.5 Griswold

General

The Town of Griswold is a suburban community located in the northeastern portion of the SCCOG region. The highest development density occurs near the boundaries of the Borough of Jewett City and along Route 138 in central Griswold. The current population is estimated at 8,881 and is expected to increase to 10,070 by 2030 and increase to 10,407 by 2040.

Governance

Management and financial oversight of the Griswold sewer system is provided by the Griswold WPCA. Technical and day-to-day operational oversight is provided by the Jewett City Department of Public Utilities.

Existing Sewerage Facilities

The Town of Griswold directs its sewage to the Jewett City WWTF in accordance with their inter-municipal agreement (see Section 2.4.4). The agreement allows for an average daily flow of 0.05 mgd from Griswold to Jewett City. Flows from Griswold to Jewett City are by gravity. The existing service areas and major infrastructure components are shown on Appended Figure 1.

Future Sewerage Plan

The Town of Griswold 2018 POCD identifies the desired areas for expansion and intensive development south of Interstate 395 (Exit 22) on Route 164, as well as near Interstate 395 (Exit 24) on Route 201.[50] These areas have been included as "proposed" sewer areas in this RWMP as they passed referendum in May 2019.[51] The 2018 POCD acknowledges that the Jewett City WWTF is underutilized and that additional flow, either from Griswold or regionally, would help to correct the issue.

The 1999 *Report to the Town of Griswold on a Regional Wastewater Facilities Plan* projects increased wastewater flows of 1.35 mgd from all projected service areas in Griswold, Lisbon, and Jewett City.[52] The proposed expansion areas in Griswold above are generally consistent with the 20-year expansion areas in the 1999 plan; those figures are used herein for estimated flows.

[50] Town of Griswold, Connecticut. (2018). *Plan of Conservation and Development 2017-2027.*
[51] Steinhagen, J. (2019, May 22). Griswold Voters Approve New Senior Center, Utility Improvements. *Hartford Courant*.
[52] Metcalf & Eddy, Inc. (1999). *Draft Report to the Town of Griswold, Connecticut on a Regional Wastewater Facilities Plan.*

The 2018 POCD also acknowledges that there are some areas of town with small non-conforming lots near lakes and ponds which may not be large enough to accommodate on-site wastewater systems in the long term. Due to the limited information regarding these areas and the distance from existing sewers, these areas are not specifically considered for sewers at this time. However, it is estimated that 40% of the expected population increase in Griswold through 2040 has the potential to connect to the expanded sewer system. This increased flow may include parcels nearby the non-conforming lot areas.

Projected Wastewater Flows

Projected wastewater flows for Griswold are presented in Table 4-12. Should these areas be developed, the projected flows in Griswold are anticipated to require revisions to the agreement between Jewett City and Griswold, as well as expansion of the Jewett City WWTF by 2040.

Table 4-12
Projected Wastewater Flow Increase for Griswold

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Route 164 and Heritage Hills and Route 201 Business Park	Proposed	0.38	0.77	$4.0 M
Griswold System Growth	-	0.02	0.04	By Developers
Total for Griswold	**-**	**0.40**	**0.81**	**$4.0 M**

4.2.6 Groton, City of

General

The City of Groton is a dependent political subdivision of the Town of Groton and an urban coastal community located in the south-central portion of the SCCOG region. The current population is estimated at 10,400 and is expected to increase to 10,963 by 2030 and increase to 11,150 by 2040.

Governance

Management and financial oversight of the City of Groton sewer system is provided by Groton Utilities. Technical and day-to-day operational oversight is also provided by Groton Utilities.

Existing Sewerage Facilities

According to discussion with Groton Utilities, the City of Groton is 99% sewered (islands are not sewered) and flow is treated at the City's WWTF, which has a permitted capacity of 3.1 mgd. According to Groton Utilities, flows in 2018 averaged 1.8 mgd with a peak of 5.0 mgd. The WWTF provides secondary treatment and chlorine disinfection before discharging to the Thames River. The existing service areas and major infrastructure components are shown on Figure 4-1 and Appended Figure 1.

SCCOG Regional Wastewater Plan

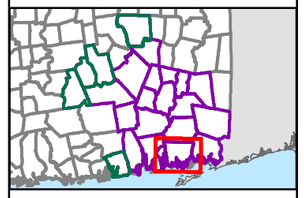
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 3,900

Feet

1:48,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesty of CTECO.

Groton

June 2019

Figure 4-1

Tighe&Bond

Engineers | Environmental Specialists

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:36:20 AM]

S-5068

Future Sewerage Plan

According to the City of Groton 2018 POCD, there are additional growth areas in the city which may generate sewer flows. Desired areas for mixed-use growth include Thames Street and Five Corners, and industrial growth is encouraged along the waterfront and Pfizer campus areas, as well as north of Bridge Street.[53] Expansion of EB is expected to require a new pump station.

According to Groton Utilities, there are some areas of the sewer system that have identified inflow/infiltration issues. Funding should be secured to address these areas. Groton Utilities does not believe that pump station upgrades are necessary at this time.

The Facilities Plan for the wastewater system recommended a variety of system upgrades.[54] The City completed the corrosion-related projects but all others are on hold pending establishment of appropriate sewer rate to support the projects. These should be pursued as necessary through 2040.

Projected Wastewater Flows

Projected wastewater flows for the City of Groton are presented in Table 4-13. These flow increases are expected to be handled by current the WWTF capacity. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Table 4-13
Projected Wastewater Flow Increase for City of Groton

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
EB Expansion (Workers)	-	0.05	0.05	By Developers
City of Groton System Growth	-	0.07	0.14	By Developers
Total for City of Groton	**-**	**0.12**	**0.19**	**-**

4.2.7 Groton, Town of

General

The Town of Groton is an urban coastal community located in the south-central portion of the SCCOG region. The current population is estimated at 29,499 and is expected to increase to 31,667 by 2030 and decrease to 30,535 by 2040.

Governance

Management and financial oversight of the Town of Groton sewer system is provided by Groton WPCA. Technical and day-to-day operational oversight is also provided by staff within the Department of Public Works. Staff in this

[53] City of Groton Planning and Zoning Commission. (2018). *Plan of Conservation and Development.*
[54] Tighe & Bond. (2013). *Wastewater Treatment Facility - City of Groton, CT - Draft Facilities Plan.*

division operates the water pollution control wastewater collection system and the WWTF that provides secondary treatment.

The WWTF is fully funded through the collection of user fees. Staff performs the necessary functions to keep the system and facility continuously operational at maximum efficiency and is responsible for the collection, treatment and discharge of effluent. Employees maintain and repair equipment, instrumentation, facilities, and sewer lines; they trouble-shoot malfunctions; oversee inventory; respond to alarms; and respond to citizen concerns. Numerous samples are collected by staff and bacteriological examination performed.[55]

Existing Sewerage Facilities

According to the Town of Groton website, the Town of Groton wastewater treatment system serves approximately 6,350 accounts. The collection system contains 22 pump stations, 136 miles of sewer lines and 2,500 manholes. The infrastructure is generally shown on Appended Figure 1 and Figure 4-1 above. The SUBASE has its own private collection system that flows via gravity into the Town's system. The WWTF is designed to treat 7.5 mgd using an activated sludge process. Solids are collected, dewatered and shipped for disposal. Nitrogen is removed from the liquid in a two-step aerobic and anaerobic process by beneficial bacteria. The wastewater is disinfected with sodium hypochlorite ("bleach") before being pumped across the City of Groton to an outfall and released in the Thames River. Strict, daily monitoring and laboratory testing continuously assure the treated water released is safe for people and the environment.[56]

Based on discussion with staff from Town of Groton Public Works, the WWTF underwent major upgrades in 2009. This included an integrated fixed-film activated sludge process which has improved efficiency and capacity. The upgraded WWTF is designed and permitted for a capacity of 7.5 mgd. DMRs from November 2017 to October 2018 report an average flow of 2.8 mgd and a peak flow of 10 mgd.

The SUBASE operates its own private sewer collection system that discharges into the Town of Groton collection system. According to the Town of Groton, when the Navy disposes of property they require the future owners to disconnect from the Navy sewer system. Creative solutions may be necessary in the future to address these properties, or the new owners may experience large expenses to tie into Groton's sewers.

Future Sewerage Plan

According to the Town of Groton 2016 POCD, there is a desire to increase the density of certain areas of town (e.g., Mystic). The 2016 POCD encourages extension of sewer service to unserved areas of concentrated industrial and commercial uses, residential areas with sufficient density, and town facilities. Extension of sewer services to serve a portion of Flanders Road north of Interstate 95 (originally identified in 2006 Strategic Economic Development Plan) is no longer considered relevant as it failed at referendum in 2013. The POCD also identifies the potential for seeking funding for extension of sewer up Route 117 into Center Groton and then to Ledyard.[57]

The Groton WPCA indicates that expansion into Center Groton (Route 117) will be the last major expansion of the system. A connection north into Ledyard may occur if funding is available (Section 4.2.10).

[55] Town of Groton. (2012). *Water Pollution Control*.
[56] *Ibid.*
[57] Town of Groton. (2016). *Plan of Conservation & Development.*

The MCP document recommends developing a program to test shoreline SSDSs in existing developments. This would determine if there are any substandard SSDSs contributing to water quality impairment along the shoreline.[58] If such a program is developed, additional shoreline areas may be connected to the sewer system.

The 2016 POCD recommended identification of large-diameter collection piping in need of repair or replacement, as well as rehabilitation of several pump stations. The Town of Groton Public Works provided project details from their Capital Improvements Program for FY 2019, which includes anticipated upgrades to several of the Town's pump stations: Goss Cove (for FY 2019), Gravel Street (for FY 2020), Mumford Cove and Beebe Cove (for FY 2021), and Little Gibraltar (for FY 2022 and FY 2023) and improvements to major sewer interceptors to address infiltration and inflow. Based on the evaluation in Table 4-7, the Mumford Cove interceptor leading to the WWTF may be undersized for future flows, and the capacity of this interceptor should be evaluated in more detail if wastewater flows from central Ledyard are routed through eastern Groton. Anticipated upgrades to the WWTF do not include changes in treatment process or capacity, though some capital improvements are planned through FY 2023.

Groton WPCA plans to update its facilities plan in 2020. The Town is aware of inflow/infiltration issues but needs to conduct a study to determine potential locations of inflow. The Town also plans to conduct a resiliency study for its pumping stations in the near future. This should be conducted using the new resiliency standards promulgated with the passage of Public Act 18-82 (Section 5.0).

Projected Wastewater Flows

Projected wastewater flows for the Town of Groton are presented in Table 4-14. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Table 4-14
Projected Wastewater Flow Increase for Town of Groton

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Route 117 Center Groton	Proposed	0.12	0.23	$8.0 M
SUBASE Expansion	-	0.06	0.08	By Developer
Town of Groton System Growth	-	0.12	0.23	By Developer
Total for Town of Groton	**-**	**0.30**	**0.54**	**$8.0 M**
Northwest Ledyard (Aljen Heights)	Proposed	0.00	0.07	By Others
Ledyard Center	Proposed	0.08	0.38	By Others
Southwest Ledyard (Gales Ferry	Proposed	0.06	0.31	By Others
Total for Town of Ledyard	**-**	**0.14**	**0.76**	**-**
Total Town of Groton WWTF	**-**	**0.44**	**1.30**	**-**

[58] Milone & MacBroom, Inc. (2014). *Town of Groton Municipal Coastal Program Update (Draft).*

4.2.8 Jewett City

General

The Borough of Jewett City is dependent political subdivision of the Town of Griswold in the northeastern portion of the SCCOG region. The current population is estimated at 3,500 and is expected to increase to 3,630 by 2030 and increase to 3,707 by 2040.

Governance

Management and financial oversight of the Jewett City sewer system is provided by the Jewett City Department of Public Utilities. Technical and day-to-day operational oversight is also provided by the Jewett City Department of Public Utilities.

Existing Sewerage Facilities

Jewett City owns and operates the Jewett City WWTF and collection system which serves the entire borough and portions of the Towns of Griswold and Lisbon. The Jewett City Department of Public Works is responsible for maintaining the collection system and WWTF. The existing service areas and major infrastructure components are shown on Appended Figure 1.

The Jewett City WWTF was constructed in 1970 and redesigned and upgraded between 2003 and 2005. The new plant uses a Bardenpho type treatment process for biological nutrient removal of phosphorous and nitrogen. Jewett City has a general permit for nitrogen discharge with an annual discharge limit of 15 pounds/day effective from 2019-2023. The upgraded WWTF was designed to treat an average flow of 1.1 mgd and a peak flow of 2.8 mgd. The WWTF accepts up to 0.208 mgd of flow from Lisbon and up to 50,000 gpd from Griswold in accordance with their respective inter-municipal agreements (see Section 2.4.4).

The Jewett City collection system dates back to 1899 with most recent upgrades in the 1990s. Flow from Griswold to Jewett City is by gravity. According to the 1999 *Report to the Town of Griswold on a Regional Wastewater Facilities Plan*, the collection system at that time consisted of approximately 45,000 linear feet of interceptor and lateral sewers, and five pump stations and associated force mains. The system was originally designed as a combined sewer system but sewer separation was completed in the 1990s. The 1999 Report predates the recent WWTF upgrades, therefore a new facilities plan is recommended.[59]

Future Sewerage Plan

Jewett City is generally considered to be built-out, although it is not 100% sewered. Sewers will be extended in Jewett City as necessary, although the majority of system expansion currently proposed is located outside of Jewett City. Some population growth is expected in Jewett City in the coming decades which is expected to be connected to the sewer system. Additional flows from Lisbon in excess of the current agreement are not anticipated through 2040.

[59] Metcalf & Eddy, Inc. (1999). *Draft Report to the Town of Griswold, Connecticut on a Regional Wastewater Facilities Plan.*

The 1999 *Report to the Town of Griswold on a Regional Wastewater Facilities Plan* projects increased wastewater flows of 1.35 mgd for a full-build out of projected sewer areas in Griswold, Lisbon, and Jewett City. Longer term, the projected flow analysis suggests that WWTF expansion will be necessary as developments in Griswold are constructed and connected to the sewer system.

According to Jewett City Department of Public Utilities, the WWTF and pumping stations presently have ample capacity and no improvements are needed in the immediate future aside from flood-proofing. Jewett City is concerned with flood prevention at the South Main Street Pump Station and is seeking funding for a flood prevention wall at the WWTF. Based on the preliminary analyses herein, the Burleson pumping station may be undersized to transfer all of the projected flows and may require upgrades. The interceptor to the WWTF also appears to be limited in capacity and should be studied in more detail to determine if upgrades are necessary to meet future flows.

Projected Wastewater Flows

Projected wastewater flows for Jewett City are presented in Table 4-15. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Table 4-15
Projected Wastewater Flow Increase for Jewett City

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Jewett City System Growth	-	0.01	0.02	By Developers
Total for Jewett City	**-**	**0.01**	**0.02**	**-**
Route 164 and Heritage Hills and Route 201 Business Park	Proposed	0.38	0.77	By Others
Griswold System Growth	-	0.02	0.04	By Others
Total for Griswold	**-**	**0.40**	**0.81**	**By Others**
Lisbon System Growth	-	0.00	0.01	By Others
Total for Jewett City WWTF	**-**	**0.41**	**0.83**	**-**

4.2.9 Lebanon (and Hebron)

General

The Town of Lebanon is a suburban community located in the northwestern portion of the SCCOG region. Development density is relatively consistent throughout the town, although small lot sizes are prevalent in the vicinity of Amston Lake. The current population is estimated at 7,289 and is expected to decrease to 6,888 by 2030 and decrease to 6,424 by 2040.

Governance

Management and financial oversight of the Amston Lake sewer system is provided by the Lebanon WPCA. Technical and day-to-day operational oversight is provided by WPCA staff and contract operators. Water pollution control concerns in the remainder of Lebanon are under the purview of the Board of Selectmen.

Existing Sewerage Facilities

The Town of Lebanon has sewers located around the Amston Lake District with flows directed into Hebron. Flows pass through Hebron, then Colchester, before ultimate treatment at the East Hampton-Colchester Joint WWTF. The existing service areas and major infrastructure components are shown on Appended Figure 1.

According to discussions with Lebanon staff, one major pump station directs flows from Lebanon to Hebron. The pump station is owned and operated by Hebron and was last upgraded in 2013. A second pump station directs flows collected from both Hebron and Lebanon to Colchester. Flow information for the pump stations were not available, although estimates of flow were available from other sources. The Town of Lebanon has a low-pressure sewer system that uses small diameter (1/4 inch to 4-inch) pipes and grinder pumps at each home. Lebanon staff reported that individual homes experience pumping issues.

Future Sewerage Plan

The Town of Lebanon 2010 POCD predates the installation of sewers in the Amston Lake area. Lebanon staff indicate that expansion of the conveyance system near Amston Lake is not anticipated. The Town of Lebanon should coordinate with Uncas Health District to be informed should SSDSs in small lot areas become an issue.

A program of development for sewers in Lebanon is not necessary at this time. The 2010 POCD recommends introducing sewers into Lebanon only to solve existing, critical wastewater disposal problems and not for economic development.[60] SSDSs that are well-designed and maintained are believed consistent with Lebanon's status as a rural, agricultural community. Although sewer avoidance is desired for the majority of town, the development of decentralized wastewater treatment systems, such as community SSDSs or package treatment plants, may be appropriate in certain areas. Areas identified at the data collection workshop where such measures may be appropriate include industrially zoned properties along Norwich Avenue, and neighborhoods near Red Cedar Lake where small lot sizes may contribute to substandard SSDSs. It is recommended that a sewer service area map delineating appropriate areas for these measures be developed in accordance with State statute (Section 2.2).

Hebron plans on making system-wide improvements to its sewer system, including redoing pumping stations and lining the collection system. According to the Town of Hebron 2014 POCD, the most likely area for future expansion of business and industrial land use is the Route 66 corridor in the existing sewer service area. Much of this area is already developed, although some properties remain vacant. Cluster-type residential development is also recommended in this area to take advantage of the sewer infrastructure.[61] This will increase the overall flows entering into Colchester, but such increases are not expected to be significant.

Should sewers be extended across northern Bozrah into the village of Gilman (Section 4.2.1), installation of sewers to targeted areas in southern Lebanon may become feasible. The Town of Lebanon should stay alert to this potential project.

[60] Town of Lebanon Planning and Zoning Commission. (2010). *Plan of Conservation and Development.*
[61] Town of Hebron. (2014). *The Plan of Conservation and Development.*

Projected Wastewater Flows

Projected wastewater flows for Lebanon and Hebron are presented in Table 4-16. Note that increased flows are not anticipated from Lebanon through 2040, although certain areas may be suitable for installation of community SSDSs or package treatment plants.

Table 4-16
Projected Wastewater Flow Increase for Lebanon and Hebron

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Hebron System Growth	-	0.00	0.01	By Others
Lebanon System Growth	-	None	None	-
Total to East Hampton WWTF	**-**	**0.00**	**0.01**	**-**

4.2.10 Ledyard

General

The Town of Ledyard is a suburban community located in the south-central portion of the SCCOG region to the north of Groton. Development density is highest in the Highlands section in southeastern Ledyard, and in Ledyard Center, Gales Ferry, Allyn Point, and Avery Hill. The current population is estimated at 14,889 and is expected to increase to 15,574 by 2030 and decrease to 15,190 by 2040.

Governance

Management and financial oversight of the Ledyard sewer system is provided by the Ledyard WPCA. Technical and day-to-day operational oversight is provided by WPCA staff.

Existing Sewerage Facilities

The Town of Ledyard is primarily served by SSDSs. The 2014 Facilities Plan prepared by CDR Maguire Inc. projected a cost of $93 million to fully sewer the desired areas of the community.[62]

The existing Highlands collection system includes two pump stations, five miles of gravity sewers, two miles of force mains, and the Highlands WWTF. The Highlands WWTF is rated as a Class IV facility, the highest designation for plants in the State of Connecticut.[63] The existing service areas and major infrastructure components are shown on Figure 4-2 and Appended Figure 1.

[62] CDR McGuire, Inc. (2014). *Wastewater Facilities Management Plan, Phase II: Facilities Plan - Town of Ledyard.*
[63] Ledyard Water Pollution Control Authority. (2019). *Water Pollution Control Authority (WPCA)*.

SCCOG Regional Wastewater Plan

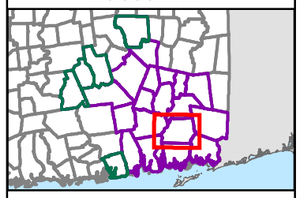
LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

LOCUS MAP



N

0 3,900

Feet

1:48,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesy of CTECO.

Ledyard

June 2019

Figure 4-2

Tighe&Bond

Engineers | Environmental Specialists

S-5068

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview_11x17_DDP_.mxd [Exported By: SMMorse, 6/14/2019, 11:36:02 AM]

The WWTF was constructed in 1962 and upgraded in 1997 and 2017. The plant has a permitted capacity of 0.26 mgd and can handle peak flows of 0.80 mgd. 2018 DMRs report an average flow of 0.15 mgd with a peak of 0.65 mgd. An activated sludge process including nitrogen removal and year-round ultraviolet disinfection is used to treat effluent before it is discharged to infiltration beds or the Seth Williams Brook during high flows. This tertiary system provides a state of the art wastewater treatment facility for the community of Ledyard. This includes a septage receiving area and a rotary drum thickening component of the plant processes. These two most recent additions to the facility continue to save a significant amount of money in solids handling costs.

Future Sewerage Plan

The Town of Ledyard 2003 POCD (last amended 2010) supports higher-density housing and mixed-use development in Ledyard Center where sewer service could be provided. The POCD also supports expansion of infrastructure in appropriately zoned areas to enhance economic development opportunities, such as in the Route 12/Gales Ferry area. Identified capital projects included the extension of sewer north along Route 12 from Groton to the vicinity of Dow Chemical, and extension of sewer to industrially zoned parcels along Baldwin Hill Road. The use of community sewer systems (e.g. package plants) is also encouraged for residential subdivisions. One goal identified in the POCD is to increase sewer connections to the existing Highlands system to maximize use of the existing WWTF.[64] This would likely occur through limited expansion into Ledyard Center. However, for the purposes of this RWMP, it is assumed that new Ledyard Center flows would likely be directed to the Town of Groton WWTF.

The 2014 Facilities Plan identified a variety of areas appropriate for sewer service. These areas included neighborhoods considered to have substandard SSDSs as well as areas desired for economic development. The total cost was estimated at $93 million. Because the cost is considered excessive, the Town plans to focus on smaller projects in the near term such as extending the Highlands system into Ledyard Center to encourage economic development.

According to Ledyard WPCA, small lot sizes are of concern in many areas of the town due to the limited room to replace failing SSDSs, particularly in Aljen Heights and Gales Ferry. These areas were evaluated in the 2014 Facilities Plan, along with Ledyard Center. Alternatively, some of these areas could be directed to NPU for treatment via connections to the existing sewer mains in the vicinity of the former Norwich State Hospital in Preston. The Town of Ledyard has spoken with NPU regarding the feasibility of sending flows from Ledyard Center and southwestern Ledyard (Gales Ferry) for treatment.

According to the 2014 Facilities Plan, the Town could upgrade its existing plant to meet some of the projected flows. Other recommended actions in the Facilities Plan that have been completed at the Highlands WWTF include updating the headworks equipment, replacing existing blowers, installing a submersible mixer in the thickened sludge holding tank, and upgrading the outdated instrumentation control systems. Ledyard WPCA believes that the existing pump stations have adequate capacity, although new pump stations would be necessary if the system expanded.

[64] Town of Ledyard. (2003, amended 2010). *Plan of Conservation & Development.*

Projected Wastewater Flows

Projected wastewater flows for Ledyard are presented in Table 4-17. The projections include nominal infill or other residential development adjacent to the Highlands system. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows. For the purposes of Section 4.2.7, the projected sewer areas are expected to direct flow to the Town of Groton WWTF. However, flow from Northwest Ledyard may also reasonably be directed to NPU for treatment.

Table 4-17
Projected Wastewater Flow Increase for Ledyard

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Highlands System Growth	-	0.00	0.01	**By Developers**
Total for Highlands WWTF		**0.00**	**0.01**	**-**
Northwest Ledyard (Aljen Heights)	Proposed	0.00	0.07	$10 M
Ledyard Center	Proposed	0.08	0.38	$25 M
Southwest Ledyard (Gales Ferry	Proposed	0.06	0.31	$57 M
Total for Town of Groton WWTF	**-**	**0.14**	**0.76**	**$93 M**

4.2.11 Lisbon

General

The Town of Lisbon is a suburban community located in the north-central portion of the SCCOG region to the northeast of the Norwich urbanized area. Development density is greatest along Route 12 in eastern Lisbon. The current population is estimated at 4,302 and is expected to decrease to 4,131 by 2030 and decrease to 3,837 by 2040.

Governance

Management and financial oversight of the Lisbon sewer system is provided by the Lisbon WPCA. Technical and day-to-day operational oversight is provided by their contract operator (NPU).

Existing Sewerage Facilities

The Town of Lisbon directs wastewater flows to Jewett City and Sprague (Versailles system) in accordance with their respective inter-municipal agreements (see Sections 2.4.4 and 2.4.8). The agreements permit an average daily flow of 0.208 mgd to Jewett City and discharge from 17 residential units in western Lisbon to Sprague's Versailles system (and eventually to Norwich) at a peak flow of 56 gpm (0.08064 mgd). The Wheelabrator facility in Lisbon also sends wastewater flows to NPU by private agreement. The existing service areas and major infrastructure components are shown on Appended Figure 1.

The Lisbon sewer district is officially Lisbon Landing, and parcels that abut Route 12 between Lisbon Landing and the Griswold town line. However, the regulations allow for sewer service to occur in other areas and become part of the overall district.

Future Sewerage Plan

The current sewer service area along Route 12 is expected to have nominal growth over the planning period of this RWMP. These connections are not expected to exceed the capacity of the current agreement with Jewett City. Expansion of sewer service outside of this area is not expected, nor is expansion of the Versailles-area system expected.

Projected Wastewater Flows

Projected wastewater flows for Lisbon are presented in Table 4-18.

Table 4-18
Projected Wastewater Flow Increase for Lisbon

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Lisbon System Growth	-	0.00	0.01	By Developers
Total to Jewett City WWTF	**-**	**0.00**	**0.01**	**-**

4.2.12 Mashantucket Pequot Tribal Nation

General

The Mashantucket Pequot Tribal Nation is a federally recognized tribe with reservation land held in trust in northeastern Ledyard by the Bureau of Indian Affairs. Additional lands in Ledyard and North Stonington are also owned by the tribe as fee lands. The reservation is home to the Foxwoods Resort Casino. The current resident population is estimated at 300 and is a small percentage of the estimated millions of individual visits to the reservation each year.

Governance

Management and financial oversight of the Mashantucket Pequot Tribal Nation sewer system is provided by the Mashantucket Pequot Tribal Nation Utilities. Technical and day-to-day operational oversight is provided by staff of Mashantucket Pequot Tribal Nation Utilities.

Existing Sewerage Facilities

No information on the existing collections system or treatment facilities was provided by the Mashantucket Pequot Tribal Nation in preparation of this report. The Mashantucket Pequot Tribal Nation has its own sewer system which conveys flow from the Foxwoods Casino complex in the northeastern part of Ledyard, but this sewer system does not appear to extend into tribal residential areas.

A reclaimed water facility treats sewage effluent that is used at the golf course for irrigation. The NPDES permit for the golf course irrigation suggests that the reclaimed water facility has an average day capacity of 0.6 mgd and a peak capacity of 1.2 mgd.

The Mashantucket WWTF has an average daily flow of approximately 1.0 mgd during the week and up to 1.3 mgd on weekends. The plant was expanded in 2008 and runs two sequencing batch reactors followed by oxidation and extended aeration. A Wescor Associates, Inc. article discusses the cost reductions the plant achieved by switching to an in-line polymer preparation and feed system.[65]

Future Sewerage Plan

The Mashantucket Pequot Tribal Nation is expected to expand sewer services on its reservation as necessary to accommodate tribal need. Should the need for sewer occur along Route 2 in southeastern Preston in the vicinity of Preston Plains and Avery Pond, it is possible that Mashantucket Pequot Tribal Nation will be approached by the Town of Preston regarding potentially treating this flow at its WWTF. However, this area of Preston appears better suited for a package treatment plant or community SSDS at this time. The Town of North Stonington has also began discussions regarding the potential for extending the collection system into western North Stonington. Potential service areas were not available at the time of this report.

Projected Wastewater Flows

Projected wastewater flows for the Mashantucket Pequot Tribal Nation are presented in Table 4-19. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Table 4-19
Projected Wastewater Flow Increase for the Mashantucket Pequot Tribal Nation

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Tribal System Growth	-	0.03	0.06	**By Development**
Total for Mashantucket WWTF	**-**	**0.03**	**0.06**	**-**

4.2.13 Mohegan Tribe

General

The Mohegan Tribal Nation is a federally recognized tribe with reservation land held in trust in northeastern Montville by the Bureau of Indian Affairs. Additional lands in Franklin, Montville, Norwich, and Sprague are also owned by the tribe as fee lands. The reservation is home to the Mohegan Sun Casino. The current resident population is estimated at 50 and is a small percentage of the estimated millions of individual visits to the reservation each year.

Governance

Management and financial oversight of the Mohegan Tribe sewer system is provided by the Mohegan Tribal Utility Authority. Technical and day-to-day operational oversight is provided by staff of the Mohegan Tribal Utility Authority.

[65] Wescor Associates, Inc. (2013, July 9). *Treatment Plant Saves $120,000 Annually Using New Polymer Preparation & Feed System.*

Existing Sewerage Facilities

According to discussions with Mohegan Tribal Nation Utilities, the Mohegan Tribe directs all of its sewage to the Town of Montville in accordance with their inter-municipal agreement (see Section 2.4.6). The Mohegan Tribe is allotted 1.6 mgd (the maximum day capacity of the Tribe's collection system) but reports an average flow of 750,000-800,000 gpd. The existing sewers are primarily gravity, but there is one pump station owned by Montville WPCA. Mohegan Tribal lands in Montville which are not on the reservation are sewered as direct customers of Montville WPCA.

The Mohegan Tribe reports having extra capacity in its subsystem and additional allocated capacity within Montville. Specifically, when the Montville WWTF was last upgraded the Mohegan Tribe paid for and installed two new sequencing batch reactors with a rated treatment capacity of 8,000 pounds of BOD. These have been reserved for the Mohegan Tribe's future growth.

Future Sewerage Plan

The Mohegan Tribe is expected to expand sewer services on its reservation as necessary to accommodate tribal need. However, this expansion is not anticipated to require a new sewer agreement with the Town of Montville through 2040.

Projected Wastewater Flows

Projected wastewater flows for the Mohegan Tribe are presented in Table 4-20.

Table 4-20
Projected Wastewater Flow Increase for the Mohegan Tribe

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Tribal System Growth	-	0.02	0.04	By Development
Total for Montville WWTF	**-**	**0.02**	**0.04**	**-**

4.2.14 Montville

General

The Town of Montville is a suburban community located in the south-central portion of the SCCOG region located between the Norwich and New London urbanized areas. Development density is highest along the Route 32 corridor in eastern Montville. The current population is estimated at 19,576 and is expected to increase to 20,012 by 2030 and decrease to 19,481 by 2040.

Governance

Management and financial oversight of the Town of Montville sewer system is provided by the Montville WPCA. Technical and day-to-day operational oversight is provided by Montville WPCA staff.

The primary contributors to the Montville WPCA sewer system are Rand-Whitney and the Mohegan Tribe. Agreements govern the connection for both entities. Any future major connections to the Montville sewer system need to be approved by Rand-Whitney.

Existing Sewerage Facilities

According to Montville WPCA, the Montville sewer system has 62.9 miles of gravity sewers, 13.2 miles of force main, 0.05 miles of syphon beneath Oxoboxo Brook, 22 pump stations, a pretreatment facility, and one WWTF. The existing service areas and major infrastructure components are shown on Appended Figure 1.

The WWTF is designed and permitted to treat 4.5 mgd. According to 2018 DMRs the average flow is approximately 1.8 mgd with a peak flow of 12 mgd. The WWTF uses biological, physical, and chemical treatment, including sequencing batch reactors and seasonal chlorine disinfection before discharging effluent to the Thames River. The 2011 Facilities Plan reports that the WPCA currently buys nitrogen credits but would consider expanding its treatment to meet nitrogen goals if it becomes cost effective. The Facilities Plan estimates inflow/infiltration issues account for only approximately 6,000 gpd.[66]

As noted above, the two principal contributors of wastewater flow to the Montville WWTF are the Mohegan Tribe (Section 2.4.6 and Section 4.2.13) and Rand-Whitney. Together, these two contributors account for approximately 83% of the 1.8 mgd of average daily flow at the Montville WWTF.

Rand-Whitney utilizes a dedicated pipeline from the Montville WWTF to utilize approximately 0.46 mgd of treated wastewater for industrial processes. The treated wastewater is supplemented by withdrawals from Oxoboxo Brook to ensure the process water is of acceptable quality. Rand-Whitney also produces a wastewater discharge of approximately 0.69 mgd, which is pretreated by Montville WPCA at a dedicated treatment facility near Rand-Whitney prior to discharge to the Montville WWTF.[67]

Future Sewerage Plan

The Town of Montville POCD notes that the area around Oxoboxo Lake will require sewers in the future. The POCD recommends not introducing sewers to the Niantic River watershed or to sewer avoidance areas except when necessary to solve existing problems.[68]

The Facilities Plan estimated that projected flows at the Montville WWTF were to reach 4.7 mgd by 2029. Similarly, the Montville WPCA *Water Supply Plan* suggests that current zoning in presently undeveloped water and sewer service areas could require a substantial amount of water supply. However, these areas have remained largely undeveloped for the past two decades despite the availability of water and sewer service.[69]

[66] URS. (2011). *Montville, Connecticut Facilities Plan.*
[67] Milone & MacBroom, Inc. (2017). *Request for Reauthorization under the General Permit for Diversion of Water for Consumptive Use.* Rand Whitney Realty, LLC.
[68] Montville Planning and Zoning Commission, V. M. (2010). *Montville Plan of Conservation and Development.*
[69] Milone & MacBroom, Inc. (2015). *Water Supply Plan.*

The Town of Montville WPCA previously indicated to the Town of Waterford that it has excess WWTF capacity and would be willing to accept wastewater flow from Waterford.[70] This RWMP recognizes that the Town of Montville may be able to play a role in relieving regional capacity issues in the southwestern SCCOG region, by either taking flows from Waterford or from East Lyme. Further discussion is presented in Section 6.2.1.

Projected Wastewater Flows

Projected wastewater flows for Montville are presented in Table 4-21. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Table 4-21
Projected Wastewater Flow Increase for Montville

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Mohegan Tribe System Growth	-	0.02	0.04	By Development
Oxoboxo Lake	Proposed	0.00	0.02	$7.5 M
Montville System Growth	-	0.03	0.05	By Developers
Total for Montville WWTF		**0.05**	**0.12**	**$7.5 M**

4.2.15 New London

General

The City of New London is an urban coastal community located in the south-central portion of the SCCOG region. The current population is estimated at 28,025 and is expected to increase to 31,447 by 2030 and increase to 32,625 by 2040.

Governance

Management and financial oversight of the City of New London sewer system is provided by the New London Department of Public Utilities. Technical and day-to-day operational oversight is provided by their contract operator (Veolia).

Existing Sewerage Facilities

According to New London's 2014 *Capital Improvement Plan*, the City of New London is 99% sewered and is serviced by approximately 80 miles of sewer pipes and force mains, eight pump stations, and one WWTF. Many of the sewers were constructed in the early 1900s.[71] According to the Department of Public Utilities, most of the pump stations were built in the 1970s and upgraded in recent years. The existing service areas and major infrastructure components are shown on Appended Figure 1.

Veolia presently maintains and operates the City's WWTF and collection system under contract. The Department of Public Utilities reported at the data collection workshop that they believe the conveyance system is oversized

[70] Wright-Pierce. (2011). *Wastewater Facilities Plan Update for the Waterford Utility Commission - Final Report.*
[71] Wright-Pierce, Inc. (2014). *Capital Improvements Plan - Wastewater System Evaluation - New London, CT.*

for the current demand. The Department of Public Utilities does not anticipate needing upgrades to the conveyance system to accommodate regional flows. However, the preliminary analysis herein suggests that the 24-inch diameter interceptor to the WWTF may be undersized for projected regional flows. Note that the WWTF regularly treats average daily flows in excess of the estimated capacity determined by the preliminary analysis, so it may not be an issue.

The WWTF is currently designed and permitted to treat 10.0 mgd. The 2016 NPDES permit includes a clause to increase the permitted flow rate to 10.3 mgd contingent on the completion of facility expansions and upgrades. However, 10.0 mgd is used by the City for facilities planning purposes. According to the 2018 DMRs, the average flow is approximately 6.4 mgd with a peak flow of 12.7 mgd. New London's WPCA reported reaching flows as high as 18 mgd during major storms. Treatment is provided by secondary biological treatment and year-round chlorine disinfection before discharge into the Thames River.

Future Sewerage Plan

Nearly all parcels in the city have access to sewer service. The City of New London 2017 POCD encourages infill development and increased density in certain areas.[72] As regional flows increase, a more detailed analysis should be performed to determine the capacity of the 24-inch diameter interceptor sewer leading to the WWTF.

The 2017 POCD encourages the Department of Public Utilities to address wastewater system issues that may affect water quality, such as by investigating and mitigating the introduction or pollutants into the coastal waterways. The POCD also recommends addressing inflow/infiltration issues and capacity constraints.

The Department of Public Utilities conducts television surveys every seven years and immediately repairs any issues found. Pump stations are considered to be oversized for the city. Two pumping stations are known to experience inflow/infiltration that should be investigated.

New London has space to expand the WWTF if needed. This may occur in the next ten years if it is determined to be the most suitable option for meeting regional sewer needs (Section 6.2.1).

Projected Wastewater Flows

Projected wastewater flows for New London are presented in Table 4-22. The combination of projected regional flows and increased city flows is expected to approach the 90% capacity threshold for the WWTF by 2040. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

[72] New London Planning & Zoning Commission. (2017). *Plan of Conservation & Development.*

Table 4-22
Projected Wastewater Flow Increase for New London

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Costco	Proposed	0.01	0.01	By Others
Gateway	Proposed	0.02	0.02	By Others
Golden Spur	Proposed	0.00	0.03	By Others
Oswegatchie Hills	Proposed	0.06	0.16	By Others
Saunders Point	Proposed	0.00	0.10	By Others
East Lyme System Growth	-	0.03	0.05	By Others
Total for East Lyme	**-**	**0.12**	**0.37**	**By Others**
Old Lyme (Except Point O' Woods)	Proposed	0.12	0.30	By Others
Total for Old Lyme	**-**	**0.12**	**0.30**	**By Others**
Waterford Moderate Expansion	-	0.48	0.96	By Others
Waterford System Growth	-	0.05	0.11	By Others
Total for Waterford	**-**	**0.53**	**1.07**	**By Others**
Total Regional Flows	**-**	**0.77**	**1.74**	**-**
New London System Growth	-	0.26	0.53	By Developers
Total for New London WWTF	**-**	**1.04**	**2.27**	**-**

4.2.16 North Stonington

General

The Town of North Stonington is a rural community located in the eastern portion of the SCCOG region. The greatest existing development density is located near the town center. The current population is estimated at 5,288 and is expected to decrease to 5,118 by 2030 and decrease to 4,614 by 2040.

Governance

The Town of North Stonington does not presently have a sewer system. Management and financial oversight of the future North Stonington sewer system is provided by the North Stonington WPCA. Technical and day-to-day operational oversight is not yet needed as the system is in the planning stages.

Existing Sewerage Facilities

The Town of North Stonington is currently served by SSDSs and does not own any sewer infrastructure. There are presently two connections to the Town of Stonington (Pawcatuck) sewer system by private agreement on Route 2. There are also two (decentralized) package treatment plants operating in town that were approved by the WPCA and the CTDEEP.

Future Sewerage Plan

According to the Town of North Stonington 2013 POCD, new housing opportunities should be supported by on-site SSDSs. This may be difficult for cluster-style or village-style developments except where sufficient space is

available for community SSDSs or package treatment plants. While the POCD recommends sewer avoidance for non-residential areas, the POCD recognizes that sewers may be necessary for economic competiveness.[73]

According to the WPCA and discussions at the data collection workshop, the Town of North Stonington desires sewer service in southeastern North Stonington to support industrial development. Up to 0.2 mgd of flow would potentially be directed to the Town of Stonington as discussed in Section 2.4.7, or would need to be treated with a package treatment plant. It is expected that the eventual agreement will require cost sharing for certain upgrades within the Pawcatuck system. Sewer development is expected to be completed in three phases:[74]

- Phase I is located in the industrial zone to the east of Route 2.
- Phase II is located along Route 2 up to the rotary with Route 184.
- Phase III is located along portions of Route 184 to the east and west of the rotary.

Two other areas in North Stonington were also discussed at the data collection workshop. The Town has started conversations with the Mashantucket Pequot Tribal Nation regarding potential expansion of sewer into northwestern North Stonington, but details of potential service areas were not available for this RWMP. The Kingswood Drive / Meadow Wood Drive neighborhood was identified as an area with substandard SSDSs where failures are common. The North Stonington WPCA desires a community SSDS or a package treatment plant for this area.

Projected Wastewater Flows

Projected wastewater flows for North Stonington are presented in Table 4-23. It is anticipated that these flows would be directed to the Town of Stonington for treatment at the Pawcatuck WWTF, although other options may be available. The two existing properties directing flow to the Pawcatuck WWTF would be put under the purview of the North Stonington WPCA as part of Phase I. The projected $4.6 million construction cost includes North Stonington's estimate for cost-sharing certain improvements in the Pawcatuck system with the Town of Stonington.[75] Due to the complexity of determining both potential construction costs and Pawcatuck system upgrade costs, development of cost estimates for Phase II and Phase III were not generated for this RWMP.

Table 4-23
Projected Wastewater Flow Increase for North Stonington

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Industrial Area – Phase I	Proposed	0.07	0.07	$4.6 M
Industrial Area – Phase II	Proposed	0.00	0.10	Needs Detailed Study
Industrial Area – Phase III	Proposed	0.00	0.04	Needs Detailed Study
Total Pawcatuck WWTF		**0.07**	**0.20**	**-**

[73] Town of North Stonington. (2013). *Plan of Conservation and Development.*

[74] Weston & Sampson Engineers. (2019). *Technical Memorandum: North Stonington Costs for Sewer Connection to Stonington.* North Stonington: Town of North Stonington.

[75] *Ibid.*

4.2.17 Norwich

General

The City of Norwich is an urban community located in the north-central portion of the SCCOG region. The current population is estimated at 42,632 and is expected to increase to 50,585 by 2030, and increase to 55,129 by 2040. The estimated population increase prepared by the CTSDC is substantial and may be optimistic for the city.

Governance

Management and financial oversight of the City of Norwich sewer system is provided by NPU. Technical and day-to-day operational oversight is provided by Norwich Public Utilities staff.

The NPU has inter-municipal agreements to treat flows from Bozrah, Preston, Lisbon, Sprague, and Franklin. Refer to Section 2.4.1, Section 2.4.8, and Table 4-1 for a summary of the agreements and flow allocations.

Existing Sewerage Facilities

According to the *Combined Sewer Overflow Long-Term Control Plan* (LTCP), the NPU collection system contains the following key features:[76]

- 16 CSO regulators discharging to 14 CSO outfalls in Norwich
- Five major interceptors: Laurel Hill, Thamesville, Salem Turnpike, Shetucket, and Yantic
- 117 miles of gravity sewer up to 42-inches in diameter in Norwich, and three miles outside Norwich
- 11 miles of force main in Norwich and 4 miles outside of Norwich
- 39 Norwich Public Utilities (NPU) maintained pumping stations, six private pumping stations, and one state-owned pumping station; the pump stations range in capacity from 30 gpm to 11.5 mgd

The existing service areas and major infrastructure components are shown on Appended Figure 1. Sewage is conveyed to the WWTF on Hollyhock Island for treatment. The last major expansion of the WWTF occurred in the mid-1970s. The WWTF is designed and permitted to treat an average flow of 8.5 mgd. The 2018 DMRs report an average flow at the WWTF of 4.6 mgd with a peak of approximately 20 mgd. A conventional activated sludge process is used to treat wastewater before discharging to the Thames River.

Future Sewerage Plan

The City of Norwich 2013 POCD encourages development to be directed to areas with existing infrastructure. Infill development is encouraged, and the Economic Development Plan map depicts areas of growth within existing sewer areas. Some areas where low-density (greater than 1 acre) residential development may occur are outside of sewered areas. The POCD recommends providing for adequate infrastructure to meet community needs and support desired growth patterns.[77]

[76] CDM Smith, Inc. (2018). *Combined Sewer Overflow Long-Term Control Plan.*

[77] City of Norwich Commission On The City Plan. (2013). *Norwich 2013 Plan of Conservation and Development - Strategic Element.*

NPU is presently working on a common inter-municipal agreement with the municipalities of Bozrah, Franklin, Sprague, and Preston regarding treatment of regional sewer flows. Regional flows may include substantial flows from the Preston Riverwalk development (Section 4.1.18) should the site be developed in the future.

The 2013 POCD recommends improving the wastewater treatment system to address issues related to water quality, CSOs, inflow/infiltration, and capacity constraints. The POCD identifies potential utility priorities that include westward expansion from Route 97 (in and north of Taftville and towards Canterbury Turnpike); expansion into unserved areas around Route 32, New London Turnpike, and Mohegan Sun in the southern part of the city; expansion into unserved areas of Norwichtown; and expansion into unserved areas of the Industrial Park.[78] These extensions have generally been accomplished.

NPU's 2018-2022 Capital Improvements Plan includes a project to upgrade the WWTF to install aeration tanks with integrated fixed film activated sludge system. This project would be partially funded by a Clean Water Fund (CWF) grant.

The LTCP recommends a plan to address CSOs that includes increasing the WWTF wet-weather capacity from 17 mgd to 20 mgd, adding new pump stations in key locations, adding new storage tanks, and increasing the diameter of dry-weather pipes around regulators.[79] According to NPU's 2018-2022 Capital Improvements Plan, the City is addressing some of these recommendations and also investing in an affordability analysis. Significant investments in eliminating combined sewers are expected over the next decade. The report indicates an annual allowance of $200,000, increasing annually over 10 years to a max of $500,000, with a stormwater allowance of $100,000 increasing annually over 10 years to a max of $300,000.

Projected Wastewater Flows

Projected wastewater flows for Norwich are presented in Table 4-24. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

Based on these flows, the Yantic Interceptor (28-inch diameter) may be undersized. NPU should evaluate the capacity of this interceptor in more detail. Furthermore, the pumping station conveying flows from Preston is presently sized at 1.0 mgd. Upgrades to this pumping station would be necessary to support flows from other areas of Preston (Section 4.2.18).

If an agreement with the Town of Ledyard is reached to direct flow from northwest Ledyard to Norwich for treatment, flows to the Norwich WWTF are expected to increase by 0.07 mgd through 2040. Furthermore, if an agreement with Sprague is reached to accept flows from its system in Baltic (resulting in abandonment of the Sprague WWTF), then flows would increase by 0.46 mgd through 2040. These combined flows would result in the Norwich WWTF operating at 96% capacity in 2040.

[78] *Ibid.*
[79] CDM Smith, Inc. (2018). *Combined Sewer Overflow Long-Term Control Plan.*

Table 4-24
Projected Wastewater Flow Increase for Norwich

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Fitchville / Stockhouse Road	Proposed	0.19	0.27	By Others
Gilman	Desired	0.00	0.10	By Others
Route 82 (West of Noble Hill Road)	Desired	0.00	0.01	By Others
Total for Bozrah	-	**0.19**	**0.38**	**By Others**
Route 32 (Southern)	Proposed	0.16	0.16	By Others
Route 32 (Northern)	Proposed	0.02	0.10	By Others
Total for Franklin	**-**	**0.18**	**0.26**	**By Others**
Route 2	Proposed	0.00	0.25	By Others
Route 12 (Happyland)	Proposed	0.01	0.04	By Others
Preston Riverwalk	-	0.50	1.00	By Others
Total for Preston	**-**	**0.51**	**1.29**	**-**
Sprague (Versailles)	Proposed	0.03	0.15	By Others
Total for Sprague	**-**	**0.03**	**0.15**	**-**
Total Regional Flows	**-**	**0.91**	**2.08**	**-**
Norwich System Growth	-	0.47	0.95	-
Total for Norwich WWTF	**-**	**1.38**	**3.03**	**-**

4.2.18 Preston

General

The Town of Preston is a suburban community located in the north-central portion of the SCCOG region. Preston lies to the southeast of the Norwich urbanized area. Development density in town is highest in Poquetanuck in the southwestern part of town, in Preston City and the area around Amos Lake, and in the Preston Plains area in southeastern Preston near Avery Pond. The current population is estimated at 4,656 and is expected to increase to 5,106 by 2030 and decrease to 5,023 by 2040.

Governance

At present, the Town of Preston does not have a WPCA, as only a limited area of town (the former Norwich State Hospital site) is served by sewer provided by Norwich Public Utilities. The Board of Selectmen serves as WPCA as needed.

Sewage from the former Norwich State Hospital site was sent to Norwich for treatment in accordance with their inter-municipal agreement dated 1997. This agreement is automatically renewed each year for an additional one-year term unless otherwise agreed upon. Flows have reportedly been minimal recently as the site is being redeveloped.

Existing Sewerage Facilities

The former Norwich State Hospital site along the Quinebaug River in Preston is served by a force main and pumping stations owned and operated by Norwich Public Utilities. The primary pumping station reportedly has a capacity of 1.0 mgd. There is currently no other sewer infrastructure in the Town of Preston.

Future Sewerage Plan

The Town of Preston 2014 POCD recommends extension of public sewer to specified areas of Preston to allow for controlled and environmentally responsible economic development, while ensuring that extensions do not spur inappropriate growth that strains human and natural resources and detracts from the Town's character. The POCD recommends the Board of Selectmen determine the feasibility of extending sewer lines in terms of supply, demand, engineering, legal issues, cost, and funding.[80]

The POCD identifies opportunities for connecting to the NPU sewer system along the western portion of Route 2 near the Norwich city line, along Route 2 near the former Norwich State Hospital site (the Resort Commercial zoning district), and along Route 12. The POCD also recommends extension of sewer into Happyland and Poquetanuck to alleviate pollutant loading into the Poquetanuck Cove.[81]

The commercial area on Route 2 in the Preston Plains / Avery Pond area is served with public water supply, although this is not specified in the POCD. Development of a package treatment plant or community SSDS may be appropriate in this area.

The Town of Preston (via the Preston Redevelopment Agency) and the Mohegan Tribe have agreed on a conceptual redevelopment plan of the former Norwich State Hospital Site in Preston along the Thames River. The conceptual master plan for the 400+ acre development may include housing, retail support services, large format entertainment, theme parks, hotels, and banquet halls.[82] Estimated sewer flows are not yet available but are generally expected to be substantial (0.5 mgd to 1.0 mgd). For the purposes of this RWMP, a flow of 1.0 mgd is assumed through 2040. It is anticipated that flow will be directed to the Norwich WWTF consistent with the currently installed infrastructure.

Projected Wastewater Flows

Projected wastewater flows for Preston are presented in Table 4-25.

Table 4-25
Projected Wastewater Flow Increase for Preston

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Route 2	Proposed	0.00	0.25	$5.5 M
Route 12 (Happyland)	Proposed	0.01	0.04	$3.0 M
Preston Riverwalk	-	0.50	1.00	By Developer
Total for Norwich WWTF	**-**	**0.51**	**1.29**	**$8.5 M**

[80] Town of Preston Planning and Zoning Commission. (2014). *Town of Preston Plan of Conservation and Development.*
[81] *Ibid.*
[82] Preston Redevelopment Agency. (2010). *Conceptual & Management Plan for the Redevelopment of Preston Riverwalk.*

4.2.19 Salem

General

The Town of Salem is a suburban community located in the western portion of the SCCOG region. Development density in town is highest in the center of town near the intersection of Route 82 and Route 85, and in the vicinity of Gardner Lake in northeastern Salem. The current population is estimated at 4,157 and is expected to decrease to 4,099 by 2030 and decrease to 3,818 by 2040.

Governance

The Uncas Health District provides oversight of private SSDSs. The Board of Selectmen provides oversight of other matters related to water pollution control.

Existing Sewerage Facilities

There is currently no sewer infrastructure in the Town of Salem.

Future Sewerage Plan

Centralized sewer systems are not proposed. According to the Town of Salem 2012 POCD, the Town will continue the current policy of town-wide municipal sanitary sewer avoidance.[83] There is some potential for community SSDSs to be used to treat certain commercial developments along Route 85 near Salem Four Corners.

Projected Wastewater Flows

No centralized wastewater flows are projected through 2040.

4.2.20 Sprague

General

The Town of Sprague is a suburban community located in the northern portion of the SCCOG region to the north of the Norwich urbanized area. Development density in town is highest in the vicinity of the villages of Baltic and Versailles. The current population is estimated at 2,988 and is expected to increase to 3,087 by 2030 and decrease to 3,035 by 2040.

Governance

Management and financial oversight of the Town of Sprague sewer system is provided by the Sprague Water and Sewer Authority Board. Technical and day-to-day operational oversight is provided by Sprague Water and Sewer Authority.

[83] Salem Planning and Zoning Commission. (2012). *Plan of Conservation and Development.*

A portion of flow (from the Versailles system) is sent to Norwich for treatment. In addition, a small amount of flow from western Lisbon is directed through the Versailles system to Norwich. For more details on these inter-municipal agreements, refer to Section 2.4.8.

Existing Sewerage Facilities

The Town of Sprague is primarily on SSDSs. The Town has two sewer systems – one generally in the village of Baltic which extends to the village of Hanover, and one generally in and around the village of Versailles. Flows to the Baltic system are treated at the Sprague WWTF. Flow in the Versailles system (including flow from 17 homes in Lisbon) is directed to the NPU sewer system for eventual treatment at the Norwich WWTF.

The Sprague WWTF was constructed in 1972 and is designed and permitted to treat a flow of 0.4 mgd. The current NPDES permit is from 2005. According to 2018 DMRs, the average flows are averaging 0.4 mgd with peak flows reaching 0.73 mgd. The plant currently uses secondary biological treatment and seasonal chlorine disinfection before discharging to the Shetucket River.[84]

The existing service areas and major infrastructure components are shown on Appended Figure 1. According to the Town of Sprague 2018 POCD, sewer lines in Baltic were upgraded in 2012.[85]

Sprague has four pump stations. The Sprague Water & Sewer Authority's Capital Improvement Plan (CIP) prepared in December 2018 indicates that the Hanover and Baltic pump stations were upgraded in 2014 and the Versailles Main Street and Versailles Bay Street pump stations were upgraded in 2009. The CIP indicates the replacement of the 8-inch force main from the Hanover Pump Station is planned in the near future.

Future Sewerage Plan

According to the 2018 POCD, sewer main upgrades are needed to the 100-year old cast iron lines in the village of Hanover as repairs to these lines are costly and frequent. The POCD further recommends giving consideration to extension of sewer service (to the west and south of Baltic and to the north of Hanover) to induce growth in Baltic. Finally, the POCD recommends beginning planning to upgrade the WWTF.[86]

According to the 2018 CIP provided by the Town of Sprague, the Town is seeking grant funding to upgrade the WWTF by 2022. This RWMP assumes that the Sprague WWTF will be upgraded, while acknowledging that the Sprague WWTF could be abandoned with flows sent to the Norwich WWTF for treatment.

Projected Wastewater Flows

Projected wastewater flows for Sprague are presented in Table 4-26. Refer to Table 4-5 for the expected increased pollutant loadings to the WWTF based on these projected flows.

[84] Wright-Pierce. (2005). *Wastewater Facilities Planning Study for the Sprague, Connecticut Water Pollution Control Authority.*
[85] Town of Sprague Planning and Zoning Commission and Chester, P. S. (2018). *Plan of Conservation and Development.*
[86] *Ibid.*

Table 4-26
Projected Wastewater Flow Increase for Sprague

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
North Hanover, Western Baltic (Route 207), and Southern Baltic (Route 97)	Proposed	0.01	0.04	$3.5 M
Sprague System Growth	-	0.01	0.02	By Developer
Total to Sprague WWTF		**0.02**	**0.06**	**$3.5 M**
Sprague (Versailles)	Proposed	0.03	0.15	By Developer
Total to Norwich WWTF	**-**	**0.03**	**0.15**	**-**
Total for Sprague	**-**	**0.05**	**0.21**	**$3.5 M**

4.2.21 Stonington, Borough of

General

The Borough of Stonington is a dependent political subdivision of the Town of Stonington in the southeastern portion of the SCCOG region. The current population is estimated at 915 and is expected to increase to 945 by 2030 and remain stable through 2040.

Governance

The Board of Warden and Burgesses is the governing authority in the Borough of Stonington, but the borough does not provide wastewater service. The sewer lines are owned and maintained by the Town of Stonington. Thus, management and financial oversight of the sewer system in the Borough of Stonington is provided by the Stonington WPCA, and technical and day-to-day operational oversight is provided by Stonington WPCA and their contract operators.

Future Sewerage Plan

Sewer service in the Borough will continue to be provided by the Town of Stonington for the foreseeable future. According to the Town of Stonington 2015 POCD, denser residential development is recommended in the borough that may result in increased sewer flows. New development, infill development, and redevelopment in keeping with the overall character of the borough is recommended.[87]

Projected Wastewater Flows

Refer to Section 4.2.22 for projected wastewater flows related to the Borough area.

[87] Town of Stonington. (2015). *Plan of Conservation & Development.*

4.2.22 Stonington, Town of

General

The Town of Stonington is a suburban coastal community located in the southeastern portion of the SCCOG region to the east of Groton. Development density in town is highest in the Mystic and Pawcatuck areas. The current population is estimated at 17,386 and is expected to decrease to 16,621 by 2030 and decrease to 15,570 by 2040.

Governance

Management and financial oversight of the sewer system in Stonington is provided by the Stonington WPCA. Technical and day-to-day operational oversight is provided by Stonington WPCA and their contract operator (Suez Environmental).

Existing Sewerage Facilities

The Town of Stonington has three sanitary sewer systems that discharge to three WWTFs: Mystic, Stonington Borough, and Pawcatuck. The existing service areas and major infrastructure components are shown on Appended Figure 1.

- *Mystic:* According to the Town's *Wastewater Facilities Plan*, the Mystic service area was predominately built in the 1970s and contains approximately 20 miles of gravity sewers, five pumping stations, and approximately 1.1 miles of force mains leading to the Mystic WWTF. One of the pumping stations was designed to convey underflow from the plant's primary clarifiers to the Borough WWTF via a separate force main installed in 1997.[88] The force main is currently not in use but is proposed to be repurposed to send raw wastewater to the Borough WWTF in the next few years.

  The Mystic WWTF has a permitted capacity of 0.80 mgd. According to 2018 DMRs, the average flow is 0.61 mgd with a peak flow of 0.81 mgd. Flows in late 2018 and spring 2019 were reportedly above capacity due to inflow and infiltration, and private sump pump contributions. Stonington WPCA reported that upgrades to the facility were completed in 2015, including the addition of preliminary treatment, a BioMag system for nitrogen removal, and ultraviolet disinfection to treat effluent before discharging to the Mystic River.

- *Stonington Borough:* The 2006 *Wastewater Facilities Plan* indicates the Stonington Borough collection system was constructed in the 1970s and includes approximately 8.5 miles of gravity sewers, seven pumping stations, 0.7 miles of force main, a force main that formerly carried sludge to the Mystic WWTF, and the Borough WWTF. The force main from Mystic to the Borough was built in 1997. The Borough WWTF has a design and permitted capacity of 0.66 mgd.[89] According to the 2018 DMRs, the average flow is 0.12 mgd with a peak flow of 0.24 mgd. The activated sludge process is used to treat effluent before discharging to the Stonington Harbor.

[88] CDM. (2006). *Wastewater Facilities Plan.*
[89] *Ibid.*

- *Pawcatuck:* According to the *2006 Wastewater Facilities Plan*, the Pawcatuck collection system contains approximately 20 miles of sewers, including six miles of interceptor sewers and 14 miles of lateral sewers. The system also contains 1.4 miles of force main, six pumping stations, and the Pawcatuck WWTF. The Pawcatuck WWTF was completed in 1980 and has a permitted capacity of 1.3 mgd.[90] According to the 2018 DMRs, the average flow is 0.52 mgd with a peak flow of 1.99 mgd. Secondary treatment with denitrification (cyclic aeration) and year-round chlorine disinfection is used to treat effluent before discharging to the Pawcatuck River.

The Town of Stonington expressed concern that it believes operating three separate WWTFs is inefficient and that WWTF consolidation should be considered. Based on the analysis in Section 2.5, the average operating cost per gallon of average daily flow is approximately $2.17, which is comparable to the average of $1.69 per gallon of average daily flow for the region. The actual operating cost is believed to be slightly higher when all expenditures by the Town not specific to the WPCA are considered. Nevertheless, out of the ten respondents in Table 2-2, the Town of Stonington has the fourth most expensive annual operating cost per gallon of average daily flow. The Town of Stonington appears to be significantly more efficient than the Town of Ledyard cost (for a very small system) and Jewett City's cost (for an underutilized plant), and is comparable to the Town of Groton operating cost ($2.10). Furthermore, plant consolidation would likely cost tens of millions of dollars.

Based on this information, WWTF consolidation is not recommended in this RWMP, but should be considered by the Town as part of its future facilities planning. Instead, other less costly solutions should be pursued by the Town to meet its needs through 2040.

Future Sewerage Plan

The Town of Stonington 2015 POCD encourages denser residential development in the village areas of Pawcatuck, Mystic, and Old Mystic. New development, infill development, and redevelopment is also encouraged in these areas when consistent with the overall character of the neighborhood. Development is encouraged in the vicinity of Interstate 95 at Exit 92 in Pawcatuck. The POCD recommends locating and phasing sewer lines to encourage concentrated development in suitable areas, and using limited excess capacity to abate sources of pollution when necessary.[91]

The Town of Stonington noted that a significant amount of development is planned for Mystic in the near future. Developers have suggested several projects including hotels that would be connected to the sewer system. Estimated sewer flows for these projects were not available for this report, but for the purposes of this it is assumed that these projects could increase flows to the Mystic WWTF by up to 0.20 mgd by 2030, and by up to 0.30 mgd by 2040.

Masons Island has been identified as an area where traditionally seasonal residences are now being occupied year round such that SSDSs are reportedly being overwhelmed more often than before.[92] According to the Stonington WPCA, this area is partially served by a private sewer system with flows directed to the Mystic WWTF. The 2017 POCD recommends expansion of sewer on the island while implementing controls to prevent increased

[90] *Ibid.*
[91] Town of Stonington. (2015). *Plan of Conservation & Development.*
[92] Milone & MacBroom, Inc. (2017). *Multi-Jurisdiction Hazard Mitigation Plan Update.*

development density.[93] Any such expansion would need to be coordinated with the Mason's Island Property Owners Association and the Mason's Island Company.

The 2015 POCD recommends identification of possible modifications to public infrastructure to account for increases in sea level. The 2015 POCD also reported that based on recent WWTF upgrades, adequate sewage treatment capacity was expected to meet community needs through 2025. This continues to be true for the Borough and Pawcatuck WWTFs, but not the Mystic WWTF. The POCD further recommends completion of a long-term plan for addressing the potential impacts of sea level rise on the sewer system.[94]

The Mystic WWTF is currently operating close to capacity during high groundwater periods, and is projected to be at 77% to 78% capacity under normal groundwater conditions with future flows. Peak flows on some days in 2018 exceeded permitted capacity, and wet-weather flows in fall 2018 and spring 2019 consistently exceeded 0.8 mgd, resulting in the issuance of a moratorium in June 2019 on new sewer connections in the Mystic system. Approximately $0.3 million has been allocated in FY 2020 to evaluate inflow and infiltration issues in the Mystic system. Note that the Perkins Farm project off Jerry Brown Road (listed in Table 4-2) will not be affected by the moratorium because (according to the WPCA) it already has approval for sewer connection. This project will create a 40,000 gallon per day increase at the Mystic WWTF.

An inflow/infiltration study is needed to determine if potential solutions for reducing inflow/infiltration may restore some capacity. The WPCA is also considering using the former primary sludge force main to direct some flow from the Mystic WWTF to the Borough WWTF. This could allow for up to 0.30 mgd to be transferred to the Borough WWTF without that plant reaching 90% capacity and therefore should be pursued in the short term. Approximately $1.7 million in funding has been allocated in FY 2020 for this purpose. The Town has also asked the Town of Groton WPCA about the feasibility of taking some flow from Mystic; this would require an expensive project to cross the Mystic River and a dedicated pumping station. This latter option may be considered in the long-term but is not considered desirable within the planning period of this RWMP.

The WPCA is also considering upgrading the capacity at the Maritime Drive pump station, and connecting homes on two streets nearby the Mystic WWTF and Pawcatuck WWTF that are currently on SSDSs. According to the WPCA, these connections would require the construction of a gravity main and lateral sewers, and would likely generate nominal flows. Other than these areas, the WPCA anticipates that any expansions of the conveyance system would be paid for by developers. Finally, the most recent facilities plan was created in 2004 and included a planning period through 2023, which warrants updating.

Projected Wastewater Flows

Projected wastewater flows for Stonington are presented in Table 4-27. Refer to Table 4-5 for the expected increased pollutant loadings to the three WWTFs based on these projected flows.

As noted in Section 4.1.3, the Stonington WPCA plans to divert up to 0.3 mgd of raw wastewater from the Mystic WWTF to the Borough WWTF for treatment in the near future. This project will provide additional capacity to the Mystic WWTF such that the used capacity would be expected to be 76% through 2040. The Borough WWTF would be operating at 65% capacity in 2040 with the additional flows from the Mystic WWTF.

[93] Town of Stonington. (2015). *Plan of Conservation & Development.*
[94] *Ibid.*

Table 4-27
Projected Wastewater Flow Increase for Stonington

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Perkins Farm Development	Proposed	0.04	0.04	By Developer
Mystic System Growth	-	0.13	0.26	By Developer
Total Mystic WWTF	**-**	**0.17**	**0.30**	**-**
Borough System Growth	-	0.00	0.01	By Developer
Total Borough WWTF	**-**	**0.00**	**0.01**	**-**
Industrial Area – Phase I	Proposed	0.07	0.07	By Others
Industrial Area – Phase II	Proposed	0.00	0.10	By Others
Industrial Area – Phase III	Proposed	0.00	0.04	By Others
Total North Stonington		**0.07**	**0.20**	**By Others**
Pawcatuck System Growth	-	0.01	0.03	By Developer
Total Pawcatuck WWTF		**0.08**	**0.23**	**-**

4.2.23 Waterford

General

The Town of Waterford is a suburban coastal community located in the south-central portion of the SCCOG region to the west of New London. Development density in town is highest in central Waterford and along the Route 85 corridor. The current population is estimated at 19,341 and is expected to decrease to 18,465 by 2030 and decrease to 17,121 by 2040.

Governance

Management and financial oversight of the Waterford sewer system is provided by the Waterford Utilities Commission. Technical and day-to-day operational oversight is provided by staff within the Waterford Utilities Commission. The Town of Waterford is part of the Tri-Town Agreement between East Lyme, Waterford and New London (see Section 2.4.3).

Existing Sewerage Facilities

Waterford Utilities Commission operates approximately 142 miles of gravity sewer and 28 pump stations, with the Evergreen Avenue Pump Station conveying nearly all of Old Lyme, East Lyme, and Waterford flow, as well as parts of New London flow, to the New London WWTF.[95] Waterford sends an average of 3.0 to 3.2 mgd to New London for treatment. The existing service areas and major infrastructure components are shown on Appended Figure 1. The peak flow capacity of the Evergreen Avenue Pump Station is 10.8 mgd.

During the data collection workshop, the Waterford Utilities Commission indicated there are no known capacity issues within the system. Based on the analysis in Table 4-6, the Harvey Avenue (Blue Hills) pumping station may be undersized for peak flows. The agreement between Waterford and East Lyme indicates a peak capacity of 8 mgd in the East Lyme to Waterford lines.

[95] Wright-Pierce. (2011). *Wastewater Facilities Plan Update for the Waterford Utility Commission - Final Report.*

Future Sewerage Plan

The Town of Waterford POCD encourages greater densities of mixed-use development within some sewered areas. Industrial and commercial activity will continue in sewered areas. The POCD suggests that the Town may wish to extend sewer service to accommodate additional growth. However, the POCD also recommends that future sewer extensions address documented SSDS problems in accordance with overall sewer policy, be in accordance with the sewerage master plan, and/or support recommendations of the POCD.[96]

The POCD recommends that the Waterford Utilities Commission address inflow/infiltration, and implement an overall maintenance plan for the refurbishment of pump stations and other improvements. The Quaker Hill pumping station on Mohegan Avenue is one area suspected to experience inflow/infiltration issues.

The Evergreen Avenue pumping station conveys nearly all of the Waterford, East Lyme, and Old Lyme flows into New London. The pump station needs additional pumping capacity for redundancy, and the Town plans to add this additional redundancy in the coming years. Installation of a bypass at this pumping station is recommended if one does not presently exist. Furthermore, other connections to the New London system should be considered for redundancy purposes.

Projected Wastewater Flows

Projected wastewater flows for Waterford are presented in Table 4-28.

Table 4-28
Projected Wastewater Flow Increase for Waterford

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Moderate Growth Projections from Facilities Plan	-	0.48	0.96	By Developer
Waterford System Growth	-	0.05	0.11	By Developer
Total for Waterford	**-**	**0.53**	**1.07**	**-**
Total Received from East Lyme	-	0.24	0.67	-
Total Directed to New London WWTF	**-**	**0.77**	**1.74**	**-**

4.2.24 Windham (and Southern Mansfield)

General

The Town of Windham is a suburban community located in the northern portion of the SCCOG region. The town includes the urbanized area of Willimantic. The current population is estimated at 26,086 and is expected to increase to 32,543 by 2030 and increase to 38,362 by 2040. The estimated population increase prepared by the CTSDC is substantial and may be optimistic.

[96] Town of Waterford. (2012). *Plan of Preservation, Conservation and Development.*

Governance

Management and financial oversight of the Windham sewer system is provided by the Windham WPCA. Technical and day-to-day operational oversight is provided by staff within the Windham WPCA.

Existing Sewerage Facilities

According to Windham WPCA, all of the Windham WWTF items identified in the 2003 Capital Improvement Plan were completed by 2016. These upgrades included headworks improvements, influent pump station improvements, primary settling tank improvements, biological wastewater treatment modifications, effluent disinfection, additional sludge storage, and plant support systems. The existing service areas and major infrastructure components are shown on Appended Figure 1.

The current NPDES permit dated November 2018 states the WWTF is designed and permitted to treat an average flow of 5.5 mgd. According to DMRs from October 2017 to October 2018, the average flow is 1.96 mgd with a peak flow of 4.20 mgd. Windham accepts flow from the southern portion of the Town of Mansfield (outside of SCCOG) via gravity flow in accordance with their inter-municipal agreement (see Section 2.4.5). This agreement allows for an average daily sewer flow of 0.5 mgd to be directed from Mansfield to Windham.

Future Sewerage Plan

Expansion of the service area in southern Mansfield is not anticipated. The Town of Mansfield indicates that it is considering rezoning industrially zoned land near Route 6. These areas are currently used for agriculture and considered suitable for farmland preservation. Perkins Corner is considered built-out and sewers are not necessary for the desired development density. Furthermore, SSDS issues are uncommon in southern Mansfield. Thus, future flows are expected to be consistent with current flows through 2040.

According to the Town of Windham 2017 POCD, development of manufacturing pad sites with access to freight rail lines along Route 32 in South Windham is encouraged. Extension of sewer to this area to facilitate this development is also encouraged.[97]

According to the Windham WPCA, there has been minimal expansion of the system within Windham in recent years, and the majority of new connections are infill. Expansion of the system into Coventry is possible but no plans have materialized. Expansion into Chaplin along Route 6 is also considered to be unlikely. As the WWTF does not have the ability to expand in its present location to increase capacity above its current capacity, significant expansion of the conveyance system is unlikely.

The Windham WPCA reports that as the current system is expected to operate efficiently until at least 2028, a new facilities plan will be prepared before 2030. Current efforts are focused on relining old asbestos mains and prioritizing wet areas. They have documented and repaired major issues related to the collection system.

[97] Windham Planning and Zoning Commission. (2017). *Plan of Conservation and Development.*

Projected Wastewater Flows

Projected wastewater flows for Windham are presented in Table 4-29. These projections suggest that the Windham WWTF will be at approximately 53% capacity in 2040, with additional capacity to support flows from other towns if necessary. Refer to Table 4-5 for the expected increased pollutant loadings to the three WWTFs based on these projected flows.

Table 4-29
Projected Wastewater Flow Increase for Windham

Area	Status	Estimated 2030 Flows (mgd)	Estimated 2040 Flows (mgd)	Estimated Construction Cost
Southern Windham	Proposed	0.10	0.52	By Developer
Windham System Growth	-	0.23	0.47	By Developer
Total for Windham WWTF	**-**	**0.34**	**0.99**	**-**

5.0 POTENTIAL IMPACTS OF CLIMATE CHANGE ON EXISTING INFRASTRUCTURE

All of the SCCOG communities are susceptible to the effects of climate change. This may include increased incidence of severe storms that may cause increased frequency of severe rainfall or coastal flooding, as well as sea level rise.

5.1 Increasing Precipitation

Mean annual precipitation in the region is 54.8 inches per year as measured in Norwich, and is typically evenly distributed throughout the year. By comparison, average annual statewide precipitation based on more than 100 years of record is much lower at 44.8 inches. It has been shown that average annual precipitation in Connecticut has been increasing by 0.95 inches per decade since the end of the 19th century.[98] In recent years, much of the increase in annual precipitation is attributable to extreme storms. Winter has also produced extreme storms in recent years, such as the winter of 2010-2011 that saw upwards of 80 inches of snowfall in parts of Connecticut. The increase in precipitation, along with sea level rise and the potential for increased heavy snowfall during the winter months, must be accounted for in regional planning.

According to the 2018 draft Connecticut *State Water Plan* climate change analysis, climate models project an increase in temperature for all calendar months. Projected temperature changes appear relatively consistent across calendar months and percentile levels, for each of the scenarios. In other words, both summer and winter temperatures are projected to increase by similar amounts; and a similar shift is observed for both extreme cold and extreme hot months. Precipitation projections are more variable despite consistently projecting a generally wetter future for all four scenarios. The largest precipitation increases are projected for the wetter months (higher percentiles), including extreme wet months. It follows, then, that the seasonality plots show that winter and spring precipitation changes are projected to be larger than summer and autumn changes. Drier months are generally projected to remain about the same in terms of both frequency and rainfall level. Small decreases in extreme dry month precipitation are projected for the "hot/dry" scenario.[99]

Recent regional and state-specific analyses have shown that the frequency of two-inch rainfall events has increased, and storms once considered a 1% annual chance event are now likely to occur twice as often. Flow rates during peak annual floods, as well as floods with recurrence intervals of 5, 10- and 20- years, have been increasing between 1962 and 2012. Average observed rates of increase are from 0.9 to 1.8 percent per year.[100]

Increasing precipitation may affect wastewater management in several ways. First, increased overall rainfall totals may lead to higher groundwater tables during some periods of the year, limiting the effectiveness of subsurface disposal systems in certain areas where the rating class is tied to the height of the groundwater table. Furthermore, higher groundwater tables may also result in increased inflow/infiltration volumes. Second, increased precipitation rates may result in increases in the occurrence and/or severity of CSOs in Norwich, thereby impacting the City's long-term control plan. Finally, increased severe rainfall events may increase the overall occurrence of flooding, thereby increasing impacts to aboveground wastewater system infrastructure such as the Jewett City WWTF.

[98] Milone & MacBroom, Inc. (2017). *Multi-Jurisdiction Hazard Mitigation Plan Update.*
[99] CDM Smith and Milone & MacBroom, Inc. (2018). *Final Report - Connecticut State Water Plan.*
[100] Barrett, K. R. (2017). Prevalence and Magnitude of Trends in Peak Annual Flow and 5-, 10- and 20-Year Flows in the Northeastern United States. *Journal of Hydrologic Engineering.*

Public Act 18-82 increased the design elevation for State-funded critical activities (such as wastewater storage and treatment) to the elevation of the 0.2% annual chance flood plus a freeboard of two feet. Critical activities identified in the act include both pump stations and WWTFs. Table 5-1 summarizes the pump stations and WWTFs located within or nearby floodplains mapped on Flood Insurance Rate Maps (FIRMs) by the Federal Emergency Management Agency (FEMA) that are not currently compliant with the Public Act 18-82 standard. Analysis of all pump stations and WWTFs in the region is presented in Appendix B.

Based on the summary in Table 5-1, 47 pump stations and six WWTFs appear to not be elevated higher than the current design standard set by Public Act 18-82. For those components identified in Table 5-1, additional study is recommended to identify specific mitigation measures for those wastewater components that are not compliant with Public Act 18-82. Note that this analysis does not consider local flood protection projects or other actions taken by these systems to mitigate flooding. Some systems are already aware of their risks and taking action. For example, the Jewett City Department of Public Utilities has been in the process of hardening its WWTF over the last decade, and also plans to mitigate the South Street pump station in the next few years.

Table 5-1
Summary of Sewer Infrastructure at Risk of Riverine Flooding

Sewer System	Pump Station (PS) or WWTF	FEMA Flood Zone
Colchester	Prospect Hill PS	Zone AE
East Lyme	Colton Road, Route 156, & Society Road PS Pump Station 1 Pump Station 2	None Zone X500 Zone AE
Groton, Town of	Deerfield & Fishtown Road PS	None
Hebron (Lebanon)	Amston Lake PS	None
Jewett City	East Main Street & Wilson Street PSs South Main Street PS Burleson Lane PS WWTF	None Zone X500 Zone AE Zone AE
Ledyard	WWTF	None
Montville	Mohegan Brook PS Pequot PS	Zone X500 Zone AE
New London	Roseaway Street PS	Zone X500
Norwich	Courthouse, New London Turnpike #2, Newton Street Sewer Extension, & Washington Street PSs Durham Street, Salem Turnpike #3, & Thames Street PSs Bolduc Lane, Cove Street, Falls Avenue, Falls Mill, River Avenue, Rose Alley, Salem Turnpike #1, Shipping Street, & Talman Street PSs Great Plain Road, Occum Road, Phelps Dodge, & Shore Road PSs WWTF	None Zone X500 Zone AE Floodway Zone AE
Sprague	Versailles PS Hanover PS Main Street PS WWTF	None Zone A Floodway Zone X500
Stonington (Pawcatuck)	Pump Station 2 & Extrusion Drive PSs WWTF	None None
Waterford	Evergreen Avenue & Harvey Avenue PSs Parkway North PS Old Norwich Road PS	None Zone X500 Zone X500
Windham	Route 195 PS Cracow Avenue PS WWTF	Zone X500 Zone AE Zone AE

As climate continues to change, SCCOG communities must consider not just the past and present, but also potential future precipitation conditions. As the expectation is that the precipitation magnitude associated with smaller, more frequent storms is expected to increase, design standards will likely need to continue to increase to compensate. Furthermore, with the expectation that the precipitation magnitude associated with larger, less frequent storms is also expected to increase, more efficient and effective stormwater management controls will be necessary to mitigate flash and poor drainage flooding.

5.2 Increased Coastal Flooding

In addition to changes to the frequency and magnitude of precipitation events, the effects of climate change also include changes to the frequency and magnitude of tropical storms. According to the Geophysical Fluid Dynamics Laboratory (GFDL) at the National Oceanic and Atmospheric Administration (NOAA), tropical cyclone intensities are expected (greater than 66% chance) to increase 1% to 10% globally due to global warming and to also bring higher rainfall rates. More intensive tropical cyclones are likely to have higher wind speeds and storm surges. Fortunately, according the GFDL, overall frequency of tropical cyclones in the North Atlantic does not appear to be increasing at this time.[101]

Coastal Erosion

While sewer systems are located underground and generally are not susceptible to coastal flooding, sewer mains along shoreline streets may be susceptible to gradual chronic coastal erosion and rapid coastal erosion. Rapid coastal erosion exacerbates the long-term threat posed by gradual chronic erosion, and typically results from episodic natural hazard events such as hurricanes, nor'easters, and storm surge. Such events have the ability to flatten dunes and create massive erosion in only hours or days. Erosion may also be worsened by human activities such as boat wakes, shoreline hardening, and offshore dredging.

As coastal erosion continues, the shoreline moves landward posing an increased threat of damages to adjacent property and infrastructure. Natural recovery from episodic erosion events can take months or years. If a beach and dune system does not recover quickly enough naturally, coastal and upland property may be exposed to further damage in subsequent events. Shoreline hardening techniques such as seawalls, revetments, bulkheads, groins and jetties may temporarily stave off coastal erosion, but in most cases they worsen existing erosion or cause new erosion in adjacent areas.

Coastal erosion will continue to be a highly likely occurrence along many shoreline areas of the SCCOG region. This includes both the continuous but slow onset, long-term effects of natural coastal processes as well as rapid, episodic erosion caused by large coastal storms. It is anticipated that the effects of climate change, including sea level rise, will result in an increase in the extent of both coastal flooding and coastal erosion. Although a specific analysis of the potential impacts of coastal erosion on sewer infrastructure is beyond the scope of this study, it is recommended that these sewer systems be included in any coastal resilience study prepared for any communities in the region.

The Town of Waterford provides a good example for concerns regarding coastal erosion. According to Waterford Utilities Commission, the barrier wall at the former Seaside Sanatorium was in danger of failing during Superstorm Sandy in 2012, putting the sewer force main behind the wall at risk. Although the Seaside property is not presently used, the Town-owned pump station on the property conveys sewer flows from surrounding neighborhoods. Potential redevelopment of this property into a State Park is expected to result in more substantial repairs to the seawall.

[101] Geophysical Fluid Dynamics Laboratory. (2019, May 31). *Global Warming and Hurricanes - An Overview of Current Research Results*.

Coastal Flooding and Storm Surge

Planning in the City and Town of Groton provides a good example for the susceptibility of the region to coastal flooding and storm surge. Utility adaptation in the City and Town of Groton will need to focus on vulnerable, low-lying wastewater infrastructure. Sewer pump stations and WWTFs are susceptible to power outages, pump failures, overflows, and power loss (shorting) when flooding occurs. The loss of sewer pumping capabilities can lead to pollution and public health threats. Elevating or flood-proofing equipment and construction of on-site floodwalls are the primary means of adapting these sites, although site-specific options may also be possible at WWTFs. Anchoring of certain equipment may also be necessary.[102]

Pump stations and WWTFs are typically located partially or fully above ground and therefore are at more risk of experiencing damage from coastal flooding. The 2014 draft MCP for Groton identifies a number of pumping stations and WWTFs as being prone to coastal flooding. Table 5-2 presents the various pump stations and WWTFs that are considered susceptible to coastal flooding based on FEMA FIRMs, hurricane storm surge areas prepared by the United States Army Corps of Engineers (USACE), and coastal topography prepared by the Connecticut Institute for Resilience & Climate Adaptation (CIRCA). Based on this analysis, 62 pump stations and five WWTFs (all listed in Table 5-2) lie in areas that do not appear to meet the current design standard under Public Act 18-82, and 19 pump stations and three WWTFs appear to lie within the storm surge zone for a Category 1 hurricane. Note that this analysis does not consider local flood protection projects or other actions taken by these systems to mitigate flooding.

Coastal resilience plans have been developed for the majority of the region's coastal towns. Many of these plans evaluated the flooding risk to coastal infrastructure, such as pump stations and WWTFs. For example, the 2017 Stonington *Coastal Resilience Plan* identifies a number of at-risk pump stations and WWTFs, and recommends detailed risk assessments be performed at each location.[103] The 2017 Waterford Climate Change Adaptation Study also identified vulnerable pumping stations and provided floodproofing and/or floodwall recommendations.[104] As the plans predate the passage of Public Act 18-82, the evaluations used older design guidelines (such as the 1% annual chance flood elevation plus three feet or the 0.2% annual chance flood) to make recommendations for mitigation actions. The passage of Public Act 18-82 now provides a defined regulatory elevation (the 0.2% annual chance flood plus two feet) that can be used for design purposes.

Shoreline SSDSs are also susceptible to coastal flooding. Floodwaters saturate the ground, preventing filtration of wastewater through the soil above the groundwater table which is necessary for proper on-site septic system function. Regarding coastal flooding and storm surge, the SSDSs most at risk of failure are those where the home or business can remain occupied but the SSDS is low-lying and floodprone.

The impact of coastal flooding on shoreline SSDSs was recently used to secure grant funding for the installation of sewer systems on Long Island, New York. During Hurricane Sandy, communities on the south shore in Suffolk County experienced widespread SSDS failure due to coastal flooding. The Suffolk County Resiliency Initiative includes five projects to sewer parcels currently using SSDSs.[105] The projects will result in the creation of new sewer districts and the expansion of existing sewer districts in order to prevent future occurrences of contamination. The total project cost is $390 million dollars, paid entirely from state and federal grants including

[102] Milone & MacBroom, Inc. (2014). *Town of Groton Municipal Coastal Program Update (Draft).*
[103] Arup, Woods Hole Group, CivicMoxie, and TDA, Inc. (2017). *Town of Stonington Coastal Resilience Plan.*
[104] Kleinfelder Northeast, Inc. (2017). *Climate Change Risk Vulnerability, Risk Assesssment and Adaptation Study.*
[105] Suffolk County Government. (2019). *Suffolk County Coastal Resiliency Initiative*.

the FEMA Hazard Mitigation Grant Program, Community Development Block Grant - Disaster Recovery funding, New York State Water Quality and Capital Programs, Clean Water State Revolving Fund administered by the New York State Environmental Facilities Corporation, and the Empire State Development grant program. The projects will eliminate nearly 7,000 cesspools and SSDSs that have been identified as the largest source of nitrogen pollution to the south shore bays. As the effects of additional coastal flooding and sea level rise are realized, a similar program may be beneficial for targeted shoreline areas in the SCCOG region reliant on SSDSs but susceptible to coastal flooding. Any grant funding would likely need to benefit both public health and water quality similar to the Suffolk County projects.

5.3 Sea Level Rise

Sea level rise refers to an increase in mean sea level over time. There is strong scientific evidence that global sea level is now rising at an increased rate and will continue to rise during this century. The major causes of global sea level rise are thermal expansion caused by the warming of the oceans (since water expands as it warms) and the loss of land-based ice

Table 5-2
Sewer Infrastructure at Risk of Coastal Flooding and/or Not Meeting Public Act 18-82 Standard

Sewer System	Pump Station (PS) or WWTF	FEMA Flood Zone	Hurricane Surge Zone
East Lyme	McCook Beach PS	None	None
	Marshfield Road PS	Zone X500	None
	Niantic PS	Zone AE	4
	East Shore Drive & Old Black Point Road PSs	Zone AE	3
	Bride Brook, Giant Neck, & Point Road PSs	Zone AE	2
	Pattagansett & Shore Road PSs	Zone AE	1
	Attawan Beach PS	Zone VE	1
Groton, City of	Twin Hills PS	None	None
	Colonial & Plant Street PSs	Zone AE	2
	Eastern Point & Jupiter Point PSs	Zone VE	1
	WWTF	Zone VE	1
Groton, Town of	Brookview, Goss Cove, & Mumford Cove PSs	Zone X500	3
	Tower Avenue PS	Zone X500	2
	Noank, Pequonnock River & Trails Corner PSs	Zone AE	2
	Beach Road, Beebe Cove, Gravel Street, & North Street PSs	Zone AE	1
	Little Gibraltar & Pacific Street PSs	Zone VE	1
	WWTF	Zone AE	3
Montville	Lower Marina PS	None	1
	Kitemaug PS	Zone AE	2
New London	Pequot Ave. (Chapel Dr.) & Pickering Street PSs	Zone X500	2
	Atlantic Street, Ocean Beach Park, and Thomas Griffin Road PSs	Zone AE	2
	Pequot Ave. (Shoreline) PS	Zone VE	2
	WWTF	Zone AE	1
Stonington (Borough)	Flanders Road PS	None	None
	Ensign Lane PS	Zone AE	3
	Diving Street PS	Zone VE	1
	WWTF	Zone VE	2
Stonington (Mystic)	Maritime Drive PS	None	None
	Old Mystic PS	Zone X500	3
	Hewitt Road PS	Zone AE	2
	Lindbergh Road PS	Zone AE	1
	Wolcott Avenue PS	Zone VE	2
	Boulder Avenue PS	Zone VE	1
	WWTF	Zone VE	1
Stonington (Pawcatuck)	Pump Station 1	Zone AE	2
	Pump Station 3	Zone AE	1
Waterford	Oswegatchie Road PS	None	None
	Dock Road, Shore Road, & Thames Landing PSs	Zone X500	3
	East Neck Road, Old Colchester Road, & Wilcox Court PSs	Zone X500	2
	Colonial Drive PS	Zone AE	None
	Millstone Road East & Seaside Drive PSs	Zone AE	4
	Bolles Court PS	Zone AE	2
	Niantic River Road, Oil Mill Road, Shore Drive, & Wadsworth Lane PSs	Zone AE	1

(such as glaciers and polar ice caps) due to increased melting.[106]

Local sea level change, which is of more direct concern to SCCOG coastal communities, is caused by a combination of global sea level rise, changes in local and global ocean currents, and local changes in land elevation. Weakening Atlantic currents and local land subsidence accelerate the rate of sea level rise occurring in Long Island Sound. Coastal communities experiencing increases in mean sea level are at greater risk to the effects of coastal flood hazards as natural protective buffers, such as coastal wetlands and dunes, are lost and property and infrastructure become more exposed to the frequency and severity of coastal flood and storm surge inundation.[107] Some lesser concerns include the risk of increasing groundwater elevations near the shoreline, increased inflow/infiltration to gravity sewers, and changes in the salinity of groundwater near the shoreline potentially resulting in soil chemistry changes that could lead to more rapid deterioration of underground infrastructure.[108]

Two long-term tide gauges are operated by NOAA along the Connecticut coastline as demonstrated in Figure 5-1.[109]

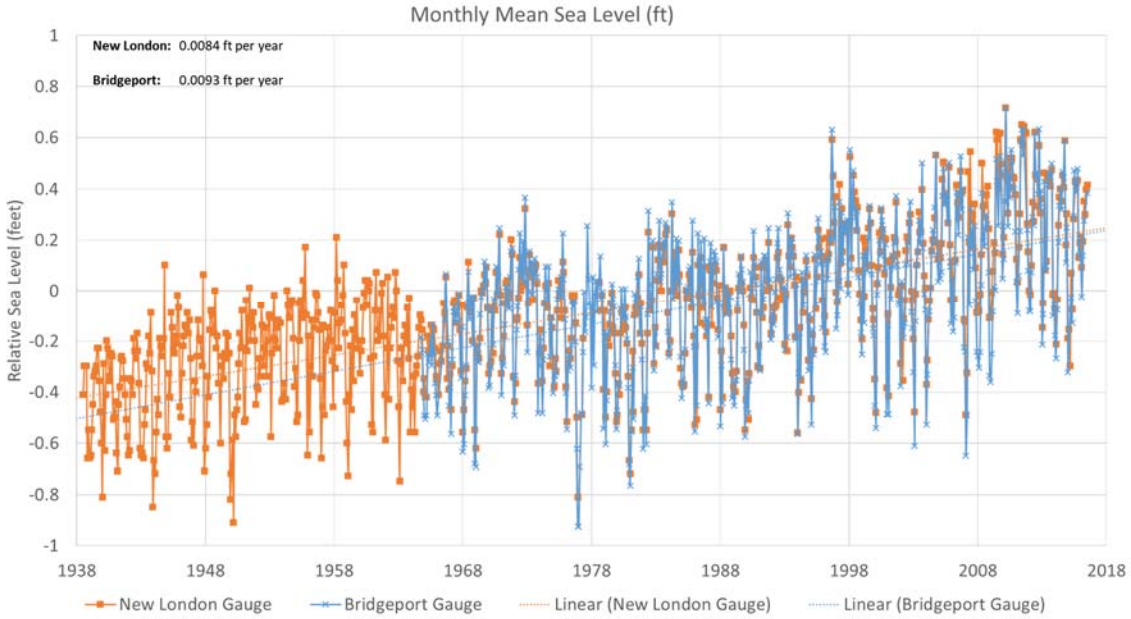


Figure 5-1 Monthly Mean Sea Level (feet)

[106] Connecticut Institute for Resilience & Climate Adaptation. (2019). *Sea Level Rise*.

[107] Jamie Caplan Consulting, LLC, Milone & MacBroom, Inc., and Punchard Consulting. (2018). *South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update.*

[108] New South Wales Office of Environment and Heritage. (2018, July 30). *Salinity*.

[109] National Oceanic and Atmospheric Administration. (2018, August 8). *Center for Operational Oceanographic Products and Services*.

The New London gauge, located in the mouth of the Thames River, has been operating since 1938. The historic mean sea level trend at that gauge has been a rise of 2.57 millimeters per year (0.84 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.22 mm/year, based on monthly mean sea level data from 1938 to 2016.

The Bridgeport gauge, located at Steel Point, has been operating since 1964. The historic mean sea level trend at that gauge has been a rise of 2.83 millimeters per year (0.93 feet in 100 years) with a 95% confidence interval of plus-or-minus 0.44 millimeters per year, based on monthly mean sea level data from 1964 to 2016.

CIRCA has developed local sea level rise scenarios. These localized scenarios were derived from previous work by NOAA, but modified to include the effects of local oceanographic conditions, more recent data and models, and local land motion. Based on the localized scenarios, CIRCA currently recommends that Connecticut communities plan for 0.5 meters (1.64 feet or 20 inches) of sea level rise above 2001 levels by 2050, and continued sea level rise beyond that date.[110] Public Act 18-82 incorporated these projections into statute, and the statute requires their use for planning.

The risks of flooding to sewer infrastructure will increase as sea level rises.[111] Table 5-3 presents a list of sewer infrastructure at risk of sea level rise in the region. Based on the summary in Table 5-3, one pumping station and one WWTF are presently susceptible to tidal flooding during Mean Higher High Water (MHHW) as well as the associated sea level rise predictions, and 34 pumping stations and three WWTFs would be affected by the 1% annual chance coastal flood with an additional 20 inches of sea level rise.

Public Act 13-15 requires CTDEEP to consider the necessity and feasibility of implementing measures designed to mitigate the impact of a rise in sea level over the project life span of any projects included on the State Revolving Fund priority list. Currently, CTDEEP requires that for any CWF project, the design criteria must adhere to the minimum protection levels included in the Connecticut Flood Management Act (CGS 25-68) as recently amended by Public Act 18-82, as well as TR-16 guidelines. As noted previously, all new wastewater infrastructure must be able to provide for uninterrupted operation and be protected from physical damage up to the 0.2% annual chance flood elevation plus two feet.

Some SCCOG communities have already been looking in more detail at their risk of sea level rise. For example, Waterford performed a study (funded by CIRCA) that found that three pump stations had a first floor elevation or access point below the 1% annual chance flood elevation. The study recommended mitigation options for each structure.[112] The low cost of the planning grant (approximately $6,000 to evaluate seven pumping stations) suggests that similar studies to determine potential mitigation actions are feasible for the region. Such studies may be used to support further grant funding efforts.

[110] O'Donnell, J. (2018). *Sea Level Rise in Connecticut.*
[111] Milone & MacBroom, Inc. (2014). *Town of Groton Municipal Coastal Program Update (Draft).*
[112] Wright-Pierce. (2016). *Wastewater Pump Station Flooding Vulnerability Evaluation.*

Table 5-3
Sewer Infrastructure at Risk of Sea Level Rise

Sewer System	Pump Station (PS) or WWTF	Higher than MHHW?	Higher than MHHW +1 Foot?	Higher than MHHW + 20 Inches?	Higher than 1% Annual Chance Flood +1 Foot?	Higher than 1% Annual Chance Flood +20 Inches?
East Lyme	Bride Brook, Giants Neck, & Niantic PSs	Yes	Yes	Yes	No	No
	Attawan Beach & Shore Road PSs	Yes	Yes	Yes	Yes	No
Groton, City of	Colonial, Eastern Point, & Jupiter Point PSs	Yes	Yes	Yes	No	No
	Plant Street PS	Yes	Yes	Yes	Yes	No
	WWTF	No	No	No	No	No
Groton, Town of	Beach Road, Beebe Cove, Gravel Street, Little Gibraltar, North Street, Pacific Street, & Trails Corner PSs	Yes	Yes	Yes	No	No
	Poquonnock River PS	Yes	Yes	Yes	Yes	No
New London	Ocean Beach Park, Pequot Ave. (Shoreline), & Thomas Griffin Road PSs	Yes	Yes	Yes	No	No
	Atlantic Street PS	Yes	Yes	Yes	Yes	No
	WWTF	Yes	Yes	Yes	No	No
Stonington (Borough)	Diving Street PS	Yes	Yes	Yes	No	No
	WWTF	Yes	Yes	Yes	No	No
Stonington (Mystic)	Boulder Avenue, Hewitt Road, Lindbergh Road, & Wolcott Avenue PSs	Yes	Yes	Yes	No	No
	WWTF	Yes	Yes	Yes	No	No
Stonington (Pawcatuck)	Pumping Station 3	No	No	No	No	No
	Pumping Station 1	Yes	Yes	Yes	No	No
Waterford	Bolles Court, Niantic River Road, Oil Mill Road, Shore Drive, & Wadsworth Lane PSs	Yes	Yes	Yes	No	No
	Old Colchester Road PS	Yes	Yes	Yes	Yes	No

5.4 Potential Actions for Adapting to Climate Change

The following actions may be taken by sewer system managers in the region in order to mitigate the impacts of climate change. Note that this is not necessarily an all-inclusive list. These actions should be considered for individual system components as well as for the pump stations and WWTFs identified as being susceptible to flooding and climate change above. Individual utilities should assess potential needs and plan for the required capital improvements through 2040 and beyond.

Table 5-4
Options for Climate Change Adaptation

Adaptation of Collection Systems and Pumping Stations	Adaptation of WWTFs
• Elevate pumping station components • Floodproof pumping station components o Careful – don't forget vents and other pathways for floodwaters • Use submersible pumps where possible • Provide standby power or elevate standby power sources • Set up pumping stations in such a way that they can be repaired more quickly • Harden collection system components and reduce infiltration and inflow pathways • Convert gravity systems to pumped systems as buildings and roads are elevated in adapting neighborhoods • Install backflow prevention where needed • Consider alternative collection systems	• Floodproof the buildings and large structures • Elevate components inside buildings • Floodproof components inside buildings • Raise all electrical systems and controls • Use parts that resist corrosion from salt water • Harden the outfall and add structure to prevent sediment from covering it • Backflow prevention where needed • Secure chemical tanks that could float • Flood wall around the facility • Harden electrical lines that lead to the facility • Install redundant electrical lines to the facility • Add redundant standby power supplies or establish "quick connection" procedures for portable generators • Create dry land access to and from the facility • Backup important records and files • Move the office to higher levels of the facility • Designate safe spaces for employees riding out the event • Consider developing or improving remote access • Make sure personnel know how to quickly change operations • Relocate the entire treatment facility

6.0 RECOMMENDATIONS

6.1 Summary of Potential Wastewater Needs

Based on the analyses in Section 4.0 and Section 5.0, Table 6-1 summarizes the potential wastewater needs in each community. These potential needs were evaluated based on high-level planning data and existing information. A more detailed investigation may identify different results. For all categories other than "Agreement Capacity", more detailed evaluations will be necessary to determine the exact specifications to meet future flow or design requirements.

Table 6-1
Potential Wastewater Needs through 2040

Community	Agreement Capacity*	WWTF Treatment Capacity	Pump Station Upgrades	Interceptor Upgrades	Flood or Sea Level Rise Mitigation
Bozrah	X				
Colchester			X		X
East Hampton			X		
East Lyme	X				X
Franklin	X				
Griswold	X				
Groton, City of					X
Groton, Town of				X	X
Hebron					X
Jewett City		X	X	X	X
Lebanon					X
Ledyard	X				X
Lisbon					
Mansfield (Southern)					
Mashantucket Pequot Tribal Nation					
Mohegan Tribe					
Montville					X
New London		X		X	X
North Stonington	X				
Norwich		X		X	X
Old Lyme					
Preston	X		X (NPU)		
Salem					
Sprague	X	X			X
Stonington, Borough of					
Stonington, Town of		X (Mystic)	X (Mystic)		X
Waterford	X		X		X
Windham					X

*The utility generating flows that will require a new or modified agreement is noted (e.g. Griswold and not Jewett City).

6.1.1 Agreement Capacity

Many communities are flagged in Table 6-1 as potentially requiring additional capacity in their inter-municipal agreements through 2040. Some will need to upgrade their agreements, while others may develop new agreements as noted below:

- Several of these communities are already drafting, or considering drafting agreements with the City of Norwich (Bozrah, Franklin, Preston, and Sprague).
- East Lyme and Waterford both project capacity deficits through 2040 and are discussed in more detail in Section 6.2.1.
- Griswold is expected to need to upgrade its agreement with Jewett City once flows increase above 50,000 gpd.
- North Stonington will need to develop an agreement with the Town of Stonington to send wastewater flow to the Pawcatuck WWTF (Section 6.2.3).

6.1.2 Wastewater Treatment Capacity Upgrades

Five of the WWTFs in the SCCOG region are anticipated to be nearing (approximately 90% of capacity) or above capacity through 2040. These include the following:

- Jewett City WWTF will be at 100% of current capacity and will need to develop additional capacity to support additional flows beyond 2040.
- New London WWTF will be at approximately 90% capacity if all regional flows are realized.
- Norwich WWTF will be at approximately 90% capacity, not including potential additional regional flows from Ledyard and Sprague. Elimination of combined sewers may restore some capacity, but the WWTF is still expected to be nearing the 90% capacity threshold for facilities planning by 2040.
- Sprague WWTF will be at 114% of current capacity and will require approximately 0.3 mgd of additional capacity.
- The Stonington – Mystic WWTF will be at approximately 114% capacity without transferring 0.3 mgd of raw wastewater flow to the Borough WWTF. The Mystic WWTF will be at 76% capacity through 2040 with the transfer project in place.

Facilities planning will be necessary to determine the extent of required upgrades. The majority of the WWTFs in the region are anticipated to be below 80% capacity through 2030, so capacity upgrades generally represent longer term needs. Exceptions include the Sprague WWTF (see Section 6.2.4) and the Stonington – Mystic WWTF (as described above).

6.1.3 Pumping Station Upgrades

While the majority of pumping stations are sized appropriately to support future flows, several were identified as needing upgrades to either meet current, future, or peak flow needs. These include the following:

- The Burleson Avenue Pumping Station in Jewett City appears to be undersized for future flows. Upgrades should be completed as new flows are realized from developments in Griswold.
- The Evergreen Avenue Pumping Station in Waterford is undersized for peak flows. This station pumps all of the flow from Waterford, East Lyme, and Old Lyme into New London. Upgrades (or a bypass) should be installed by 2030.
- The Maritime Drive Pumping Station in Stonington is nearing capacity and upgrades are planned. These should be completed by 2030.
- The Harvey Avenue (Blue Hills) Pumping Station in Waterford is undersized for peak flows. This should be upgraded by 2030.

- The Middletown Avenue Pumping Station in East Hampton supports regional flows from Colchester, Hebron, and Lebanon. The wetwell is undersized requiring the pumps to run constantly. It is recommended that upgrades be performed by 2030.
- The Niantic Pumping Station sends all flow from East Lyme and Old Lyme into Waterford. A redundant force main is recommended by 2040.
- The pumping station at the former Norwich State Hospital site may be undersized for the potential build-out in Preston. Upgrades to this station should be pursued as part of redevelopment efforts.

Implementation of these upgrades will depend on the timing of the increased flows. Operators should evaluate and upgrade pumping stations as necessary to meet future demands.

6.1.4 Interceptor Upgrades

The interceptor capacity analysis conducted for this RWMP identified four interceptor sewers that may require upgrades through 2040. These include the following:

- Jewett City has a 10-inch diameter interceptor leading to its WWTF. This appears to be undersized for future flows.
- The interceptor from *Mumford Cove to the Town of Groton WWTF* is a 20-inch line with an estimated max capacity of 3.21 MGD. This interceptor presently delivers flow from the eastern portion of the Groton system and would not route all future sewer flows to the WWTF. Consideration should be given to evaluating this line if portions of Ledyard sewer flow are ultimately routed through it.
- The 24-inch diameter interceptor leading to the New London WWTF appears to be undersized for future regional flows. However, the WWTF regularly treats average daily flows in excess of the estimated capacity, so it may not be an issue.
- The Yantic Interceptor in Norwich appears to be undersized for future flows.

The systems listed above should evaluate the capacity of these areas in more detail, particularly as sewer expansion projects move forward.

6.1.5 Flood or Sea Level Rise Mitigation

A total of 109 pumping stations and 11 WWTFs in the SCCOG region appear to not be fully compliant with the new flood mitigation standard enacted with the passage of Public Act 18-82. This standard requires new critical facilities (including sewer pumping stations and WWTFs) to be elevated or flood proofed to two feet above the 0.2% annual chance flood elevation. As the analysis conducted herein was performed as a desktop exercise, evaluating flood mitigation options for these facilities should be pursued in more detail. Note that some of these areas may already be mitigated. The 33 highest-priority sites for evaluation of flood mitigation options are presented in Table 6-2.

The cost to evaluate flood mitigation options will vary based on the infrastructure at risk. Pumping station evaluations can cost from $1,000 per station for a basic analysis, to $5,000 per station for a more advanced analysis (including generation of FEMA Elevation Certificates) that demonstrate flood risk and can potentially assist with acquiring future grant funding. Evaluation of WWTFs could range from $5,000 to $20,000 or more depending on the size of the facility and the number of components at risk of inundation.

Table 6-2
Highest Regional Priorities for Flood Mitigation of Wastewater Infrastructure

Community	Pump Station (PS) or WWTF	Reason
Colchester	Prospect Avenue Pumping Station	Appears to be located in 1% annual chance floodplain, conveys regional flows
East Lyme	Pattagansett and Shore Road PSs	Appear to be located in 1% annual chance floodplain, and in the Category 1 Hurricane Surge Zone
East Lyme	Attawan Beach PS	Appears to be located in 1% annual chance floodplain with wave velocity hazard, and in the Category 1 Hurricane Surge Zone
East Lyme	Bride Brook and Niantic PSs	Appear to be located in 1% annual chance floodplain, conveys regional flows
Groton (City of)	City of Groton WWTF	Appears to be inundated by MHHW, located in the 1% annual chance floodplain with wave velocity hazard, and located in Category 1 Hurricane Surge Zone
Groton (City of)	Eastern Point and Jupiter Point PSs	Appear to be located in 1% annual chance floodplain with wave velocity hazard, and in the Category 1 Hurricane Surge Zone
Groton (Town of)	Beach Road, Beebe Cove, Gravel Street,& North Street PSs	Appear to be located in 1% annual chance floodplain, and the Category 1 Hurricane Surge Zone
Groton (Town of)	Little Gibraltar and Pacific Street PSs	Appear to be located in 1% annual chance floodplain with wave velocity hazard, and the Category 1 Hurricane Surge Zone
Jewett City	Jewett City WWTF	Appears to be located in 1% annual chance floodplain, treats regional flows
Montville	Lower Marina PS	Appears to be located in Category 1 Hurricane Surge Zone
New London	City of New London WWTF	Appears to be located in 1% annual chance floodplain, and the Category 1 Hurricane Surge Zone
Norwich	Great Plain Road, Occum Road, Phelps Dodge, & Shore Road PSs	Appear to be located in floodway
Sprague	Main Street PS	Appears to be located in floodway
Stonington (Borough)	Diving Street PS	Appears to be located in 1% annual chance floodplain with wave velocity hazard, and the Category 1 Hurricane Surge Zone
Stonington (Mystic)	Lindbergh Road PS	Appears to be located in 1% annual chance floodplain, and the Category 1 Hurricane Surge Zone
Stonington (Mystic)	Boulder Avenue PS and Mystic WWTF	Appear to be located in 1% annual chance floodplain with wave velocity hazard, and the Category 1 Hurricane Surge Zone
Stonington (Pawcatuck)	Pumping Station 3	Appears to be inundated by MHHW, located in the 1% annual chance floodplain, and located in Category 1 Hurricane Surge Zone
Waterford	Niantic River Road, Oil Mill Road, Shore Drive, and Wadsworth Lane PSs	Appear to be located in the 1% annual chance floodplain, and the Category 1 Hurricane Surge Zone
Windham	Windham WWTF	Appears to be located in 1% annual chance floodplain, treats regional flows

Similar to the "Municipal Infrastructure Resilience Project – Critical Facilities Assessment" conducted by SCCOG,[113] SCCOG should pursue grant funding to assist these communities with flood mitigation assessments of the infrastructure identified in Table 6-2. It is recommended that these assessments be performed by 2023 such that projects can be completed by 2030.

Local communities should also pursue funding to evaluate potential flood mitigation options for other floodprone infrastructure listed in Tables 5-1, 5-2, and 5-3. For those communities with infrastructure listed in these tables,

[113] Connecticut Institute for Resilience and Climate Adaptation. (2017). *Southeastern Connecticut Council of Governments Municipal Infrastructure Resilience Project - Critical Facilities Assessment: Final Report.*

climate adaptation plans should be developed and updated regularly, evaluating and provide guidance on implementing specific actions to prevent damage to these critical infrastructure components. Any project designs should meet or exceed the Public Act 18-82 standard of the 0.2% annual chance flood elevation plus two feet of freeboard, or any subsequent guidance developed by CTDEEP.

6.2 Potential Alternatives for Selected Areas of Need

The majority of sewer systems in the region have minimal concerns regarding future operation. However, several of the sewered areas in the region have complex issues that may require a regional solution as opposed to being corrected locally. These areas, and potential alternatives, are presented in more detail below.

6.2.1 East Lyme

Previous studies have evaluated potential capacity options for East Lyme. The 2007 *Wastewater Planning Report* identified the following alternatives to address sewer capacity constraints in East Lyme:[114]

- Renegotiate capacity with New London
- Obtain additional capacity via one or more of the following projects:
  - Purchase additional capacity from Waterford
  - Fund inflow/infiltration reduction programs in New London or Waterford and transfer "found" capacity to East Lyme
  - Expand New London's WWTF
- Manage future development
- Sewer connection moratorium
- Inflow/infiltration reduction program in East Lyme
- Reduce wastewater flow generation through public awareness program
- Use community treatment systems
- Modify sewer service area boundary
- On-site wastewater management programs

The Town of East Lyme has performed or initiated discussions regarding a variety of these options. Several have been viewed as non-starters, or as impractical by virtue of the significant flows that are believed necessary. For example, Town of East Lyme staff are unsure about the legality of a semi-permanent sewer moratorium, and water conservation and public education programs are unlikely to provide the significant capacity necessary to support future development. This RWMP assumes that the Town of East Lyme needs 0.5 mgd of additional sewer capacity through 2030 and 1.0 mgd of additional sewer capacity through 2040 to address its immediate and longer term needs. It is recommended that the Town of East Lyme focus on the following potential options to address sewer capacity.

Renegotiate Capacity Agreements

The tri-town sewer service agreement between New London, Waterford, and East Lyme expires on January 10, 2021. At present, New London is assigned 55% of the 10 mgd WWTF capacity, Waterford is assigned 30%, and

[114] Fuss & O'Neill, Inc. (2007). *Wastewater Collection System Capacity Analysis Planning Report - Town of East Lyme, Connecticut.*

East Lyme is assigned 15%. However, other agreements reduce East Lyme's share to slightly above 10%, with the State of Connecticut (approximately 4%) and Point O' Woods (approximately 1%) holding the remaining capacity.

Although the State of Connecticut is generating less sewer flow than before due to the closure of one of the prisons, it is likely that the State will desire to maintain its remaining allocation in order to support future connection of Rocky Neck State Park (estimated flows of 0.17 mgd), if necessary. Furthermore, any capacity obtained from the State of Connecticut would only be a fraction of the 1.0 mgd believed necessary through 2040. Thus, any agreement with the State of Connecticut would only serve to bridge immediate needs while a longer-term solution is realized.

According to Table 4-1, the current flows to the New London WWTF average 6.4 mgd. Approximately 3.1 mgd of this flow comes from Old Lyme, East Lyme, and Waterford, such that New London flows are approximately 3.3 mgd out of New London's 5.2 mgd capacity allocation (this figure includes the recent 0.3 mgd capacity allocation for Old Lyme). Moving 1.0 mgd of capacity to East Lyme would result in New London's future capacity allocation being 4.2 mgd. Given New London's projected wastewater flow increase of 0.53 mgd, New London would be using at least 3.8 mgd of its future 4.2 mgd capacity allocation in 2040. Transferring 1.0 mgd of capacity to East Lyme would therefore result in New London being at 90% of its allocated capacity; this is likely to be a concern for New London.

Similarly, Waterford is using approximately 2.0 mgd of its allotted 3.0 mgd average day capacity. Projected flows through 2040 (an increase of 1.07 mgd) suggest that Waterford may max out its capacity. Thus, it is unlikely that Waterford will have any capacity to provide to East Lyme. Similar to the discussion for the State of Connecticut capacity above, any agreement with these two towns to exchange capacity would only serve to bridge immediate needs in East Lyme while a longer term solution is realized.

Upgrade New London WWTF

The pending expiration of the tri-town agreement provides the opportunity for a new inter-municipal agreement to be negotiated. As all three communities are expected to be nearing capacity through 2040 (with the New London WWTF operating at approximately 90% capacity), upgrades to increase capacity at the plant by at least 3.0 mgd should be evaluated. The detailed assessment necessary to evaluate a more precise cost of these upgrades is beyond the scope of this RWMP, but is expected to result in a significant capital expense divided between the three communities, likely totaling several tens of millions of dollars. To help offset costs, the Town of Old Lyme and the representative beach associations should be included in any agreement to provide a proportional amount of funding based on its flow percentage.

Connection to Montville WWTF

The Montville WWTF has extra capacity through 2040 (2.5 mgd, minus the 0.8 mgd unused allocation to the Mohegan Tribe, for an excess capacity of 1.7 mgd) and limited sewer expansion is planned in Montville through 2040. Thus, the Montville WWTF may be an option to provide capacity to the New London sub-region. Two options are proposed for consideration herein:

- It may be feasible to isolate portions of Waterford's sewer system and send flow to Montville via a force main, instead of to the New London WWTF. Connection to Montville would likely occur in the vicinity of Route 32 or in the Lathrop Road area, although it could also potentially occur along Route 85 and Chesterfield Road. It

is noteworthy that the Route 85 area in Montville is an expanding industrial area. By transferring 1.0 mgd of Waterford's capacity allocation to Montville's WWTF, it would free up 1.0 mgd of additional capacity for East Lyme in New London's WWTF. This project is expected to cost at least $4 million (to cover the distance between the existing systems), plus any additional costs to rework the Waterford sewer system to isolate 1.0 mgd of flow. However, this may be a viable option if acceptable to the parties involved, including East Lyme which would likely need to fund the effort.

- A second option would be for East Lyme to isolate portions of its own system and send 1.0 mgd directly to Montville via Chesterfield. A minimum 6.2 mile force main would be needed to run north along Route 161 from the vicinity of Exit 74 on Interstate 95, along Route 85, and along Chesterfield Road to the terminus of the Montville sewer system. This project is expected to cost at least $11 million[115], plus any additional costs to rework the East Lyme sewer system to isolate 1.0 mgd of flow. Given the complexities of system isolation, a detailed cost estimate would need to be developed as part of the study. An agreement may be more straightforward in this option as only two towns are involved. However, an important consideration is that the force main would cross through the public water supply watershed to Lake Konomoc.

The goal of both options described above is to identify additional wastewater flow capacity for East Lyme by sending flow from either Waterford or East Lyme directly to Montville, offsetting flows that would otherwise be treated at New London. Both options would require further study to determine the technical feasibility, and estimated cost along with an implementation plan. Should these options be determined as feasible, an inter-municipal agreement would be required either between East Lyme and Montville, or Waterford and Montville. Furthermore, depending on the option selected, the tri-town sewer service agreement between New London, Waterford, and East Lyme may require modification with respect to flow allocations, and potentially the addition of Montville to the agreement.

The feasibility study would determine logical interconnection points within the respective collection systems for East Lyme, Waterford, and Montville. These interconnection points would need to be adequate to collect and receive the desired wastewater flows. The actual wastewater flows to be collected and received would also have to be determined (it is presently assumed that East Lyme requires 1.0 mgd of additional capacity). Sewer interconnection routes would need to established and evaluated, considering areas where pump stations, force mains, bridge or waterbody crossings, and other necessary sewer infrastructure may be required. Permitting requirements would also need to be identified and evaluated. The feasibility study would provide planning-level cost estimates for engineering, construction, operation, and maintenance, along with a financing plan which would consider cost allocation between the municipalities. Furthermore, if state or federal funding is planned to be pursued, the feasibility study should provide the necessary detail to conduct an environmental impact evaluation or environmental impact statement.

Additionally, an implementation plan would need to be established, identifying the means for funding, engineering, constructing, operating, and maintaining the interconnection, including roles and responsibilities of each community. The implementation plan, along with the financing plan, would form the basis for establishing inter-municipal agreements amongst the communities.

In preliminary discussions between SCCOG and Montville WPCA staff, the Montville WPCA staff noted that these options may benefit the Montville WWTF. As the Montville WWTF presently treats a significant amount of

[115] All planning-level provided herein do not assume rock excavation.

industrial wastewater flows, additional residential wastewater flows would likely benefit treatment processes at the plant. Note that Rand-Whitney would need to approve any major connection per its agreement with Montville WPCA (Section 4.2.14).

Connection to the Town of Groton WWTF

The Town of Groton WWTF is projected to have more than 3.0 mgd of excess capacity through 2040, even with projected flows from Ledyard. This volume of excess capacity could assist the entire New London sub-region. It may be possible to construct a force main from New London to the Town of Groton system across the Thames River, either on the Gold Star Memorial Bridge (Interstate 95) or along the bed of the river. Given the various permitting and logistical requirements of crossing an active shipping channel (and potentially in the vicinity of the SUBASE), this potential alternative should be considered in more detail outside of this RWMP. However, it is possible that the ultimate costs may be comparable to, or less than, the cost to upgrade the New London WWTF or to connect to the Montville WWTF.

Fund Inflow/Infiltration Reduction Programs

East Lyme, Waterford, and New London each have identified reducing inflow/infiltration as potential projects in their POCDs. East Lyme may consider funding regional projects to reduce inflow/infiltration in exchange for accessing the flow reduction as additional capacity. Such a program may prove difficult to track and evaluate, but may be less expensive than some of the other capital options.

Regionalization of Services

As discussed in Section 2.6, regionalization of services may be an appropriate option for the Greater New London region. New London, Waterford, East Lyme, and Old Lyme are an example of an area where a regional WPCA may be appropriate, because the system is already regionally interconnected through the four communities, and the tri-town agreement between New London, Waterford, and East Lyme will expire soon. The connection of additional beach communities in Old Lyme in the near future provides an excellent opportunity to review the overall management structure.

The Naugatuck Valley Council of Governments is presently conducting a CTOPM-funded $1.35 million study to potentially consolidate and/or share wastewater services in Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby.[116] Thus, funding may be available to evaluate the potential for regionalization of sewer services under one dedicated authority.

In order to create a regional WPCA, the following steps are necessary:[117]

- Each municipal WPCA and the town and city councils (or electors at a town meeting) would need to approve an ordinance.
- A preliminary plan of operation, including estimated rates, would need to be approved by CTDEEP and the State Treasurer.
- Each municipality would appoint members to the new regional WPCA board.

[116] Naugatuck Valley Council of Governments. (2019). *Regional Wastewater Treatment Consolidation Study*.
[117] Torres, K. (2010, September 27). Regional WPCA a possibility for Bridgeport, Trumbull and Monroe. *Connecticut Post*.

- The regional WPCA would present plans to rating agencies for the issuance of bonds to purchases existing sewer infrastructure. All debts and sewer projects would be absorbed by the regional authority with asset purchase.
- Regional WPCA would still need local approval for sewer expansions.

The benefits of such an arrangement may include the influx of capital from the new regional entity to each community related to the acquisition of the sewer infrastructure. For example, as part of the formation of the Greater New Haven WPCA, New Haven received more than $34 million for the sale of its WWTF and sewer system, while Hamden, East Haven, and Woodbridge received $10.8 million, $8.3 million, and $0.5 million, respectively.[118] Capacity allocations for each town could be removed and instead based on the common regional sewer service area, with upgrades conducted as necessary to meet regional needs. The drawback is the loss of direct local control of the infrastructure, as oversight would be transferred to a regional board.

Increasing Capacity by Lowering Use

Accessing sewer capacity is of great concern for both developers and municipalities in (and outside of) the SCCOG region. In order to provide for some wastewater service expansion in areas where capacity concerns exist, the region (particularly the New London sub-region) may consider application of a water-neutral concept recently being promoted in the public water supply sector. Implemented primarily in water-stressed areas of the country, "water demand offset policies" are designed to help enable new development that otherwise would likely have been prohibited due to supply capacity constraints. Such policies often utilize an ordinance that either requires or incentivizes residential and commercial developments to offset their projected additional water demand through funding water-efficient retrofits of existing development.

Because wastewater systems would similarly benefit from any water use savings realized by a potable water retrofit program, application of such a program targeted at wastewater may provide for additional growth in certain capacity-stressed areas. Grant and/or loan funding for such projects may also be available through such sources as the Drinking Water State Revolving Fund. Capacity-stressed communities such as East Lyme may wish to consider such a program in more detail over the next few years. The development and implementation of such a program may prove less expensive than paying a share of a regional WWTF upgrade or other capital projects.

6.2.2 Ledyard

The Town of Ledyard has identified several areas where sewers are desired. The project cost to sewer all of these areas and send the flow to the Town of Groton WWTF was estimated to be approximately $93 million, although it may be possible (and potentially less expensive) to direct some flow to Norwich WWTF for treatment. Funding the entire project at one time is likely to be infeasible for the Town. Instead, Ledyard should seek to expand sewers as funding allows, and should focus on obtaining grants for targeted areas near existing sewer lines in the immediate future. The Town should seek larger blocks of funding over the long term as other projects move closer to town boundaries.

- Ledyard Center should be an immediate focus as sewer is already available near this area, and the Highlands WWTF is not at capacity. Capacity upgrades at the Highlands WWTF should also be considered to further

[118] *Ibid.*

serve the Ledyard Center area (estimated at $1 million in 2014 Facilities plan), although it may not be possible to provide treatment for the full 0.4 mgd of Ledyard Center wastewater flow projections through 2040.

- The Flat Brook area near Baldwin Hill Road and Long Cove Road in Gales Ferry should be prioritized for service as there is a potential water quality issue, and sewers are nearby in the Town of Groton. Further extension into Gales Ferry should be pursued as funding allows.

- Once the Town of Groton moves forward with extending sewers up Route 117 into Center Groton, the Town of Ledyard should then consider more detailed designs for continued expansion up Route 117 into Ledyard.

- The northwestern portion of Ledyard (Aljen Heights) should be considered for sewer once sewer installation in Preston expands to Happyland (Route 12) or into Poquetanuck village (Route 2A). Extension of sewers from Gales Ferry to the Avery Hill/Aljen Heights area will likely be prohibitively expensive for the town to collect a benefit assessment, as the density of development on Route 12 declines north of Ledyard Middle School. Therefore, it likely will be less expensive to send these flows through Preston for treatment at the Norwich WWTF. The Town of Ledyard will need to evaluate whether or not the cost to send this flow to the Town of Groton WWTF is greater than, or less than, any expense it would potentially bear for upgrades to the Norwich WWTF, as the Norwich WWTF is expected to be at 90% capacity through 2040, absent any flow from Aljen Heights.

6.2.3 North Stonington

North Stonington officials requested that the RWMP evaluate whether the Town should build their own WWTF or connect to the Stonington (Pawcatuck) WWTF. In general, the construction of community SSDSs is not considered feasible for the industrially zoned areas desired for sewer, as the purpose of installing sewer is to attract economic development.

Connection to Pawcatuck WWTF

Connection of a North Stonington sewer system to the Pawcatuck WWTF has been discussed between the two towns for several decades. The Town of Stonington has completed approximately $3.6 million in upgrades to support flows from North Stonington of approximately 0.2 mgd.[119] Thus, between a tie-in fee, reimbursement for previous projects, and percentage of the cost for future upgrades, the Town of North Stonington may need to provide $2 million to $3 million to the Town of Stonington through 2040. This is in addition to the cost to construct the conveyance system. Nevertheless, these costs are generally less than the expected cost to construct and operate a WWTF (below).

Construction of North Stonington WWTF

Construction of a WWTF that discharges to the Pawcatuck River is an option for the Town of North Stonington. The planning level capital cost to construct such a facility capable of treating the projected flows would be approximately $10 million, plus the costs to acquire the land.

[119] Wojtas, J. (2019, February 26). Stonington willing to discuss taking North Stonington sewage. *The Day*.

6.2.4 Sprague

The Sprague WWTF is operating at capacity. The Town plans to either upgrade the WWTF by 2022 or abandon the WWTF in favor of connection to the Norwich WWTF. As noted below, the planning-level costs for upgrading the WWTF are slightly less expensive than connection to the Norwich WWTF, but these costs may change as more detailed estimates are prepared. The ultimate decision may rely on the Sprague Water and Sewer Authority's desire to continue operation of its own WWTF, or to downsize to operating only the conveyance systems and pumping stations.

Upgrade Sprague WWTF

Flows leading to the Sprague WWTF are expected to increase by 0.06 mgd through 2040. Upgrades to the Sprague WWTF to increase capacity to 0.7 mgd are likely to cost at least $3 million. Additional upgrades to the Main Street pumping station will also be necessary to support peak flows in the future.

Connection to Norwich WWTF

In order to connect to the Norwich WWTF, the Main Street pumping station will need modifications to move flow into a new force main installed in Route 97 from Sprague to the Occum section of Norwich. The approximately 2.0 mile force main would extend from the Main Street pumping station to the vicinity of Bridge Street where flows from the Versailles system presently pass into Norwich. The planning level estimate for this work is approximately $4.5 million. Additional upgrades to the Main Street pumping station will also be necessary to support peak flows. WWTF abandonment would result in additional costs, likely up to approximately $1 million.

Note that the Norwich WWTF is expected to be at approximately 90% capacity through 2040 absent the flow presently being treated at the Sprague WWTF. Thus, the Town of Sprague would likely need to provide a portion of future upgrade costs to this facility.

6.3 Other Regional Recommendations

As noted in Section 2.2, while many communities in the SCCOG region have developed sewer service area maps, the majority of such maps do not appear to have been developed in strict accordance with CGS Chapter 103, Section 7-246(b). Therefore, each community should strive to develop official "Sewer Service Area Maps" consistent with statute. Delineating areas where such sewer systems are allowed, areas where decentralized systems are encouraged, and true sewer avoidance areas will help communities set expectations for developers, as well as specifically outlining desired growth patterns. Assistance from SCCOG could include providing a regional training session, or offering to meet with local planners to provide a regional perspective to the planning effort. As an example, sewer planning in Ledyard should consider understanding future options for Sprague's WWTF, future capacity considerations at Norwich's WWTF, and the Town of Groton's and Town of Preston's future plans for development. SCCOG could also provide direct assistance to communities where SCCOG provides local planning services.

Several respondents noted the general lack of availability of sewer service data as well as other related regional spatial data. As part of the RWMP effort, SCCOG collected sewer-related GIS data as well as paper mapping from many communities. SCCOG should therefore act as the regional repository for GIS-based information related to sewer service area mapping, existing and proposed service areas, locations of critical infrastructure and outfalls,

and locations of community subsurface sewage disposal systems. This information may then be distributed to local health departments and planning agencies as necessary to analyze local conditions. As part of this effort, SCCOG should encourage the State, with the assistance of local health districts, to digitize private well locations, and encourage local water and sewer utilities to provide updated service area boundaries on a regular basis.

Furthermore, the Town of Groton noted that development of a regionally owned and operated biosolids facility may be prudent for the region. SCCOG, through a regional wastewater committee (Section 7.1), should study this issue for potential future implementation.

Finally, the following recommendations were identified for various areas during the course of developing this RWMP:

- Several areas in the region may be appropriate for development of decentralized community SSDSs or package treatment plants. These include, at a minimum, the following areas:

    - Lebanon should consider these for industrially zoned parcels along Norwich Avenue, and in the Red Cedar Lake neighborhood.
    - North Stonington should consider these for the Kingswood Drive / Meadow Wood Drive neighborhood.
    - Preston should consider these for residential areas near Amos Lake, as well as in the Preston Plains area near Avery Pond.

- As presented in Section 3.3.2, several areas with poor water quality may be helped by extension of sewers or by evaluating the condition of existing sewers. These include the following areas:

    - Montville should consider surveying sewer lines in the Oxoboxo Brook watershed for leaks. These visual surveys typically cost $1 to $2 per foot.
    - Waterford and New London should consider surveying sewer lines in the Fenger Brook watershed for leaks.
    - Stonington should consider surveying sewer lines in the Hyde Brook and Kelly Brook watershed for leaks.

6.4 Potential Financial Impact

The majority of projects will be paid for out of the capital improvement or operating budgets for each community. In some cases, a sewer benefit assessment will be levied on parcels adjacent to, or benefiting from, the capital improvement. Nevertheless, a variety of federal and state grants and loans are available for projects aimed at sewer installation, sewer expansion, or improving sewer resilience. Other technical resources are also available. SCCOG should assist its communities in identifying funding sources for particular projects, and host grant writing workshops to train local staff to apply for funding. Potential funding sources are presented below.

Federal Funding Sources

- Environmental Protection Agency: EPA offers a variety of grant programs aimed at reducing pollution.

    - *Clean Water State Revolving Fund*: Administered in Connecticut by the CTDEEP, it funds water quality protection projects for centralized and decentralized wastewater treatment, nonpoint source pollution control, and watershed and estuary management. The fund uses federal, state, and other program funds

to provide low-interest loans to communities for water quality projects. States may customize loan terms to meet the needs of small, disadvantaged communities, which typically have fewer financing options.

- *Nonpoint Source Grants Program (Section 319 of the CWA):* Provides grants for activities that prevent water pollution from nonpoint sources, including education, training, technical and financial assistance, technology transfer, demonstration projects, and monitoring nonpoint source implementation projects. Eligible projects include decentralized wastewater systems.

- *Clean Water Indian Set-Aside Program:* Provides funds for wastewater infrastructure to Indian tribes and Alaska Native Villages. The Program is administered in cooperation with the Indian Health Service. To be considered for this funding, tribes must identify their wastewater needs through the Indian Health Service Sanitation Deficiency System.

- *Indian Environmental General Assistance Program*: Provides grants to federally recognized tribes and tribal consortia to develop and implement wastewater and other programs on tribal lands.

- *Tribal Water Pollution Control Program Grants (Section 106 of the Clean Water Act)*: Assists Indian tribes in implementing effective water pollution control programs.

- *Water Pollution Grants Program (Section 106 of the CWA):* Provides federal assistance to states, territories, the District of Columbia, Indian tribes, and interstate agencies to establish and implement ongoing water pollution control programs.

- Northeast Regional Ocean Council (NROC): NROC is a state/federal partnership that facilitates the New England states, federal agencies, regional organizations, and other interested regional groups in their efforts to address ocean and coastal issues from a regional perspective. NROC builds capacity of New England communities through training and a small grants program to improve the region's resilience and response to impacts of coastal hazards and climate change. The region should access NROC grants as applicable projects are advanced from this plan.

- NOAA Regional Coastal Resilience Grants: NOAA is committed to helping coastal communities address increasing risks from extreme weather events, climate hazards, and changing ocean conditions. To that end, NOAA's National Ocean Service provides funding through the Regional Coastal Resilience Grants program. Awards are made for project proposals that advance resilience strategies, often through land and ocean use planning, disaster preparedness projects, environmental restoration, hazard mitigation planning, or other regional, state, or community planning efforts. Eligible applicants include nonprofit organizations; institutions of higher education; regional organizations; private (for profit) entities; and local, state, and tribal governments. Award amounts typically range from $500,000 to $1 million for projects lasting up to 36 months. Applicants must conduct projects benefiting coastal communities in one or more of the 35 U.S. coastal states or territories. Because the Regional Coastal Resilience Grants program favors regional approaches to resilience problems, the SCCOG or the State of Connecticut should pursue future funds on behalf of a group of municipalities.

- Regional and National Design Competitions: Although the Rebuild By Design competition and National Disaster Resilience Competition awards were announced in the last 3 years and the competitions are complete, they have provided a methodology for screening and selecting resilience grant awardees in the

United States. The region should monitor announcements for future design competitions and consider pursuing these competitions as an individual applicant (if eligible), with a group of municipalities, or directly as an active participant with the State of Connecticut.

- U.S. Department of Housing and Urban Development (HUD): HUD administers the Community Development Block Grant and related Disaster Recovery programs.

  - *Community Development Block Grant (CDBG)*: The Connecticut Department of Housing administers the CDBG program in Connecticut. The CDBG program provides financial assistance to eligible municipalities in order to develop viable communities. The financial assistance provides affordable housing and suitable living environments, as well as expanding economic opportunities, principally for persons of low and moderate income. It is possible that the CDBG funding program could be applicable for floodproofing and elevating non-residential buildings, depending on eligibility of those buildings relative to the program requirements.

  - *Community Development Block Grant – Disaster Recovery (CDBG-DR)*: HUD provides flexible grants to help cities, counties, and States recover from federally declared disasters, especially in low-income areas. Following disaster declarations, and when funds are appropriated to HUD and the Connecticut Department of Housing, communities should apply for CDBG-DR grants.

- National Resource Conservation Service: The NRCS provides technical assistance to individual landowners, groups of landowners, communities, and soil and water conservation districts for land use and conservation planning, resource development, stormwater management, flood prevention, erosion control and sediment reduction, detailed soil surveys, watershed/river basin planning and recreation, and fish and wildlife management. Financial assistance is available to reduce flood damage in small watersheds and to improve water quality. Two major programs are described below.

  - *Emergency Watershed Protection (EWP) Program*: Through the EWP program, the NRCS can help communities address watershed impairments that pose imminent threats to lives and property. Note that EWP is not an emergency response program. Most EWP work is for the protection of threatened infrastructure from continued stream erosion. NRCS may pay up to 75% of the construction costs of emergency measures. The remaining costs must come from local sources and can be made in cash or in-kind services. No work done prior to a project agreement can be included as in-kind services or part of the cost share. EWP projects must reduce threats to lives and property; be economically, environmentally, and socially defensible; be designed and implemented according to sound technical standards; and conserve natural resources.

  - *Watersheds and Flood Prevention Operations*: This program element contains two separate and distinct programs, "Watershed Operations" and "Small Watersheds." The purpose of these programs is to cooperate with state and local agencies, tribal governments, and other federal agencies to prevent damages caused by erosion, floodwater, and sediment and to further the conservation, development, utilization, disposal of water, and the conservation and utilization of land. The objectives of these programs are to assist local sponsors in assessing conditions in their watershed, developing solutions to their problems, and installing necessary measures to alleviate problems. Measures may include land treatment and structural and non-structural measures. Federal cost sharing for installation of prevention measures is available. The grant amount depends on the purpose of the project.

- Federal Emergency Management Agency (FEMA): FEMA administers two pre-disaster grant programs, and one post-disaster grant program aimed at mitigating future damage from natural hazards.

  - *Pre-Disaster Mitigation (PDM) Program*: The PDM program provides funds to states, territories, tribal governments, communities, and universities for hazard mitigation planning and implementation of mitigation projects prior to disasters. Funding of pre-disaster plans and projects is meant to reduce overall risks to populations and facilities.

  - *Hazard Mitigation Grant Program (HMGP)*: The HMGP provides grants to state and local governments to implement long-term hazard mitigation measures following a major disaster declaration. The purpose of the HMGP is to reduce the loss of life and property due to natural disasters, and to enable mitigation measures to be implemented during the immediate recovery from a disaster. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not "lost" during the recovery and reconstruction process following a disaster.

    HMGP is available only in the months subsequent to a federal disaster declaration. Because the state administers HMGP directly, application cycles will need to be closely monitored after disasters are declared.

  - *Flood Mitigation Assistance (FMA) Program*: FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities. One limitation of the FMA program is that it is generally used to provide mitigation for structures that are insured or located in Special Flood Hazard Areas.

- U.S. Army Corps of Engineers: USACE provides up to 100% funding for floodplain management planning and technical assistance to states and local governments under several flood control acts and the Floodplain Management Services (FPMS) Program. Specific programs used by USACE for mitigation are listed below.

  - *Section 205 – Small Flood Damage Reduction Projects*: This section of the 1948 Flood Control Act authorizes USACE to study, design, and construct small flood control projects in partnership with non-federal government agencies. Feasibility studies are 100% federally funded up to $100,000, with additional costs shared equally. Costs for preparation of plans and construction are funded 55% with a 35% non-federal match. In certain cases, the non-federal share for construction could be as high as 50%. The maximum federal expenditure for any project is $7 million.

  - *Section 14 – Emergency Streambank and Shoreline Protection*: This section of the 1945 Flood Control Act authorizes USACE to construct emergency shoreline and stream bank protection works to protect public facilities such as bridges, roads, public buildings, sewage treatment plants, water wells, and non-profit

public facilities such as churches, hospitals, and schools. Cost sharing is similar to the Section 205 projects above. The maximum federal expenditure for any project is $1.5 million.

- *Section 208 – Clearing and Snagging Projects*: This section of the 1954 Flood Control Act authorizes USACE to perform channel clearing and excavation with limited embankment construction. These projects aim to reduce nuisance flood damages caused by debris and minor shoaling of rivers. Cost sharing is similar to the Section 205 projects above. The maximum federal expenditure for any project is $500,000.

- *Section 205 – Floodplain Management Services*: The FPMS section of the 1950 Flood Control Act, as amended, authorizes USACE to provide a full range of technical services and planning guidance necessary to support effective floodplain management. General technical assistance efforts include determining the following: site-specific data on obstructions to flood flows, flood formation, and timing; flood depths, stages, or floodwater velocities; the extent, duration, and frequency of flooding; information on natural and cultural floodplain resources; and flood loss potential before and after the use of floodplain management measures. Types of studies conducted under FPMS include floodplain delineation, dam failure, hurricane evacuation, flood warning, floodway delineation, flood damage reduction, stormwater management, floodproofing, and inventories of floodprone structures. When funding is available, this work is 100% federally funded.

In addition, USACE provides emergency flood assistance (under Public Law 84-99) after local and state funding has been used. This assistance can be used for both flood response and post-flood response. USACE assistance is limited to the preservation of life and improved property; direct assistance to individual homeowners or businesses is not permitted. In addition, USACE can loan or issue supplies and equipment once local sources are exhausted during emergencies.

- United States Department of Agriculture (USDA) Rural Development Water & Environmental Programs: The USDA through its Rural Development program provides technical assistance and financing necessary to develop wastewater disposal systems in rural areas. Funding is available for the construction of waste infrastructure facilities in rural communities with populations of 10,000 people or less, and USDA also provides funding to organizations that provide technical assistance and training to rural communities in relation to their water activities. Examples of the USDA programs are provided below:

  - Circuit Rider Program – Provides technical assistance to rural water systems that are experiencing day-to-day operational, financial, or managerial issues, and can provide energy audits.

  - Water & Waste Disposal Loan & Grant Program – Provides funding for sanitary sewage disposal to rural households and businesses, who are not otherwise able to obtain commercial credit on reasonable terms. Funds may be used for sewer collection, transmission, treatment, and disposal as well as some related activities. Eligible areas include rural areas and towns with populations of 10,000 or less and Tribal lands in rural areas. Related planning grants are also available.

  - Special Evaluation Assistance for Rural Communities and Households – This program helps very small, financially distressed rural communities (including local governments, non-profits, and federally recognized tribes) with predevelopment feasibility studies, design, and technical assistance on proposed waste disposal projects. Eligible areas include rural areas with a population of 2,500 or less and a median

household income below the poverty line, or less than 80% of the statewide non-metropolitan median household income, based on latest census data. The grants may fund evaluation of projects to construct, enlarge, extend, or improve rural wastewater facilities, and make public or private improvements for the successful operation or protection of such facilities.

- United States Economic Development Administration (EDA): The EDA provides grants for sewer infrastructure projects through its Public Works Program. The grant programs support development in economically distressed areas of the United States by fostering job creation and attracting private investment through subsidized construction, non-construction, and revolving loans. The EDA also assists eligible recipients in developing economic development plans and studies designed to build capacity, guide the economic prosperity and resiliency of an area, and encourage the creation and retention of high-quality jobs. The EDA also administers grant funding for eligible grantees in communities impacted by natural disasters.

State Funding Sources

- Clean Water Fund: This state program, created in 1986, provides financial assistance in the form of grants and low-interest loans to municipalities for water pollution control projects. Typical projects funded through this program include WWTF upgrades, including nutrient (nitrogen or phosphorus) removal, combined sewer overflow elimination, sewer extensions to resolve pollution problems created by substandard SSDSs, and sewer system rehabilitation of pipes and plumbing systems. Funding for the CWF is from state general obligation bonds (for grants), state revenue bonds (for loans), and a federal capitalization grant (pays for either). In 2018, the State funded 100% of the program.

  The CWF covers engineering services costs in the planning and design phases of a project, as well as engineering and construction costs to build a project. Project financing is based on state statute. Grants vary by project type and range from 20% to 55% of the project cost. Project loans are for 20 years, with a 2% interest rate.

- Small Town Economic Assistance Program (STEAP): STEAP (CGS Section 4-66g) funds economic development, community conservation, and quality-of-life capital projects for communities that are ineligible to receive Urban Action (CGS Section 4-66c) bonds. This program is administered by CTOPM, with funding issued by the State Bond Commission and the grants administered by various state agencies. The range of projects eligible for STEAP funding is very broad and can include the costs of land, engineering, architectural planning, and contract services needed to complete the project. As such, the use of funds is also relatively flexible. Wastewater and sewer projects have been partially funded by STEAP in the past. STEAP funding could potentially be used in part to develop new sewer systems, extend sewer mains, or perform system improvements as part of a development project.

Other Agencies

While not a funding source per se, the Atlantic States Rural Water & Wastewater Association (ASRWWA) is a private non-profit organization that represents water and wastewater systems across Connecticut and Rhode Island providing training, technical assistance, and advocacy to small and rural systems. ASRWWA provides on-site technical assistance for leak detection, process control, compliance, and source water and groundwater protection, and can also assist with securing grants for improvements.

7.0 IMPLEMENTATION PLAN

7.1 Recommended Policies and Governance for Implementation

Establishing a forum in which individual wastewater operators and managers may exchange and discuss ideas will be key to advancing regional initiatives. The desire to have a regular regional meeting regarding wastewater issues was advanced by several parties at the data collection workshops in 2018, as well as to the Regional Water Committee. An annual meeting is recommended, with more frequent meetings proposed as necessary. If the Regional Water Committee would rather remain focused on public water supply issues, then establishment of a Regional Wastewater Committee is recommended.

A variety of stakeholders either affect, or are affected by, centralized wastewater services in the region. In implementing this RWMP, SCCOG and its member communities are encouraged to consider these stakeholders and their related desires when investing in both local and regional solutions for managing wastewater in the region.[120] These are summarized in Table 7-1.

When advancing wastewater projects of a regional nature, SCCOG and its member municipalities are encouraged to utilize innovative technologies when possible. Optimal solutions for wastewater management in the region should include those that are 1) effective at reducing nutrients that may impact water quality, 2) require fewer resources, 3) provide measureable results sooner, and 4) are less expensive to implement. Consideration should also be given to the use of alternative technologies on specific sites in order to reduce potential sewer (and potentially water) demand.[121] These may include:

- Use of reclaimed water infrastructure to reduce off-site discharges and decrease non-potable water demands from public water systems (e.g., the Reclaimed Water Facility at Mashantucket Pequot Tribal Nation that produces irrigation water, and the use of treated wastewater by Rand-Whitney for industrial processes in Montville).
- Use of non-discharge technologies where appropriate (e.g. the composting toilets at Rocky Neck State Park).

The amount and pattern of development that occurs in the SCCOG region is likely to continue to be the primary driver of the costs to provide adequate wastewater infrastructure and treatment. Given the high cost of conventionally engineered solutions, lack of existing wastewater infrastructure in several areas (e.g., many parts of Ledyard), and general public disapproval of sewer expansion, SCCOG communities will need to focus on watershed-based planning that is not restrained by municipal boundaries. These approaches will need to engage both community members and local politicians, place less emphasis on isolationism strategies, and instead focus on consideration of multiple technology approaches and cost-saving strategies.[122]

Although many wastewater projects will be driven at the local level, SCCOG can assist local communities with wastewater planning by:

[120] Adapted from Clark Regional Wastewater District. (2009). *2009 Strategic Plan.*
[121] Cape Cod Commmission. (2017). *Technology Assessment*.
[122] *Ibid.*

Table 7-1
Stakeholder Identification and Desires

Stakeholders	Desires
Customers • Residential • Commercial • Industrial • Public Authority	1. Reliable and responsive service 2. Reasonable rates 3. Efficient use of resources 4. Flexible payment options 5. Communication / accessibility
Community Partners • Homeowner Associations • Fire Districts • Environmental Groups • Business Associations	1. Environmental stewardship 2. Technical expertise 3. Leadership on wastewater issues 4. Affordable sewer options 5. Communication / accessibility 6. Participation in / by their organizations
Economic Development Community • Developers • Contractors • Consultants	1. Capacity assurance 2. Professional experience (consistent standards and timely plan reviews) 3. Fair and independent relationship 4. Balance of infrastructure safeguards with real world complexities 5. Well planned infrastructure investment strategy
Public Agencies • Cities and Towns • SCCOG	1. Technical solutions 2. Leadership on ways to maximize investments across department lines 3. Long-range planning 4. Timely responses to issues and questions 5. Independent, non-biased, best practices viewpoint 6. Communication 7. Participation
Regulatory Agencies • CTDEEP • CTDPH • Local Health Districts	1. Environmental protection and stewardship 2. Compliance 3. Reports and information 4. Community and employee safety
Vendors	1. Fair process 2. Accurate and timely payment 3. Communication / accessibility
WPCA Board and Employees	1. Technical and management competency 2. Leadership 3. Ethics and values (fair, honest, customer service) 4. Safety

- Providing a forum for regional discussions and training (e.g., regarding regional projects, emerging contaminants, biosolids, metals, etc.).
- Assisting with regional solutions to wastewater issues, including capital projects and public outreach for shared problems (e.g. flushing of sanitary wipes), as well as helping to identify cost-sharing opportunities (sharing staff, combining financial resources to increase purchasing power, etc.).
- Seeking funding to support region-wide wastewater training opportunities.
- Working with local communities to prepare recruitment information to help attract new talent to assist with wastewater staff retirements in the next decade.
- Making recommendations for local website updates that have the right information to inform the public about wastewater goals and needs.

7.2 Staged Implementation Plan

For the majority of recommendations in Section 6.1 through 6.3, the path from planning to funding and construction is fairly straightforward. SCCOG and local communities will implement the recommendations as time and funding allows utilizing their planning and capital improvement guidelines. The majority of the recommendations will require the development of more detailed plans and specifications, as well as detailed engineers' cost estimates, prior to moving towards local approval and construction.

Other recommendations will result in more complex decision-making processes requiring development of a staged implementation plan. The four elements of a staged implementation plan are exploration, installation, initial implementation, and full implementation. Table 7-2 presents the staged implementation plan for several recommendations that were highlighted due to the need for detailed exploration phases to determine the best project for implementation.

The completion of detailed engineering and cost assessments will be necessary to appropriately determine courses of action for these complex issues. The exploration phase for the above projects should be implemented as soon as possible. This will ensure that construction may be completed in a timely manner and sufficient capacity is available in the region during the next 20 years.

Table 7-2
Staged Implementation Plan for Selected Recommendations

Project	Exploration Tasks	Installation Tasks	Initial Implementation Tasks	Full Implementation Tasks
East Lyme Capacity Issues	• Perform low cost negotiations to bridge immediate capacity gap • Evaluate cost of upgrading New London WWTF capacity by 3.0 mgd • Evaluate cost of reworking Waterford or East Lyme sewer system to transfer 1.0 mgd of flow to Montville WWTF • Evaluate cost of sending flow across Thames River to Town of Groton WWTF • Evaluate consolidation of New London, Waterford, East Lyme, and Old Lyme sewer systems into Regional WPCA • Determine best project to address regional capacity needs	For construction tasks: • Advance design • Secure permits • Secure funding • Construct project For Regional WPCA tasks: • Petition legislature • Establish regional WPCA • Secure capital • Establish management oversight and operations	For construction tasks: • Operate and maintain infrastructure For Regional WPCA tasks: • Purchase existing infrastructure • Transfer management and operations • Establish regional sewer service area	For construction tasks: • Operate and maintain infrastructure • Extend infrastructure as necessary to make use of capacity For Regional WPCA tasks: • Operate and maintain infrastructure • Extend infrastructure as necessary to make use of capacity • Increase capacity as necessary to meet regional needs
Ledyard Sewer Development	• Evaluate cost of installing limited sewer expansions into Gales Ferry and Ledyard Center • Evaluate cost of longer-term sewer expansions from Center Groton to Ledyard Center and to Avery Hill/Aljen Heights	• Advance design • Secure permits • Secure funding • Complete wastewater treatment plant upgrades to support additional flows from Ledyard Center • Construct limited sewer expansions into Gales Ferry and Ledyard Center	• Operate and maintain infrastructure • Monitor sewer expansion in Groton and Preston to time long term projects	• Operate and maintain infrastructure • Construct sewer expansions to serve remainder of Ledyard Center and Avery Hill/Aljen Heights area
North Stonington Sewer Development	• Evaluate cost of building WWTF on Pawcatuck River • Evaluate cost to connect to Stonington - Pawcatuck WWTF • Determine best project to meet Town's needs	• Advance design • Secure permits • Secure funding • Construct project	• Operate and maintain infrastructure	• Operate and maintain infrastructure • Complete WWTF upgrades as necessary
Sprague WWTF	• Evaluate cost to upgrade Sprague WWTF • Evaluate cost to connect to Norwich WWTF • Determine best project for Town's needs	• Advance design • Secure permits • Secure funding • Construct project	• Operate and maintain infrastructure	• Operate and maintain infrastructure • Complete WWTF upgrades as necessary

8.0 REFERENCES

Arcadis and O'Neil Accounting & Consulting, LLC. (2018). *Cost of Service Study for Fiscal Year 2019.* New Haven: Greater New Haven Water Pollution Control Authority. Retrieved from https://gnhwpca.com/wp-content/uploads/2018/05/GNH_COSS_Report_2018_v2-FINAL.pdf

Arup, Woods Hole Group, CivicMoxie, and TDA, Inc. (2017). *Town of Stonington Coastal Resilience Plan.* Stonington: Town of Stonington.

Barrett, K. R. (2017). Prevalence and Magnitude of Trends in Peak Annual Flow and 5-, 10- and 20-Year Flows in the Northeastern United States. *Journal of Hydrologic Engineering, 22*(3). Retrieved from https://ascelibrary.org/doi/10.1061/%28ASCE%29HE.1943-5584.0001474

Biekert, M. (2019, January 26). With dwindling sewage capacity, East Lyme questions potential for growth. *The Day*. Retrieved from https://www.theday.com/article/20190126/NWS01/190129523

Bozrah Planning & Zoning Commission. (2015). *Plan of Conservation & Development.* Bozrah: Town of Bozrah.

Cape Cod Commmission. (2017). *Technology Assessment*. Retrieved from RWMP: Watershed Solutions: http://www.capecodcommission.org/index.php?id=337&maincatid=332

Carter, A. (2004, September 30). City, Hamden nearly agree on sewer bill. *New Haven Register*. Retrieved from https://www.nhregister.com/news/article/City-Hamden-nearly-agree-on-sewer-bill-11657212.php

CDM. (2006). *Wastewater Facilities Plan.* Stonington: Town of Stonington.

CDM Smith and Milone & MacBroom, Inc. (2018). *Final Report - Connecticut State Water Plan.* Hartford: Connecticut Water Planning Council. Retrieved from https://www.ct.gov/water/cwp/view.asp?a=4801&Q=586878&PM=1

CDM Smith, Inc. (2018). *Combined Sewer Overflow Long-Term Control Plan.* Norwich: Norwich Public Utilities.

CDR McGuire, Inc. (2014). *Wastewater Facilities Management Plan, Phase II: Facilities Plan - Town of Ledyard.* Ledyard: Town of Ledyard.

City of Groton Planning and Zoning Commission. (2018). *Plan of Conservation and Development.* Groton: City of Groton.

City of Norwich Commission On The City Plan. (2013). *Norwich 2013 Plan of Conservation and Development - Strategic Element.* Norwich: City of Norwich.

Clark Regional Wastewater District. (2009). *2009 Strategic Plan.* Clark County: Clark Regional Wastewater District. Retrieved from https://www.crwwd.com/documents/Strategic_Plan.pdf

Connecticut Data Collaborative. (2017). *Raw Data*. Retrieved from http://data.ctdata.org/dataset

Connecticut Department of Economic & Community Development. (2019). *Export, Housing, and Income Data*. Retrieved from https://portal.ct.gov/DECD/Content/About_DECD/Research-and-Publications/01_Access-Research/Exports-and-Housing-and-Income-Data

Connecticut Department of Energy & Environmental Protection. (2014). *Environmental Impact Evaluation - Regional Wastewater Management Project - Miami Beach, Old Lyme Shores Beach and Old Colony Beach Club Associations Wastewater Facilities Plan.* Hartford: Connecticut Department of Energy & Environmental Protection. Retrieved from https://www.ct.gov/deep/lib/deep/water/municipal_wastewater/ltcps/ol_beach_assoc_eie.pdf

Connecticut Department of Energy & Environmental Protection. (2015). *Environmental Impact Evaluation - Combined Sewer Overflow Long Term Control Plan - Norwich Department of Public Utilities.* Hartford: Connecticut Department of Energy & Environmental Protection.

Connecticut Department of Energy & Environmental Protection. (2017). *2016 Integrated Water Quality Report.* Hartford: Connecticut Department of Energy & Environmental Protection. Retrieved from https://www.ct.gov/deep/lib/deep/water/water_quality_management/305b/2016_IWQR_Final.pdf

Connecticut Department of Energy & Environmental Protection. (2017). *Environmental Impact Evaluation - Franklin Sanitary Sewer & Water Main Extension Project.* Hartford: Connecticut Department of Energy & Environmental Protection. Retrieved from https://www.ct.gov/deep/lib/deep/water/municipal_wastewater/eie_franklin_2017.pdf

Connecticut Department of Energy & Environmental Protection. (2017, October 12). *Subsurface Sewage Treatment and Disposal Systems (Septic Systems)*. Retrieved from https://www.ct.gov/deep/cwp/view.asp?a=2721&q=325706&deepNav_GID=1654

Connecticut Department of Energy & Environmental Protection. (2018, April 25). *Over 50 Years of the Clean Water Act in Connecticut!* Retrieved from https://www.ct.gov/deep/cwp/view.asp?a=2719&q=325598&deepNav_GID=1654

Connecticut Department of Energy & Environmental Protection. (2019, March 22). *The Connecticut Total Maximum Daily Load (TMDL) Program*. Retrieved from https://www.ct.gov/deep/cwp/view.asp?a=2719&q=325604&deepNav_GID=1654

Connecticut Department of Environmental Protection. (2008, November). *Development of a Water Pollution Control Plan and a Sewer Service Area Map.* Hartford. Retrieved from http://ct.gov/deep/lib/deep/water/municipal_wastewater/development_of_wpcplan.pdf

Connecticut Department of Labor. (2019, May 16). *Eastern Workforce Development Area - State of Connecticut*. Retrieved from Labor Market Information: https://www1.ctdol.state.ct.us/lmi/wda_eastern.asp

Connecticut Department of Public Health. (2018). *Connecticut Public Health Code: On-site Sewage Disposal Regulations and Technical Standards for Subsurface Sewage Disposal Systems.* Hartford: Connecticut Department of Public Health. Retrieved from https://portal.ct.gov/-/media/Departments-and-

Agencies/DPH/dph/environmental_health/environmental_engineering/2018-Uploads/Technical-Standards-2018-Master-011918.pdf?la=en

Connecticut Department of Public Health. (2019). *Environmental Engineering - Subsurface Sewage*. Retrieved from https://portal.ct.gov/DPH/Environmental-Health/Environmental-Engineering/Environmental-Engineering----Subsurface-Sewage

Connecticut Institute for Resilience & Climate Adaptation. (2019). *Sea Level Rise*. Retrieved from https://circa.uconn.edu/sea-level-rise/

Connecticut Institute for Resilience and Climate Adaptation. (2017). *Southeastern Connecticut Council of Governments Municipal Infrastructure Resilience Project - Critical Facilities Assessment: Final Report.* Groton: Connecticut Institute for Resilience and Climate Adaptation. Retrieved from https://circa.uconn.edu/wp-content/uploads/sites/1618/2017/12/SCCOG-Critical-Facilities-Final-Report.pdf

Daughtry, A. (2019, June 3). Authority imposes moratorium on connections to Mystic treatment plant. *The Westerly Sun*. Retrieved from https://www.thewesterlysun.com/news/stonington/authority-imposes-moratorium-on-connections-to-mystic-treatment-plant/article_1fbf1296-8323-11e9-92d1-731deb182145.html

Earth Tech. (2005). *Wastewater Facilities Plan for Colchester-East Hampton Joint Facilities.* Town of Colchester and Town of East Hampton.

Franklin Planning & Zoning Commission. (2013). *Town of Franklin Plan of Conservation and Development.* Franklin: Town of Franklin.

Fuss & O'Neill, Inc. (2007). *Wastewater Collection System Capacity Analysis Planning Report - Town of East Lyme, Connecticut.* Manchester: Connecticut Department of Environmental Protection.

Geophysical Fluid Dynamics Laboratory. (2019, May 31). *Global Warming and Hurricanes - An Overview of Current Research Results*. Retrieved from https://www.gfdl.noaa.gov/global-warming-and-hurricanes/

Greater New Haven Water Pollution Control Authority. (2018). *About GNHWPCA*. Retrieved from https://gnhwpca.com/about-gnhwpca/about-gnhwpca/

Groton Economic Development. (2019). *Groton Community Profile*. Retrieved from https://www.exploremoregroton.com/site-selection/town-of-groton-profile/p/item/310/groton

Harrall-Michalowski Associates, I. (2004). *Hamden Plan of Conservation and Development.* Hamden: Town of Hamden. Retrieved from http://www.hamden.com/filestorage/7089/7093/7091/7121/7242/FINAL_2004_POCD.pdf

Jamie Caplan Consulting, LLC, Milone & MacBroom, Inc., and Punchard Consulting. (2018). *South Central Region Multi-Jurisdiction Hazard Mitigation Plan Update.* North Haven: South Central Regional Council of Governments.

Kleinfelder Northeast, Inc. (2017). *Climate Change Risk Vulnerability, Risk Assesssment and Adaptation Study.* Waterford: Town of Waterford.

Ledyard Water Pollution Control Authority. (2019). *Water Pollution Control Authority (WPCA)*. Retrieved from The Town of Ledyard, Connecticut: https://www.town.ledyard.ct.us/63/Water-Pollution-Control-Authority-WPCA

Metcalf & Eddy. (1991). *Wastewater Engineering: Treatment, Disposal, Reuse* (Vol. Water Resources & Environmental Engineer Series). (G. a. Tchobanoglous, Ed.) McGraw-Hill Higher Education.

Metcalf & Eddy, Inc. (1969). *Recommended Regional Sewerage Plan.* Norwich: Southeastern Connecticut Regional Planning Agency.

Metcalf & Eddy, Inc. (1999). *Draft Report to the Town of Griswold, Connecticut on a Regional Wastewater Facilities Plan.* Griswold: Town of Griswold.

Milone & MacBroom, Inc. (2014). *Town of Groton Municipal Coastal Program Update (Draft).* Groton: Town of Groton.

Milone & MacBroom, Inc. (2015). *Water Supply Plan.* Montville: Montville WPCA.

Milone & MacBroom, Inc. (2017). *Multi-Jurisdiction Hazard Mitigation Plan Update.* Norwich: Southeastern Connecticut Council of Governments.

Milone & MacBroom, Inc. (2017). *Request for Reauthorization under the General Permit for Diversion of Water for Consumptive Use.* Montville: Rand-Whitney Realty, LLC.

Milone & MacBroom, Inc. (2018). *Coordinated Water System Plan - Eastern Connecticut Public Water Supply Management Area.* Hartford: Connecticut Department of Public Health. Retrieved from https://portal.ct.gov/DPH/Drinking-Water/WUCC/Water-Utility-Coordinating-Committee

Montville Planning and Zoning Commission, V. M. (2010). *Montville Plan of Conservation and Development.* Montville: Town of Montville.

National Oceanic and Atmospheric Administration. (2018, August 8). *Center for Operational Oceanographic Products and Services*. Retrieved from Tides and Currents: https://tidesandcurrents.noaa.gov/

National Resource Conservation Service. (2017, August 21). *Web Soil Survey*. Retrieved from https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm

Naugatuck Valley Council of Governments. (2019). *Regional Wastewater Treatment Consolidation Study*. Retrieved from https://nvcogct.gov/project/current-projects/regional-wastewater-treatment-consolidation-study/

New England Interstate Water Pollution Control Commission. (2011, revised 2016). *TR-16: Guides for the Design of Wastewater Treatment Works.* Lowell, Massachusetts: New England Interstate Water Pollution Control Commission.

New London Planning & Zoning Commission. (2017). *Plan of Conservation & Development.* New London: City of New London.

New South Wales Office of Environment and Heritage. (2018, July 30). *Salinity*. Retrieved from https://www.environment.nsw.gov.au/topics/land-and-soil/soil-degradation/salinity

O'Donnell, J. (2018). *Sea Level Rise in Connecticut.* Groton: Connecticut Institute for Resilience and Climate Adaptation.

Preston Redevelopment Agency. (2010). *Conceptual & Management Plan for the Redevelopment of Preston Riverwalk.* Preston: Town of Preston.

Salem Planning and Zoning Commission. (2012). *Plan of Conservation and Development.* Salem: Town of Salem.

Southeastern Connecticut Council of Governments. (2017). *Regional Plan of Conservation and Development.* Norwich: Southeastern Connecticut Council of Governments. Retrieved from http://seccog.org/wp-content/uploads/2018/05/RPOCD_Full-Document_11-16-2017.pdf

State of Massachusetts. (2017). *Inter-Municipal Agreements: A Best Practice.* Retrieved from https://www.mass.gov/files/documents/2017/10/11/best-practice-intermunicipal-agreements.pdf

Steinhagen, J. (2019, May 22). Griswold Voters Approve New Senior Center, Utility Improvements. *Hartford Courant*. Retrieved from https://www.courant.com/community/griswold/hc-pk-griswold-votes-on-bond-issues-05302019-20190522-cksbpvbmjvenvdaaf667mwmusq-story.html

Suffolk County Government. (2019). *Suffolk County Coastal Resiliency Initiative*. Retrieved from https://www.suffolkcountyny.gov/Departments/Public-Works/Sanitation/-Suffolk-County-Coastal-Resiliency-Initiative

Tighe & Bond. (2013). *Wastewater Treatment Facility - City of Groton, CT - Draft Facilities Plan.* Groton: City of Groton.

Torres, K. (2010, September 27). Regional WPCA a possibility for Bridgeport, Trumbull and Monroe. *Connecticut Post*. Retrieved from https://www.ctpost.com/news/article/Regional-WPCA-a-possibility-for-Bridgeport-675481.php

Town of Colchester. (2015). *Plan of Conservation and Development.* Colchester: Town of Colchester.

Town of East Lyme. (Amended 2010). *Plan of Conservation and Development 2009.* East Lyme: Town of East Lyme.

Town of Griswold, Connecticut. (2018). *Plan of Conservation and Development 2017-2027.* Griswold: Town of Griswold.

Town of Groton. (2012). *Water Pollution Control*. Retrieved from Town of Groton Connecticut: http://www.groton-ct.gov/depts/pubwks/wpcf.asp

Town of Groton. (2016). *Plan of Conservation & Development.* Groton: Town of Groton.

Town of Hebron. (2014). *The Plan of Conservation and Development.* Hebron: Town of Hebron.

Town of Lebanon Planning and Zoning Commission. (2010). *Plan of Conservation and Development.* Lebanon: Town of Lebanon.

Town of Ledyard. (2003, amended 2010). *Plan of Conservation & Development.* Ledyard: Town of Ledyard.

Town of North Stonington. (2012, February 10). Wastewater Flow Projections - Town of North Stonington Sewer District (Draft). North Stonington, Connecticut.

Town of North Stonington. (2013). *Plan of Conservation and Development.* North Stonington: Town of North Stonington.

Town of Preston Planning and Zoning Commission. (2014). *Town of Preston Plan of Conservation and Development.* Preston: Town of Preston.

Town of Sprague Planning and Zoning Commission and Chester, P. S. (2018). *Plan of Conservation and Development.* Sprague: Town of Sprague.

Town of Stonington. (2015). *Plan of Conservation & Development.* Stonington: Town of Stonington.

Town of Waterford. (2012). *Plan of Preservation, Conservation and Development.* Waterford: Town of Waterford.

United States Census Bureau. (2017). *American Fact Finder*. Retrieved from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml

United States Environmental Protection Agency. (2019, March 11). *Summary of the Clean Water Act*. Retrieved from Laws & Regulations: https://www.epa.gov/laws-regulations/summary-clean-water-act

URS. (2011). *Montville, Connecticut Facilities Plan.* Montville: Montville WPCA.

Water Environment Federation. (2010). *Design of Municipal Wastewater Treatment Plans: WEF Manual of Practice No. 8* (ASCE Manuals and Reports on Engineering Practice No. 76, Fifth Edition ed.). New York, Chicago, San Francisco, Lisbon, London, Madrid, Mexico City, Milan, New Delhi, San Juan, Seoul, Singapore, Sydney, Toronto: McGraw-Hill Education.

Wescor Associates, Inc. (2013, July 9). *Treatment Plant Saves $120,000 Annually Using New Polymer Preparation & Feed System.* Retrieved from ProMinent Solutions Case Studies: http://prominent.us/promx/pdf/foxwoods_wwtp_final.pdf

Weston & Sampson Engineers. (2019). *Technical Memorandum: North Stonington Costs for Sewer Connection to Stonington.* North Stonington: Town of North Stonington.

Windham Planning and Zoning Commission. (2017). *Plan of Conservation and Development*. Windham: Town of Windham.

Wojtas, J. (2019, February 26). Stonington willing to discuss taking North Stonington sewage. *The Day*. Retrieved from https://www.theday.com/local-news/20190226/stonington-willing-to-discuss-taking-north-stonington-sewage

Wright-Pierce. (2005). *Wastewater Facilities Planning Study for the Sprague, Connecticut Water Pollution Control Authority*. Sprague: Sprague Water & Sewer Authority.

Wright-Pierce. (2011). *Wastewater Facilities Plan Update for the Waterford Utility Commission - Final Report*. Waterford: Town of Waterford.

Wright-Pierce. (2016). *Wastewater Pump Station Flooding Vulnerability Evaluation*. Waterford: Town of Waterford.

Wright-Pierce, Inc. (2014). *Capital Improvements Plan - Wastewater System Evaluation - New London, CT*. New London: City of New London.

SCCOG REGIONAL WASTEWATER PLAN

LEGEND

- Major Pump Station
- Other Pump Station
- WWTF Location
- Potential Connection Routes
- Direction of Sewer Flow
- SCCOG Community
- Outside SCCOG Community
- Municipal Boundary

SCCOG Sewer Service Area

- Desired but not yet studied
- Existing
- Proposed
- Package

N

0 9,000 18,000 Feet

1:108,000

NOTES

1. Based on 2016 Statewide Orthophotography, Courtesty of CTECO.

Overview Map

June 2019

Tighe&Bond
Engineers | Environmental Specialists

V:\Projects\S\S5068\MXD\SCCOG_ArcGISOnline_Overview.mxd [Exported By: SMMorse, 6/14/2019, 11:34:34 AM]

APPENDIX A

Data Collection Workshops

DATA COLLECTION WORKSHOP

SCCOG
REGIONAL WASTEWATER MANAGEMENT PLAN

DECEMBER 5 & 6, 2018

MILONE & MACBROOM

in association with

Tighe&Bond

AGENDA

- Welcome & Introductions
- Overview of Approach & Process
- Breakout Sessions:
  - Sewer Service Areas, Potential Demands, and Flood Risks
  - Infrastructure Conditions and Needs
  - Management, Agreements, and Budgets
- Additional Discussion
- Wrap-Up

MILONE & MACBROOM

WELCOME & INTRODUCTIONS

OVERVIEW OF APPROACH & PROCESS

HISTORY

- Last regional Wastewater Plan dated 1969, adopted 1970
- Recommended regional consolidation to reduce overall number of treatment plants
- Set stage for many of the regional collaboration efforts by municipalities & utilities in the region today

MILONE & MACBROOM

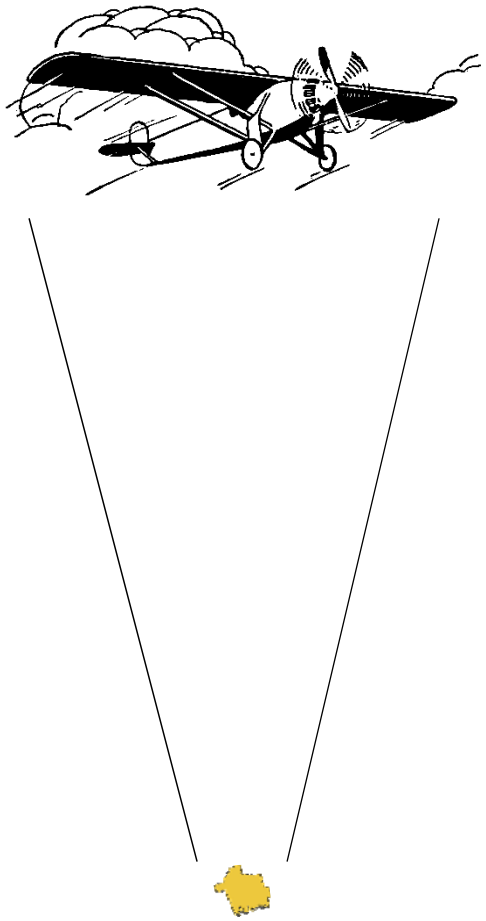
CENTRALIZED SEWER FLOWS IN SCCOG REGION

Collection System	Directs Flow to	Discharges Flow to WWTF
Colchester	East Hampton*	East Hampton*
East Lyme	Waterford	New London
Griswold (includes Jewett City and part of Lisbon)	-	Jewett City
Groton (City of)	-	Groton (City of)
Groton (Town of)	-	Groton (Town of)
Lebanon	Hebron*	East Hampton*
Ledyard	-	Ledyard
Old Lyme* (Proposed)	East Lyme	New London
Mashantucket Pequot Tribal Nation	-	Mashantucket Pequot Tribal Nation
Mohegan Tribe	Montville	Montville
Montville	-	Montville
New London	-	New London
Norwich (includes parts of Franklin and Preston)	-	Norwich
Sprague	-	Sprague
Stonington (Borough)	-	Stonington (Borough of)
Stonington (Mystic)	-	Stonington (Mystic)
Stonington (Pawcatuck)	-	Stonington (Pawcatuck)
Waterford	New London	New London
Windham (includes southern Mansfield*)	-	Windham

MILONE & MACBROOM

GOALS & EXPECTATIONS

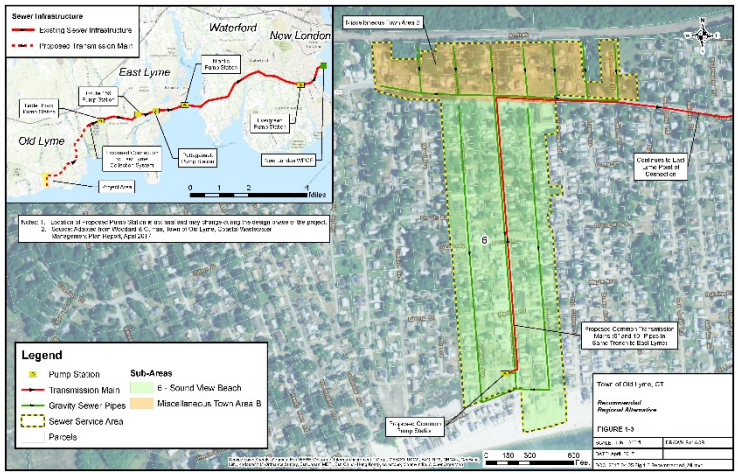
- Provide high-level planning study – a regional perspective on local conditions (the 5,000-foot view)
- Provide a snapshot of existing conditions from local data provided from member communities
- General evaluation of existing capacity of major infrastructure (WWTP, pump stations, interceptor sewers) and capability to meet projected demands
- Incorporate new population projections into regional demands
- Provide recommendations and options to address forecasted regional deficiencies
- Complete all work by June 15, 2019



MILONE & MACBROOM

BUILD UPON LOCAL EFFORTS

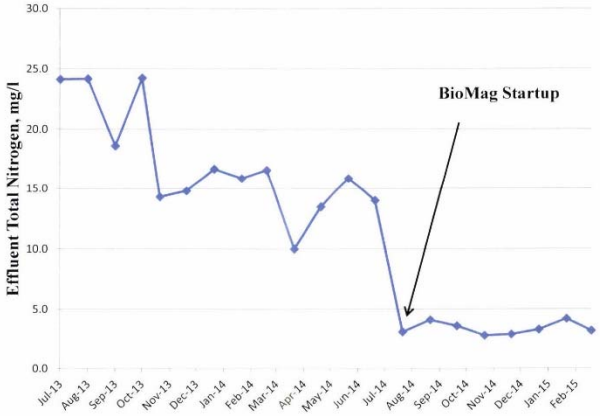
- Take advantage of the local work performed to date
- Upload existing local documents, plans, and information
- Apply this information at a regional scale



CT DEEP Coastal Wastewater Plan, 2018

Figure 1
Mystic WPCF Effluent Total Nitrogen

Town of Stonington – Mystic Upgrades



TOWN OF LEDYARD
WATER POLLUTION CONTROL AUTHORITY
WASTEWATER FACILITIES PLAN
Public Hearing

July 29, 2014

CDR MAGUIRE

MILONE & MACBROOM

SYSTEM EVALUATION / IDENTIFYING NEEDS

- Present status of existing systems and flows
  - Is infrastructure at risk of flooding or sea level rise?
  - Utilize CIRCA tools
- Evaluate published projected demands
  - Incorporate information from ongoing studies (JLUS)
- What upgrades are planned?
- What may be needed?
- What issues could be addressed regionally?

Colchester Directs Flow to
East Hampton WPCF (Google Image)

MILONE & MACBROOM

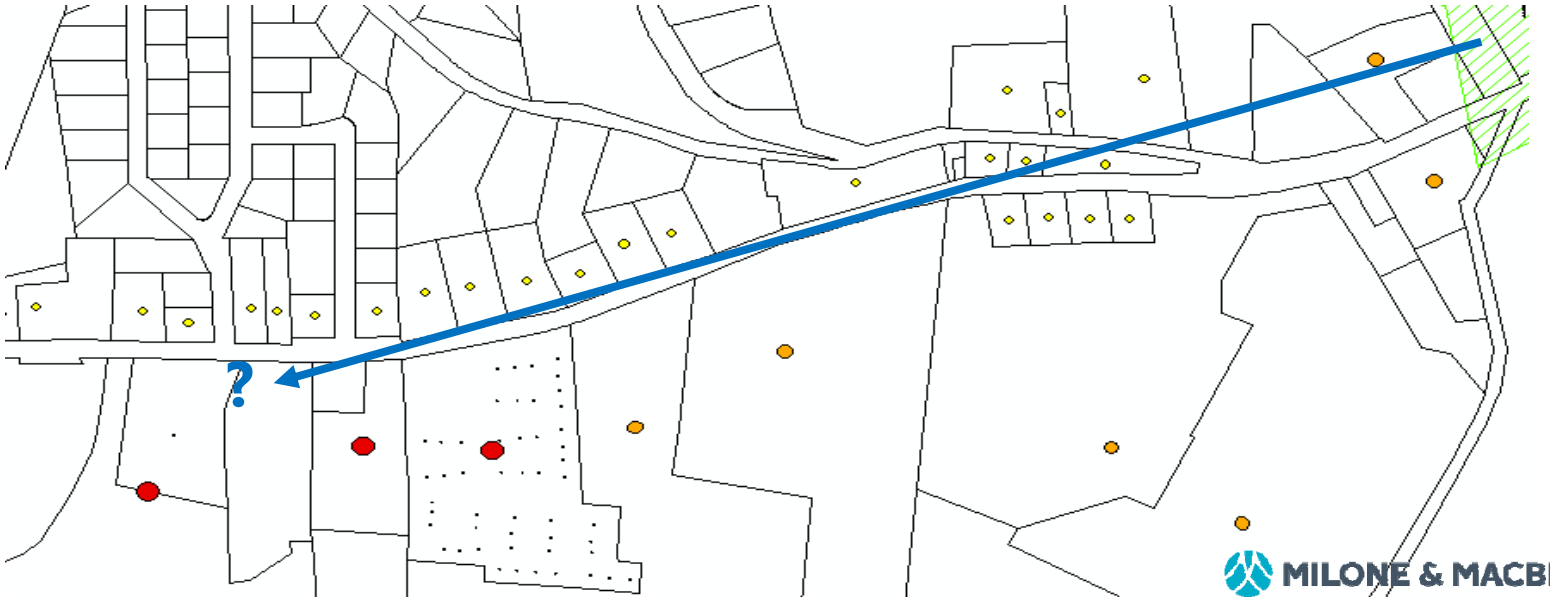
RECOMMENDATIONS

- Identify areas where sewer extension may be of interest
- Identify areas where infrastructure may be at risk of flooding (CSOs, sea level rise)
- Identify options to meet forecasted deficiencies in capacity and treatment
- Recommend regional wastewater management structures for future consideration
- Recommend staged implementation plan
- Recommend policy and governance guide to implement plan

BREAKOUT SESSIONS

BREAKOUT STATION #1

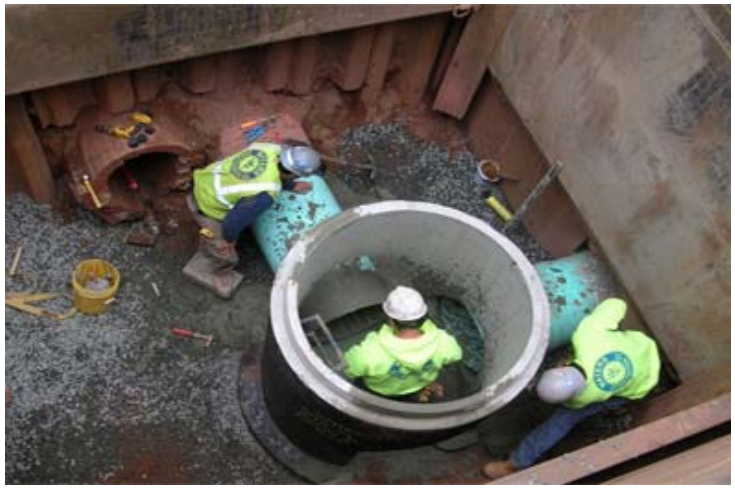
- **Service Areas and Risks**
  - **Where is there increased density of non-centralized services?**
  - **Which areas could benefit from extension of service for:**
    - ✓ **Economic development?**
    - ✓ **Managing population increases?**
    - ✓ **Resolving repeated septic failures?**
  - **How do these areas match current plans for expansion or sewer avoidance?**
  - **What areas could be affected by flooding or sea level rise?**



BREAKOUT STATION #2

- **Collection System Infrastructure Conditions and Needs**

  - **Known collection system problems**
    - ✓ **Capacity limitations?**
    - ✓ **Overflows?**
    - ✓ **Pumping station issues?**
    - ✓ **Failing conditions?**
  - **What needs to be addressed?**
    - ✓ **Recent or proposed upgrades?**
  - **Other Concerns?**



Tighe&Bond

BREAKOUT STATION #2

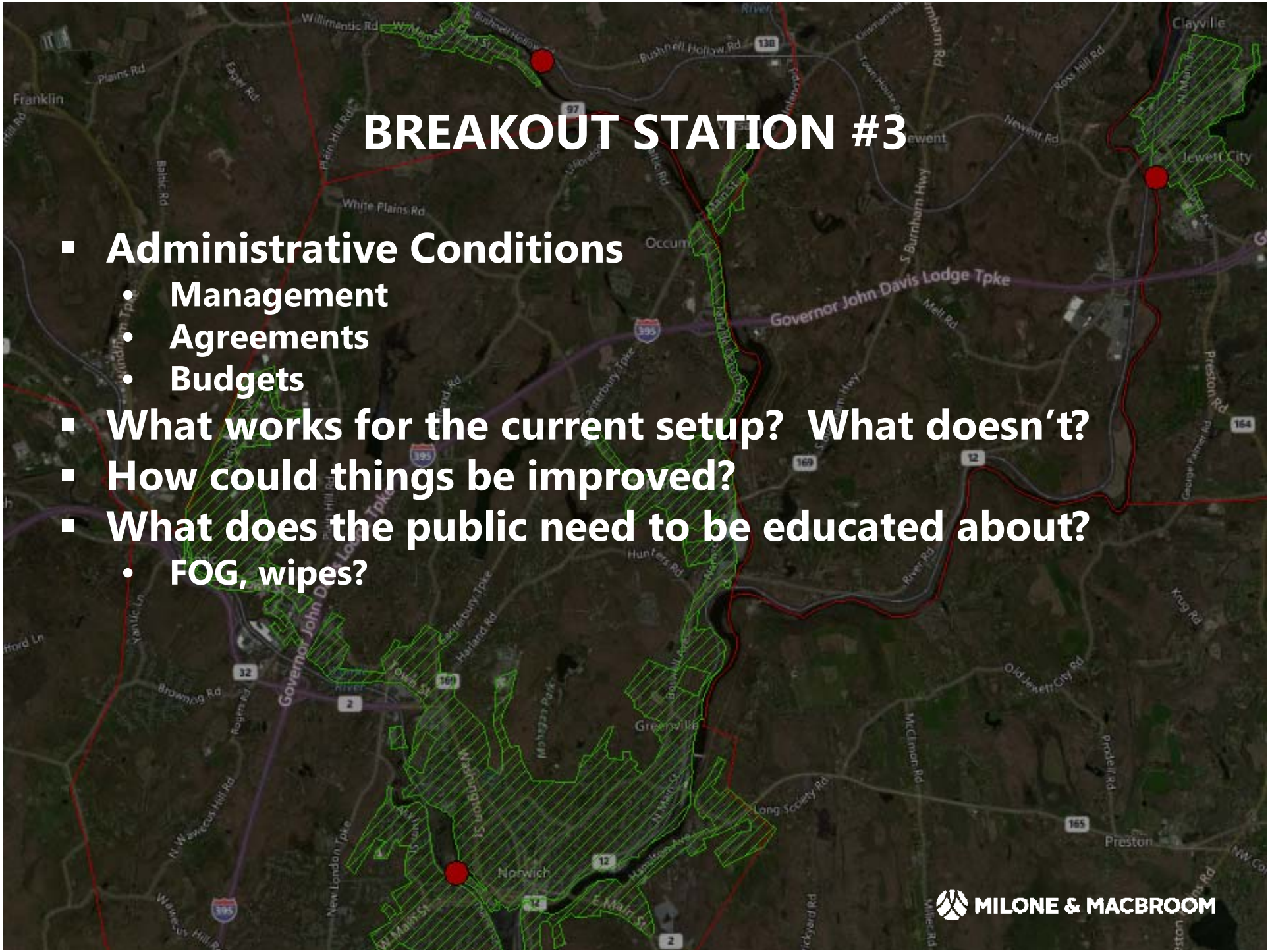
- **WWTP Conditions and Needs**

  - **Known WWTP limitations?**
    - ✓ **WWTP capacity limitations?**
    - ✓ **WWTP permit limits, current or future concerns?**
    - ✓ **Failing conditions?**
  - **What needs to be addressed?**
    - ✓ **Recent or proposed upgrades?**
  - **Other Concerns?**

Tighe&Bond

BREAKOUT STATION #3

- **Administrative Conditions**
  - **Management**
  - **Agreements**
  - **Budgets**
- **What works for the current setup? What doesn't?**
- **How could things be improved?**
- **What does the public need to be educated about?**
  - **FOG, wipes?**



ADDITIONAL DISCUSSION

WRAP-UP

FINAL THOUGHTS

- If you haven't already:
  - Please sign in
  - Please respond to the data collection request

CONTACT US

Scott Bighinatti
Milone & MacBroom, Inc.
99 Realty Drive
Cheshire, CT 06410
(203) 271-1773
SBighinatti@mminc.com

Sam Alexander
SCCOG
5 Connecticut Avenue
Norwich, CT 06360
(860) 889-2324
SAlexander@seccog.org

Cynthia Castellon
Tighe & Bond, Inc.
213 Court Street, Suite 1100
Middletown, CT 06457
(860) 852-5227
CMCastellon@TigheBond.com

Megan Carpenter
Tighe & Bond, Inc.
213 Court Street, Suite 1100
Middletown, CT 06457
(860) 852-5227
MCarpenter@TigheBond.com

MILONE & MACBROOM

THANK YOU FOR YOUR TIME

MILONE & MACBROOM

MEETING MINUTES

MEETING DATE:	December 5, 2018 at 10:00 AM	**ATTENDEES:**
PROJECT:	SCCOG Regional Wastewater Management Plan	Joseph Lanzafame, City of New London Wendy Brown-Arnold, Ledge Light Health Dist.
MMI #:	3570-12-01	Jim Bartelli, Town of Waterford Utilities
SUBJECT:	Data Collection Workshop – New London Sub-region	Neftali Soto, Town of Waterford Utilities Joseph Bragaw, Town of East Lyme
LOCATION:	SCCOG Office, 5 Connecticut Avenue, Norwich, CT	Jim Butler, SCCOG Sam Alexander, SCCOG Scott Bighinatti, Milone & MacBroom, Inc. Steve Dietzko, Milone & MacBroom, Inc. Steve Seigal, Tighe & Bond, Inc. Cynthia Castellon, Tighe & Bond, Inc. Megan Carpenter, Tighe & Bond, Inc.

Welcome and Introductions and Presentation

- Jim Butler provided background on the previous regional sewer plan, the desire of certain communities to have the Regional Water Committee take up regional sewer planning, and the OPM regional services grant for this project which provides a short timeframe to consider and briefly evaluate wastewater collection and treatment conditions regionally. He emphasized that as a COG plan the RWMP will be a plan for the region's communities and having contributions from the communities is important to its success.
- Scott Bighinatti gave a presentation discussing the goals and objectives of the plan and an overview of the breakout sessions. The service area and infrastructure discussions were held around a large map on a table, and the management breakout involved attendees providing their ideas in charrette format for what they perceive to be the pros and cons of wastewater management in the region as well as space for attendees to share their ideas on how things may be improved. Later, time was provided for additional wrap-up discussion and Mr. Bighinatti thanked attendees for their insights and participation.
- This sub-region provides a good example of an area where a regional WPCA may be appropriate because it is already regionally interconnected with a tri-town agreement in place concerning the wastewater treatment facilities (New London-East Lyme-Waterford), as well as a second agreement between Waterford and East Lyme for the collection system facilities. The inclusion of a fourth community (Old Lyme) via the beach communities provides an opportunity to review the overall management structure.

Old Lyme Discussion

- Point O' Woods beach community was connected to East Lyme's sewer system back in 2011-2012 by "borrowing" from the State's capacity allocation in East Lyme (475,000 gpd). The State's capacity allocation is shared between the prisons, Camp Niantic, and Rocky Neck State Park. Flow is directed to East Lyme via force main. East Lyme doesn't want the force main shared with the other beach communities that want to connect because it would be difficult to monitor the flow under the separate agreements. Also, sharing the force main may require pump station upgrades that Point O' Woods may not desire.
- Three beach communities in Old Lyme have requested a total capacity of 120,000 gpd to send wastewater through East Lyme and Waterford to New London WWTP. This is to be a direct allocation from New London's capacity (1.2% of the total design capacity of 10 mgd) and not involving the other two Towns. These beach communities are under a consent order.

- The Town of Old Lyme wants to secure an additional 180,000 gpd to provide sewers to additional areas other than the three beach communities, but which town or towns (out of New London, Waterford, or East Lyme) will provide that allocation is undecided. The First Selectwoman may have specifics on which areas are desired for service.
- The current plan calls for a separate force main to direct flow into East Lyme such that there would be parallel force mains down Route 156. The DOT is holding off paving Route 156 for the time being to help the project, but they will not hold off indefinitely and repaving will increase project costs.
- The beach communities have their own governments and WPCAs. New London made it clear that they do not wish to negotiate with every individual beach community. So, Old Lyme Shores is taking the lead and the other two communities are expected to work out their differences of opinion with Old Lyme Shores.
- New London provided an agreement to hold a certain amount of capacity allocation for Old Lyme for three years. If Old Lyme doesn't begin construction in the next two years they will lose the capacity.
- There's not much financial incentive for the three Towns to assist Old Lyme with providing sewer service to the shoreline area. They are trying to help because DEEP wants them to.
- There is a desire for the RWMP to provide guidance on this issue.

<u>East Lyme Discussion</u>

- East Lyme has a total 1.5 mgd capacity including the 475,000 gpd State allocation.
- The 30-year Tri-Town regional agreement with New London expires in 2021. The respective WPCAs are in discussions about renewing the agreement and any changes that may be necessary.
- East Lyme, Waterford, and New London are already somewhat regionalized. East Lyme receives 15% of the WWTP capacity (Point O' Woods counts in this), Waterford 30% of the WWTP capacity, and New London 55% of the WWTP capacity. The beach communities in Old Lyme would reduce New London's allocation to 53.8%. East Lyme wants to increase its capacity allocation.
- Pending developments include an additional 120 apartments at Gateway, the interchange (below), and the Landmark property apartments (there is an ongoing lawsuit) and Costco (proposed sewer flows of 7,650 gpd).
- DOT is reconstructing the Exit 74 interchange off Interstate 95 in the next few years. This could result in development pressure in the area that may increase sewer flows.
- The Bride Brook pump station needs upgrades. East Lyme wants Old Lyme to contribute to costs, as it directs all flow from the Town. A new location is preferred as the current location is floodprone.
- The Niantic and Pattagansett pump stations also need major upgrades in the next two years. These are considered to be major projects for East Lyme. One of these stations had a pump failure in recent years.
- East Lyme recently did a study looking at the cost to extend sewers into areas with substandard septic fields. Saunder's Point was one example. However, the assessment costs to extend the sewers were very high and the Town doesn't believe that extension is feasible at this time.
- The biggest need for redundancy in the system is the Niantic River crossing. This force main is 25 years old and is key for delivering flow to Waterford. East Lyme would like to build a parallel force main, however a planning study has not been initiated.
- Downtown Niantic is not sewered east of Pennsylvania Avenue.
- Approximately 3 years ago, East Lyme noticed a decrease in flows across sewers and pump stations, which has been attributed to a reduction in the population served at the State prison. This decrease in flows is not expected to be permanent.

<u>Waterford Discussion</u>

- Waterford was heavily sewered years ago. Installations stopped about 10 years ago.

- All areas of Town with R-120 zoning are essentially sewer avoidance areas. However, the Town may extend service into these areas if there are issues with substandard or failing septic systems.
- An area near the airport (light industrial) is not sewered.
- Waterford has 28 pumping stations, but the Evergreen Avenue Pump Station ultimately conveys flows to the New London WPCF. All flows to Evergreen PS are by gravity.
- The pumping station on the north side of Mohegan Avenue (Quaker Hill?) has experienced longer run times and inflow-infiltration issues. The source is unknown.
- One pumping station may create a system bottleneck for flow.
- The Evergreen Avenue pumping station is the largest in the system and receives both East Lyme and some New London flow. It has come close to overflowing once but this was averted with a bypass. The pump station is in need of additional pumping for redundancy (currently has 3 pumps at 3,500 gpm each). There are provisions for this inside the station and the town has plans to add pumping.
- There are no known capacity issues in the system. Waterford indicated the interceptor has capacity.
- One location in the collection system was identified as having issues in the Wright-Pierce report (provided to SCCOG).
- AECOM did a capacity study a couple of years ago for Waterford. However, Joe Lanzafame believes that the AECOM study relied on older New London data for its conveyance and treatment systems which does not reflect current conditions.
- Waterford sends 3.0 to 3.2 mgd to New London via two gravity pipes (24" and 30" mains out of Evergreen Avenue Pump Station, the force main then becomes full flow gravity, and then the two mains combine). This includes East Lyme.
- The East Lyme and Waterford agreement indicates a peak capacity of 8 mgd in the East Lyme to Waterford lines (24" to 48").
- Waterford sends quarterly bill stuffers with information on FOG and wipes.

<u>New London Discussion</u>

- New London is 99% sewered. A few septic systems exist here and there. Bayonet Road near the Red Roof Inn were mentioned as areas with septic systems.
- In general, the sewer system is oversized for the city. More development and flows were expected when the system was built than have occurred. Joe Lanzafame believes that it is unlikely that they would need to upsize pipes to accommodate regional flows. The City CCTVs the sewer lines every seven years and immediately repairs any issues found. According to New London, the collection system has no foreseeable needs for upgrades.
- Pump stations are also considered to be oversized for the city. Two pumping stations (#2 and #3) have inflow-infiltration issues.
- CSOs are not an issue. The Department of Public Utilities is not aware of combined sewers but recently took over stormwater management in the city. Thus, as the Department of Public Utilities surveys storm sewers they may find areas with illicit connections.
- The WPCF is contract operated by Veolia. New London has space to expand its treatment plant. The last estimate they prepared (related to a 2009 study) was approximately $18 million, much higher than the $5 to $8 million they expected. Expansion plans are not proposed at this time.
- New London's facilities plan is relatively dated because they haven't had compliance issues in more than 10 years. BOD, N, and P are all compliant.
- Average flows at the WWTP are 6.8 mgd. The permit allows them to treat an average of 10.3 mgd with conditions, or 10.0 mgd without conditions. New London uses 10.0 mgd as its planning capacity. Thus, 90% flows or 9.0 mgd for 180 consecutive days triggers a facilities upgrade study.

- Wet weather peak flows at the WWTP are in the range of 15 mgd to 18 mgd, and were as high as 50 mgd during Sandy (measurement limit). The high groundwater table and lots of rain have resulted in elevated flows recently. Flows around 10.5 mgd for 30 days are common, but lower flows during the summer bring the average down so the planning trigger doesn't occur. Flows have been over 10 mgd in the last month but are expected to decline now.
- Any upgrades at the WWTP would be related to processing more flow, treatment capabilities are considered adequate. It is believed that significant regional flow increases may require plant expansion, or that this may lead to triggering the 180 consecutive days of 9.0 mgd flows.

General Discussion

- Wendy Brown-Arnold noted that the health department has no records or remarks on clusters of septic failures. Septic systems are repaired for many reasons. While she is aware of non-compliant systems and small lot areas, these are not mapped. Mapping of sewer service areas and GIS shapefiles would be very helpful for regional planning.

MILONE & MACBROOM

MEETING MINUTES

MEETING DATE:	December 5, 2018 at 1:00 PM	**ATTENDEES:**
PROJECT:	SCCOG Regional Wastewater Management Plan	Douglas Nettleton, Town of Stonington Wendy Brown-Arnold, Ledge Light Health Dist.
MMI #:	3570-12-01	Ed Lynch, Ledyard WPCA
SUBJECT:	Data Collection Workshop – Southeast Sub-region	Steve Banks, Ledyard WPCA Bradford Currier, North Stonington WPCA
LOCATION:	SCCOG Office, 5 Connecticut Avenue, Norwich, CT	Rick Stevens, City of Groton Utilities Ray Valentini, City of Groton Utilities Carl R. Johnson, North Stonington WPCA Sam Alexander, SCCOG Scott Bighinatti, Milone & MacBroom, Inc. Steve Dietzko, Milone & MacBroom, Inc. Steve Seigal, Tighe & Bond, Inc. Cynthia Castellon, Tighe & Bond, Inc. Megan Carpenter, Tighe & Bond, Inc.

Welcome and Introductions and Presentation

- Sam Alexander provided background on the previous regional sewer plan, the desire of certain communities to have the Regional Water Committee take up regional sewer planning, and the OPM regional services grant for this project which provides a short timeframe to consider and briefly evaluate wastewater collection and treatment conditions regionally. He emphasized that as a COG plan the RWMP will be a plan for the region's communities and having contributions from the communities is important to its success.
- Scott Bighinatti gave a presentation discussing the goals and objectives of the plan and an overview of the breakout sessions. The service area and infrastructure discussions were held around a large map on a table, and the management breakout involved attendees providing their ideas in charrette format for what they perceive to be the pros and cons of wastewater management in the region as well as space for attendees to share their ideas on how things may be improved. Later, time was provided for additional wrap-up discussion and Mr. Bighinatti thanked attendees for their insights and participation.

City of Groton Discussion (Groton Utilities)

- Electric Boat is building a new building that will have 10,000 employees. This will require a new pump station. The location is undetermined.
- The City is 99% sewered. Current average flow is 1.8 mgd. They have a permit for 3.1 mgd. Flows have been as high as 5 mgd.
- Some areas have inflow-infiltration issues that have been identified, but they lack funding to address them at present.
- Sewer functions were recently transferred into an enterprise fund and they are still adjusting. They need to determine appropriate rates.
- The facilities plan (prepared by Tighe & Bond) is approximately five years old. The City has completed the corrosion related projects but all others are on hold pending determining an appropriate sewer rate to support the projects.

- GU does not have a concern regarding overall capacity at this time. The plant is sized to handle higher flows which occurred in the past. Past flow capacity was determined based on peak employment times at Electric Boat and Pfizer process flows.
- Only one out of 9 pumping stations have been upgraded, but generally feel they have no problems with their pump stations.
- The naval base sends all of its flow to the Town of Groton WWTP and not the City WWTP.
- Emerging contaminants and new regulations need to be mentioned in this plan. What is reasonably possible to occur over the 20 year period?

Ledyard Discussion

- Ledyard WPCA oversees two pump stations and the Highlands WWTP. The Highlands WWTP was constructed in 1962 and later taken over by the town. Upgrades were completed in 1997, and additional upgrades in 2017 (about $3 million) but these recent upgrades were not capacity related.
- Ledyard considers the pump stations to be adequate regarding capacity. Most of the collection system is gravity. A new pump station may be needed if sewers are expanded.
- The town would like to upgrade the pump station located at the high school and send flows to the plant.
- It is a very small plant that discharges to an infiltration bed and ultimately to the Mystic River. Thus, effluent is directed primarily to groundwater (except overflows). DEEP reportedly prefers other technologies and approaches than those used at Highlands even though the effluent is very clean from the SBR and UV treatment. Public water supply wells are located downstream in Stonington.
- The WWTP averages 0.15 mgd and has peaked at 0.24 mgd over the last two months. The facility has 50,000-70,000 gpd in excess capacity. Permit capacity is 0.26 mgd. The last two months have had high flows due to rainfall and high groundwater. Many houses are believed to have sump pump connections.
- Ledyard just received a new nitrogen permit, and its NPDES is up for renewal next year. They are currently removing nitrogen.
- Solar panels were recently installed that should be able to power the majority of WWTP operations.
- There are very small lots in several areas of town. Many of these areas have public water but on-site septic. The small lots are an issue because when the system fails there is limited area to replace the system on the same lot. Aljen Heights was mentioned as an area with substandard/failing septic systems. Gales Ferry is also known to have non-code compliant septic systems but public water is available in the area.
- Their 2014 facilities plan looked at sending flow from these areas to the Town of Groton. The estimated cost was approximately $93 million. The previous Plan of Conservation and Development anticipated sewer to be expanded up Route 117. The Plan of Conservation and Development was being updated but is now on hold. The Town wants to facilitate a connection to Groton but it's just too expensive. It doesn't seem feasible at this time, although connection to another plant would be preferable.
- Some areas in northwestern Ledyard could potentially be directed to Norwich for treatment. This would require crossing the Poquetanuck Cove on Route 12 to the vicinity of the former Norwich State Hospital. A water main is proposed for this area to connect Ledyard to NPU in Preston.
- From a land use perspective, Ledyard WPCA has many concerns regarding development in the watershed draining to the Groton Utilities reservoirs. This is why a Drinking Water Quality Management Plan was developed for Groton Utilities. Zoning in some areas is not dense enough for sewer, although in many areas the zoning is now R-60 and appropriate for sewer (the R-80 zone was eliminated). Unfortunately, much of the development in town seems to be occurring away from the sewer system.
- Several mobile home parks have community septic systems.
- The Ledyard Center school will be closed soon and become surplus. The Town may look to sell this land to a developer. Ledyard WPCA wants to extend a sewer main to make this area more attractive to development,

and to prevent any issues related to new septic systems encroaching on the sanitary radii of the SCWA public water supply wells in the area. The areas is zoned as a Design-Development district.

- The Thames Aquatic center is seeking to install a Non-Community public water system well and connect to sewer. However, well yields are reportedly low and they may need public water supply from SCWA or the Town.
- Ledyard is far below the statewide affordable housing goal of 10% per town. The WPCA believes sewers would help provide that type of development.
- One of the Zoning requirements in Ledyard is for developers of 10 or more lots to evaluate connection to public water supply. There is no requirement for them to evaluate sewer but perhaps there should be.

North Stonington Discussion

- All properties are currently served by septic systems. The Town doesn't own any sewer infrastructure.
- Sewer service is desired along Route 2 in the southeastern part of Town, and possibly along the truck stop near the Rhode Island border (?). This is solely for economic development purposes. An access road may be used for part of the sewer route. The WPCA has been looking at getting sewers for 20 years.
- The town is interested in developing parts near Foxwoods and for Foxwoods to extend their system; the town just started talks with Foxwoods.
- They would like the RWMP to provide guidance on whether or not the Town should build their own package plant or connect to Stonington.
- The Town has hired an engineer (Weston & Sampson) to estimate potential public water expansion along Route 2 from Westerly Water Department. The Town will provide these estimates to be used for potential sewer flows.
- There is concern about installing sewers without extension of the water main. How would flows be calculated from private wells to determine usage?
- The Town states that septic system failures are common within one of the developments served with public water by SCWA. This is the Kingswood/Meadowood 225-lot subdivision area. These are primarily half-acre lots with systems dating from 1967. The town would like to sewer this area.
- Public water extends into the village from one of the SCWA systems (North Stonington system).
- No agreements are in place yet with either Westerly Water or Stonington. The engineering studies need to be completed first so that flows could be allocated. North Stonington is working on this to keep things moving.
- Stonington may have political concerns regarding enabling and encouraging economic development in a neighboring town. It may be difficult to get a sewer agreement without some concessions, particularly related to facilities upgrades in the Pawcatuck subsystem. Previous talks stalled when Stonington and North Stonington could not agree on what the fee to North Stonington should be. A study completed by the BETA Group was conducted in conjunction with Stonington (a copy was requested by SCCOG, also mentioned below).
- The Belisimo Grand and adjacent hotel each have DEEP subsurface disposal systems with pretreatment package systems.
- A question was raised regarding the use of advanced treatment systems. According to Wendy Brown-Arnold, only DEEP can approve advanced treatment systems. Thus, advanced technologies are only used for systems with flows above 7,500 gpd (or those grandfathered in). The technology cannot be used on single lots in Connecticut (because DEEP is not interested in regulating septic systems on individual lots) even though it is common in other states.

Stonington Discussion

- Stonington has 3 WWTPs (Mystic, Borough, and Pawcatuck), 17 pump stations, and 3 odor control facilities.
- The Pawcatuck WWTP may take flow from North Stonington in the future. This plant doesn't have any capacity issues at the moment. The politics surrounding allocation of the flow, and who would pay for eventual facility improvements, needs to be worked out.
- The Borough WWTP has a capacity of 0.6 mgd and averages 0.15 mgd.
- The Mystic WWTP is most likely to be affected by new development. It has been over the capacity threshold on 13 of 30 days in the past month due to high groundwater and rainfall, with flows as high as 1.2 mgd. They may need to go into moratorium on new connections in this subsystem. They have to examine whether there is I/I, they suspect several homes have sump pumps.
- The Town plans to try to divert some flow from the Mystic WWTP to the Borough WWTP. They will use the former sludge force main that went between plants (in the opposite direction).
- The Town has asked the Town of Groton about potentially taking flow. This would require underground tunneling beneath the Mystic River and probably a dedicated pumping station. The project would be expensive. Stonington may come back to this in 15 years once they are out of other options, but currently have the facilities in place to handle needs before reaching out to Groton.
- The capacity of the sewer main in Old Mystick Village is limited. Aquarion Water Company backwashes to it at night.
- The Maritime Drive pump station will be maxed out soon with new development. This area is slated for the new Perkins Farm development.
- The Town has received inquiries regarding construction of 3 more hotels, all would need sewer connections.
- Funding is not available to expand the sewer service area. Any expansions would need to be funded through assessment or by developers. As assessment is unpopular, this has limited expansion in recent years to developers. New single family homes have been limited.
- The Stonington facilities plan is outdated (about 13 years old), but it has details on areas where sewer is desired. These areas are largely unchanged.
- Mason's Island has a private sewer system, but the flow is directed to the Mystic WWTP.
- Marks Street in Pawcatuck has 15 homes and some want to connect. The road is adjacent to the WWTP and would require only a gravity main and laterals. However, not all homeowners are interested in the assessment.
- A study completed by the BETA Group considered sewer needs under a full-buildout scenario for the town. It is an older study but gives good numbers according to Doug Nettleton. It also has a capacity analysis of sewers leading to the Pawcatuck WWTP. He will forward it to Sam.
- New discharge permits are expected soon for Mystic WWTP. They are not expecting any changes.
- Lord's Point is sewered.

General Discussion

- Wendy Brown-Arnold noted that the health department has no records or remarks on clusters of septic failures. Septic systems are repaired for many reasons. While she is aware of non-compliant systems and small lot areas, these are not mapped. Mapping of sewer service areas and GIS shapefiles would be very helpful for regional planning.

MILONE & MACBROOM

MEETING MINUTES

MEETING DATE:	December 6, 2018 at 1:00 PM	**ATTENDEES:**
PROJECT:	SCCOG Regional Wastewater Management Plan	John Carrington, Mansfield Public Works Derek Dilaj, Mansfield Public Works
MMI #:	3570-12-01	James Paggioli, Colchester Public Works
SUBJECT:	Data Collection Workshop – Northwest Sub-region	Scott Clayton, Town of East Hampton WPCA Sam Alexander, SCCOG
LOCATION:	SCCOG Office, 5 Connecticut Avenue, Norwich, CT	Scott Bighinatti, Milone & MacBroom, Inc. David Murphy, Milone & MacBroom, Inc. Steve Seigal, Tighe & Bond, Inc. Cynthia Castellon, Tighe & Bond, Inc. Megan Carpenter, Tighe & Bond, Inc.

Welcome and Introductions and Presentation

- Sam Alexander provided background on the previous regional sewer plan, the desire of certain communities to have the Regional Water Committee take up regional sewer planning, and the OPM regional services grant for this project which provides a short timeframe to consider and briefly evaluate wastewater collection and treatment conditions regionally. He emphasized that as a COG plan the RWMP will be a plan for the region's communities and having contributions from the communities is important to its success.
- Scott Bighinatti gave a presentation discussing the goals and objectives of the plan and an overview of the breakout sessions. The service area and infrastructure discussions were held around a large map on a table, and the management breakout involved attendees providing their ideas in charrette format for what they perceive to be the pros and cons of wastewater management in the region as well as space for attendees to share their ideas on how things may be improved. Later, time was provided for additional wrap-up discussion and Mr. Bighinatti thanked attendees for their insights and participation.

Mansfield Discussion

- Mansfield directs its sewer flows to the Windham WWTP by gravity.
- Windham directs flow into Mansfield in the southwestern part of town and loops it to the east to Route 195. These looping mains that collect Mansfield flow are owned by Windham.
- Flows in Mansfield are predominantly gravity in the Town-owned mains. There is one private pumping station serving a condominium that pumps into the Town's mains.
- The majority of sewer expansions in Mansfield are for private communities. The Town has agreements with them all, and two are located in southern Mansfield.
- Mansfield's facilities plan is from the 1980s. Projections are focused in sewered areas. However, Mansfield doesn't have any treatment plants under their control so there is no immediate need to update the plan.
- A Sewer System Evaluation Study was completed in 2002 and 2004, which recommended lining the trunk sewer (24" or 30") and other problem areas.
- Sewer projections in the southern part of town are considered to be the "East Brook Area".
- The majority of the Town is sewer avoidance. It's a hot button issue and the public wants to maintain rural character.
- The inter-municipal agreement with Windham doesn't have a set expiration but is renewed regularly. They meet to periodically review it.

- Scott Bighinatti asked if potential expansion into Coventry would occur through Mansfield. Mansfield had heard that expansion into Coventry was a possibility but no discussions have included Mansfield. Perkins Corner is generally built out and sewers are not planned for the area, so there is no driving need for sewers in this area. The sand and gravel overburden in this area is conducive to septic.
- Although there is a lot of industrial zoning in southern Mansfield, a lot of it off Route 6 is presently used for farmland. The town is revisiting whether this should still be zoned industrial as farmland preservation is a topic of interest in town.
- Mansfield noted septic issues are not common. The soil is considered good soil, mainly sand/gravel.
- Mansfield would have liked for the Windham WWTP to be regionally owned so they could have more of a say, but the town acknowledges that this is not the current situation.

East Hampton and Colchester Discussion

- East Hampton receives flows from Lebanon, Hebron, Colchester, and Marlborough. The sewer system is 35 years old. Colchester's system was built in 1982. Flows from Lebanon and Hebron are collected and passed through Colchester, whereas flows from Marlborough are directed to East Hampton. 50% of the WWTP capacity is allotted to Lebanon, Hebron, and Colchester, and 50% is allotted to East Hampton and Marlborough.
- Colchester's capacity allocation includes a reservation that the Lake Hayward area may provide 0.2 mgd in the future.
- East Hampton and Colchester split the cost of the WWTP 50/50. Thus, Colchester has agreements with Lebanon and Hebron rather than East Hampton.
- Some force mains in East Hampton are experiencing deterioration due to aggressive soil chemistry. They are looking into PVC replacements for the DIP. They noted that capacity was not an issue.
- In Colchester, the area of Route 2 & 11 was planned for growth. The Town altered the State C&D plan for it. Weston and Sampson did the study and design. The development (mostly commercial such as big box retail) didn't occur. Now they have a pumping station that operates 3 hours per week. Odor was not a concern.
- Pickerel Lake has small lot sizes but is far from centralized sewer. A package plant would be better here if needed.
- Both Colchester and East Hampton require developers to pay to build new system extensions and then turn these assets over to the towns. This is similar to Hampton Woods (MMI project).
- A lot of historical connections were driven by consent orders, but East Hampton and Colchester do not see more of that happening, and don't foresee other areas connecting.
- For Colchester, water flow is equal to sewer flow on bills.
- East Hampton reached out to Portland about getting Portland to send its wastewater to East Hampton. Portland operates its own plant. Talks haven't gone anywhere. It's possible that an East Hampton connection could pick up flows from Saint Clement's Castle, in lieu of a more substantial connection that accepts wastewater from the entire town.
- Marlborough has one major pump station that sends all of its flow to East Hampton.
- There are 18 or 19 pump stations in East Hampton, but ultimately one pump station sends all flow to the WWTP. This is "MAPS" or the Middletown Avenue Pump Station. It runs continuously with no downtime. The station needs to be renovated and needs a bigger wet well.
- Seven pump stations in Hebron feed to one pump station in Colchester.
- One main pump station in Colchester sends flow to East Hampton.
- Upgrades are expensive, and the combined system hasn't had any violations which would prioritize it for funding. So, the two towns don't use Clean Water Funding. The majority of improvements are conducted on a cash flow basis as the two towns can afford them. They will perform WWTP upgrades as they can afford them.

The facilities plan is about 15 years old and was not enacted formally but the towns are making improvements as they can. East Hampton is slowly upgrading its pump stations.

- They are buying credits at under $20,000 per year, and are not incentivized to upgrade the plant for denitrification. They are nitrifying continuously and the long term plan is to continue to buy credits.
- The pipeline from Colchester to East Hampton has 8 hours of storage in it volumetrically due to its length. Fortunately, there are no sulfide problems resulting. There is an odor control station that uses compressed air. Colchester also has a 50,000 gallon equalization tank that also provides some storage.
- Hebron is looking at making system-wide improvements, including redoing pump stations and lining the collection system.
- Backup power is available at most pumping stations. However, the pump station that directs all of Colchester's flow to East Hampton does not have backup power.
- The WWTP has a capacity of 3.8 mgd. They are using 2.0 mgd average.
- Funding was a primary concern.

MILONE & MACBROOM

MEETING MINUTES

MEETING DATE:	December 6, 2018 at 10:00 AM	**ATTENDEES:**
PROJECT:	SCCOG Regional Wastewater Management Plan	Ken Sullivan, Jewett City Dept. of Utilities Terri Pelletier, Jewett City Dept. of Utilities
MMI #:	3570-12-01	Patrick McCormack, Uncas Health District
SUBJECT:	Data Collection Workshop – Norwich Sub-region	Chris Lund, Town of Groton Public Works Mike Lalima, Town of Griswold WPCA
LOCATION:	SCCOG Office, 5 Connecticut Avenue, Norwich, CT	David Garand, Town of Windham Chris Clark, Mohegan Tribe Jason Nowosad, Lebanon WPCA Jim Butler, SCCOG Sam Alexander, SCCOG Scott Bighinatti, Milone & MacBroom, Inc. David Murphy, Milone & MacBroom, Inc. Steve Seigal, Tighe & Bond, Inc. Cynthia Castellon, Tighe & Bond, Inc. Megan Carpenter, Tighe & Bond, Inc.

Welcome and Introductions and Presentation

- Jim Butler provided background on the previous regional sewer plan, the desire of certain communities to have the Regional Water Committee take up regional sewer planning, and the OPM regional services grant for this project which provides a short timeframe to consider and briefly evaluate wastewater collection and treatment conditions regionally. He emphasized that as a COG plan the RWMP will be a plan for the region's communities and having contributions from the communities is important to its success.
- Scott Bighinatti gave a presentation discussing the goals and objectives of the plan and an overview of the breakout sessions. The service area and infrastructure discussions were held around a large map on a table, and the management breakout involved attendees providing their ideas in charrette format for what they perceive to be the pros and cons of wastewater management in the region as well as space for attendees to share their ideas on how things may be improved. Later, time was provided for additional wrap-up discussion and Mr. Bighinatti thanked attendees for their insights and participation.

General Discussion

- Ken Sullivan asked if the plan could discuss current resiliency standards. Steve Seigal noted that the current guidelines used by the CT DEEP in reviewing Contract Documents for improvements to wastewater facilities is based upon the 100 year flood elevation plus three feet. The standard required by Public Act 18-82 may be even higher (500 year plus freeboard).
- Patrick McCormack asked about the process for funding connections. Mike Lalima indicated that most often they are paid by developers, but noted that WPCAs are authorized by law to charge a benefit assessment to properties passed by the sewer main if a connection is possible. David Garand added that in Windham, they haven't required connections along new sewer mains in areas with septic systems even if a property has been assessed.
- Data regarding failing septic systems is hard to compile, because systems fail for different reasons and sometimes repairs are done even though a system has not actually failed. Uncas Health District reports that

they know general areas with recurring problems but that in general people are not quick to report real failures. Real estate transactions are spurring replacements that are not always needed.

Town of Groton Discussion (Groton WPCA)

- Chris Lund noted that expansion into Center Groton along Route 117 and 184 will be the last major expansion. This area is included in the Town's facilities plan. There has been some discussion with extending further upstream into Ledyard, but that would be primarily for Ledyard's benefit. The Town of Groton and Ledyard have had some discussions.
- There may be the potential for some higher density developments to occur in other parts of Groton, but these are generally already near sewer lines.
- Both Electric Boat and the subbase may expand, but the numbers aren't clear at the moment. There was discussion yesterday at the previous data collection workshop about more workers in a new building.
- The Naval Base owns its own sewer lines and the Town of Groton does not have them in their spatial data. The lines are entirely gravity flow into the Town system. This includes areas of naval housing.
- The WPCF had a major upgrade in 2009. The treatment plant has a design capacity of 7.5 mgd. They average approximately half of that, about 3.5 mgd. They are currently rehabbing portions of the plant and indicated the plant is in good shape. Items from the facilities plan are being addressed in this current rehabbed, and other items were addressed in 2009. They expect to update the facilities plan in approximately 2020.
- The Town is largely focusing on doing improvements to their linear assets and pump stations at the moment. There are no combined sewers therefore no CSOs.
- Some pump stations along the shoreline have flooded. The Town plans to do a resiliency study in the near future. These are also discussed to a limited extent in the Groton Municipal Coastal Program document.
- The Town is aware of their inflow-infiltration issues but they are not sure where the flow is occurring. Since the plant was averaging 2.2 mgd during the last drought, I/I may be around 1 mgd.
- If the City decided to discontinue providing treatment, the existing City plant could be turned into a pump station to send flow to the Town.
- Chris Lund suggested that the plan should discuss biosolids, metals, and emerging contaminants. Detailed discussions of these are beyond our scope. In particular, biosolids are currently a problem as incinerators are shutting down because they cannot comply with the Clean Air Act. A regional biosolids processing plant may be a good investment.

Jewett City Discussion

- Jewett City provided hardcopies of plans and data for use.
- Expansion plans include south along Route 164 about one mile to the vicinity of the golf course (River Ridge Golf Course). Some potential large-scale development has been discussed in this area, but flow estimates are not available.
- They also plan to expand the system east along Route 201 towards Hopeville, ending at the Interstate 395 interchange. This would be approximately ¾-mile to 1 mile of additional sewer. Flow estimates are not available.
- Otherwise, they consider Jewett City to be built out.
- The March 2010 flood was very bad at the treatment plant. Ken had to call in the National Guard in the middle of the night to lay sandbags. He thought the plant would be lost, but they ended up with only $10,000 in damage thanks to the guard.
- In 2019, they will be looking for a grant for additional floodproofing at the plant and at one pump station (South Main Street). Jewett operates 5 pump stations overall, they consider the capacities to be ample.

- Jewett City has inter-municipal agreements with Griswold and Lisbon. Lisbon purchased 0.208 mgd of capacity for $4.4 million. Flows to Jewett from Griswold are by gravity.
- Current flows at the WWTP are 0.27 mgd. The plant has a design capacity of 1.1 mgd. The last upgrade occurred in 2004, and there are no process-related concerns at the plant.
- The facilities plan dates from 1999. The majority of the predicted development never occurred. The gap between average flows and capacity hurts their financials. The Borough described this with the phrase "The good news is we have ample capacity. The bad news is we have ample capacity."
- No other improvements are needed in the immediate future except for floodproofing.
- Pump station capacities are fine for now and into the immediate future. Steve Seigal asked if they would still be good in 20 years. Mike Lalima noted that in the past 20 years he has been on the Griswold WPCA they have connected only 6 homes. Griswold isn't growing.
- The sewage treatment plant by Glasgo Pond in eastern Griswold is a septic system serving 11 homes.
- Ken Sullivan noted that Jewett City is trying to walk a fine line of planning ahead for possible growth but doing their best to not pass excess costs onto customers.
- Scott Bighinatti noted that Plainfield is relatively close up Route 12 although they are out of the region. It was generally believed that they did not have capacity issues.

Windham Discussion

- The WWTP is located in the FEMA SFHA and therefore has flood risk, and is located in a "very tight spot" (no room to add new facilities) on a peninsula at the confluence of the Natchaug and Willimantic Rivers. It was last upgraded in 2008. The sludge storage was upgraded in 2014. Plant capacity is 5.5 mgd, average flow is 2.0-2.5 mgd. Flows are 3.5 mgd during heavy rain.
- There are no plans to expand the plant at this time. Expansion of the plant would have a capital cost thereby affecting rates.
- There has been 10 years of discussion with Coventry about potential expansion but nothing has materialized. Scott Bighinatti asked about potential expansion along Route 6 into Chaplin and it was noted that although public water is desired there has been no request for sewer. David Garand believes that a new inter-municipal agreement would result in different rates for different classes of customers that would help offset costs that they would otherwise need to pass on to existing core customers.
- They have three major pump stations and several smaller pump stations. All were last upgraded in 2008. New expansions would require new pump stations.
- Current efforts are focused on the collection system, specifically on lining old asbestos lines and prioritizing wet areas. They have documented and repaired major issues related to the collection system.
- Some of the sewer users have discharges that are above the allowed discharge for pollutants and are charged accordingly.
- There has been minimal expansion in recent years. Most new connections are infill. Others are special cases where DEEP has been petitioned to allow for a connection outside of the Sewer Service area. Examples include a new STEM school off George Street and the Fire Training Academy. In general, Windham tells developers outside the sewer service area to seek DEEP approval and once it is received they are happy to connect it.
- Scott Bighinatti noted that the new population projections for Windham were discussed during the WUCC process and Jim Hooper stated that they made no sense as they were very high. Any new development to support this population increase would likely be in areas without sewer and water.
- David Garand noted that the public water service area is much larger than the sewer service area.
- A new bottling plant in Willimantic could produce 100,000 gpd in high strength waste. The WPCA can recover additional treatment costs for higher strength waste.

Lebanon Discussion

- The "triangle" at the south end of town near Norwich is where development could occur with sewers. Possible developers keep passing on this area because of the lack of sewers. The soils aren't appropriate for septic. Sewer in this area would have to piggyback on top of any expansion through the northern half of Bozrah.
- Red Cedar Lake neighborhoods have substandard septic systems. Many of the lots are small and replacements would interfere with setbacks for private wells.
- Sewers in Lebanon are around Amston Lake and are directed into Hebron. The Amston Lake area is built out so expansion is not anticipated. There is a hotel nearby that would have been nice to have connected, but it is located on a 60-acre parcel and they found room for the required septic.
- The flow directed to Hebron enters a force main at one pumping station, which was rebuilt in 2013. Hebron owns the pumping station but Lebanon built it with USDA funding. Hebron is reportedly trying to get Lebanon to cost-share on all system upgrades, not just those that flow from Lebanon would utilize. This isn't acceptable to Lebanon.
- The Lebanon collection system is fully pumped, there are no gravity lines. Individual homes will have pumping issues.
- The Lake Williams area is less dense and septic systems in the area are generally ok.
- On the southern Windham / Franklin side of Lebanon on Williams Crossing Road, a solar company purchased all the industrially zoned land and installed five 1 MW power plants. This land use is not taxable so the town is getting zero benefit from the zoning. This is a big regret for the Town.
- In general, because so much land in Lebanon is permanently protected there will not be a lot of public pushback about expanding sewer into industrial zones. The industrial zones are surrounded by protected land which limits the development density and therefore may make sewer expansion more expensive in the long run.

Bozrah Discussion

- Stockhouse Road does not have sewer yet. Developers are spending lots of money on engineered septic systems and will not want to tie in once sewers are installed. This will be a problem/challenge.
- Uncas Health District noted that the septic systems in Fitchville are problematic. This is primarily in the vicinity of the Town Hall.
- Bozrah desires sewer extended from Norwich into Fitchville and Gilman. Expansion into Gilman would allow for further extension into Lebanon.
- Extension of water down Route 82 in southern Bozrah is desired for Bozrah Senior Living, but sewer extension is not needed at this time.
- The Town does not have a WPCA at present. The Board of Selectman acts as WPCA for the time being.

Mohegan Tribe Discussion

- All sewer flow is directed to Montville (750,000-800,000 gpd on average, they are allotted 1.6 mgd). This is governed by an MOU. The Tribe has extra capacity in its subsystem and lots of allocated capacity with Montville.
- There are two pump stations on Mohegan land but owned by Montville that are about 18 years old and considered to be in good condition. There is a dedicated 12" line from Mohegan to Montville.
- They never wanted to build their own WWTF and prefer the regional solution.
- Mohegan lands off of the main tribal lands are also on sewer as direct customers of Montville WPCA.

Closing Discussion

- Ken Sullivan noted that this was a good discussion and asked if this would be a regular practice as it was good to get peers into the room to discuss common issues. Patrick McCormack concurred. Scott Bighinatti suggested that this is something that the Regional Water Committee could consider, and include as a recommendation in this report.
- Patrick McCormack asked if there was funding that is not from DEEP. Steve Seigal noted that there are other funding sources but that Connecticut DEEP is generous with grants, particularly for planning. Most states only provide low interest loans for improvements. Rural Development and STEAP grants may be available for certain types of qualifying projects. As at other workshops, funding is a primary concern for several communities.
- There was a brief discussion on the politics of inter-municipal cooperation. There is sometimes resentment between communities because "they get the tax base and all we get is the sewage".
- There was concern regarding the Clean Water Fund as it seems that the overall number of projects being funded has decreased. The large projects for the MDC, CSO projects, and phosphorus removal projects are receiving funding. Necessary upgrades for systems that are not yet failing or substandard are not being funding based upon the Clean Water Fund's current point-based method for setting priorities.
- Ken Sullivan noted that the public is largely uninterested in the importance of wastewater. Steve Seigal noted that this is because everyone does their jobs so well that the public can "flush and forget". There is a need for more public education about how difficult it is to treat wastewater and how expensive upgrades can be. The public resents the expense without appreciating its value.
- It was noted that in the past, members of the Sprague WPCA didn't live in the water and sewer service area. This resulted in a lot of deferred maintenance due to "Not in My Backyard" opinions. Hence, the systems came in danger of failing. The irony was that the Town Hall, public works facility, shelter, and school serve the entire community and need water and sewer service. This has been addressed in recent years.
- Chris Lund noted that when dealing with inter-municipal flows, there is a perception that communities with WWTPs make a fortune through rates. But this isn't profit – the revenue is needed for operations, maintenance, and upgrades for the combined system!

APPENDIX B

Infrastructure Susceptible to Flooding or Sea Level Rise

Appended Table 1: General Flooding and Sea Level Rise Risk to Pumping Stations and Wastewater Treatment Facilities

Town (Owner)	Name	Mapped FEMA Floodzone	Dominant Flood Risk	Hurricane Surge Zone	Infrastructure Above 0.2% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain + 20	Infrastructure Above Mean Higher High Water?	Infrastructure Above Mean High Higher Water + 1	Infrastructure Above Mean Higher High Water + 20 Inches?
Colchester	Lake Hayward Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Colchester	Prospect Hill Road Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
East Hampton	Middletown Avenue Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
East Hampton	East Hampton/Colchester Joint WWTF	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
East Lyme	Attawan Beach Pump Station	Zone VE	Coastal	1	No	Yes	No	Yes	Yes	Yes
East Lyme	Bride Brook Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
East Lyme	Colton Road Pump Station	None	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
East Lyme	East Shore Drive Pump Station	Zone AE	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Giants Neck Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
East Lyme	J.B. Gates Correctional Institute Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
East Lyme	Marshfield Road Pump Station	Zone X500	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
East Lyme	McCook Beach Pump Station	None	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Niantic Pump Station	Zone AE	Coastal	4	No	No	No	Yes	Yes	Yes
East Lyme	Old Black Point Road Pump Station	Zone AE	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Pattagansett Pump Station	Zone AE	Coastal	1	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Point Road Pump Station	Zone AE	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Pump Station 1	Zone X500	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
East Lyme	Pump Station 2	Zone AE	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
East Lyme	Ridgewood Road Pump Station	Zone AE	Coastal	4	No	Yes	Yes	Yes	Yes	Yes
East Lyme	Route 156 Pump Station	None	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
East Lyme	Shore Road Pump Station	Zone AE	Coastal	1	No	Yes	No	Yes	Yes	Yes
East Lyme	Society Road Pump Station	None	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
East Lyme	South Trail Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
East Lyme	Woodbridge Road Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Groton, City of	Colonial Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Groton, City of	East Slope Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, City of	Eastern Point Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, City of	Groton (City) WWTF	Zone VE	Coastal	1	No	No	No	No	No	No
Groton, City of	Jupiter Point Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, City of	North Slope Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Groton, City of	Plant Street Pump Station	Zone AE	Coastal	2	No	Yes	No	Yes	Yes	Yes
Groton, City of	Twin Hills Pump Station	None	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
Groton, City of	West Side Pump Station	None	Inland	N/A	Yes	N/A	N/A	Yes	Yes	Yes
Groton, Town of	Beach Road Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Beebe Cove Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Bel-Aire Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Bridge Street Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Brookview Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Groton, Town of	Burgess Park Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Country Glen Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Deerfield Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Fieldcrest/Ann Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Fishtown Road Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Goss Cove Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Groton, Town of	Gravel Street Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Groton (Town) WWTF	Zone AE	Coastal	3	No	Yes	Yes	Yes	Yes	Yes

Appended Table 1: General Flooding and Sea Level Rise Risk to Pumping Stations and Wastewater Treatment Facilities

Town (Owner)	Name	Mapped FEMA Floodzone	Dominant Flood Risk	Hurricane Surge Zone	Infrastructure Above 0.2% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain + 20	Infrastructure Above Mean Higher High Water?	Infrastructure Above Mean High Higher Water + 1	Infrastructure Above Mean Higher High Water + 20 Inches?
Groton, Town of	Lestertown Road Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Groton, Town of	Little Gibraltar Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Mumford Cove Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Groton, Town of	Noank Pump Station	Zone AE	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
Groton, Town of	North Street Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Pacific Street Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Groton, Town of	Poquonnock River Pump Station	Zone AE	Coastal	2	No	Yes	No	Yes	Yes	Yes
Groton, Town of	Tower Avenue Pump Station	Zone X500	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
Groton, Town of	Town Hall Annex Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Groton, Town of	Trails Corner Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Hebron	Amston Lake Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Hebron	Amston Village Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Hebron	Hope Valley Pump Station	Zone A	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Hebron	Millstream Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Hebron	Old Railroad Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Hebron	Pendleton Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Hebron	Raymond Brook Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Hebron	Stonecraft Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Hebron	Wellswood Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Jewett City	Burleson Lane Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Jewett City	East Main Street Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Jewett City	Jewett City WWTF	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Jewett City	South Main Street Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Jewett City	Tift Street Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Jewett City	Wilson Street Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Ledyard	Highlands WWTF	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Ledyard	Lakeside Condominiums Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Ledyard	Ledyard High School Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Lisbon	Route 12 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Mansfield (Freedom Green)	Freedom Green Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Mashantucket Pequot Tribal Nation	Mashantucket Pequot WWTF	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Avery #1 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Avery #2 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Chesterfield Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	D'Amato #1 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	D'Amato #2 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Derry Hill Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Holly Hill Pump Station	None	Coastal	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Indian Hill Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Kitemaug Pump Station	Zone AE	Coastal	2	No	N/A	N/A	N/A	N/A	N/A
Montville	Lathrop Pump Station	None	Coastal	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Lower Marina Pump Station	None	Coastal	1	No	N/A	N/A	N/A	N/A	N/A
Montville	Massapeag Side Pump Station	None	Coastal	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Mayo Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Mohegan Brook Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Montville	Montville WWTF	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes

Appended Table 1: General Flooding and Sea Level Rise Risk to Pumping Stations and Wastewater Treatment Facilities

Town (Owner)	Name	Mapped FEMA Floodzone	Dominant Flood Risk	Hurricane Surge Zone	Infrastructure Above 0.2% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain + 20	Infrastructure Above Mean Higher High Water?	Infrastructure Above Mean High Higher Water + 1	Infrastructure Above Mean Higher High Water + 20 Inches?
Montville	Orchard Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Paint Brush Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Partridge Hill Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Pequot Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Montville	Peter Pump Station	None	Coastal	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Pheasant Run Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Rand Whitney Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Sandy Desert Pump Station	None	Coastal	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Village Apts Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Montville	Woodland Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
New London	Atlantic Street Pump Station	Zone AE	Coastal	2	No	Yes	No	Yes	Yes	Yes
New London	Bayonet Street Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
New London	New London WWTF	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
New London	Ocean Beach Park Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
New London	Pequot Avenue - Chapel Dr. Pump Station	Zone X500	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
New London	Pequot Avenue - Shoreline Pump Station	Zone VE	Coastal	2	No	No	No	Yes	Yes	Yes
New London	Pickering Street Pump Station	Zone X500	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
New London	Roseway Street Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
New London	Thomas Griffin Road Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Norwich	Bolduc Lane Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	City Hall Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Courthouse Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Cove Street Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Dodd Stadium Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Durham Street Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Edgewood Drive Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Falls Avenue Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Falls Mill Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Forestview Drive Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Preston - North Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Preston - South Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Great Plain Road Pump Station	Floodway	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Lambert Drive Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Mallon Chevrolet Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Marcus Plz Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	New Concord Drive Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	New London Turnpike #1 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	New London Turnpike #2 Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Newton Street Sewer Extension Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Norwith WWTF	Zone AE	Inland	4	No	N/A	N/A	N/A	N/A	N/A
Norwich	Occum Road Pump Station	Floodway	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Old Salem Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Parkwood Condos Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Phelps Dodge Pump Station	Floodway	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	River Avenue Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Rose Alley Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A

Appended Table 1: General Flooding and Sea Level Rise Risk to Pumping Stations and Wastewater Treatment Facilities

Town (Owner)	Name	Mapped FEMA Floodzone	Dominant Flood Risk	Hurricane Surge Zone	Infrastructure Above 0.2% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain + 20	Infrastructure Above Mean Higher High Water?	Infrastructure Above Mean High Higher Water + 1	Infrastructure Above Mean Higher High Water + 20 Inches?
Norwich	Salem Turnpike #1 Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Salem Turnpike #2 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Salem Turnpike #3 Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Shipping Street Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Shore Road Pump Station	Floodway	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Sunnyside Street Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Talman Street Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Thames Street Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Uncas Condos #1 Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Victoria Landing Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Norwich	Washington Street Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Norwich	Yantic Landing Condos Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Old Lyme (Point O' Woods)	Point O' Woods Pump Station	Zone X500	Coastal	4	No	Yes	Yes	Yes	Yes	Yes
Sprague	Hanover Pump Station	Zone A	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Sprague	Main Street Pump Station	Floodway	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Sprague	Sprague WWTF	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Sprague	Versailles Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Stonington - Borough	Diving Street Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Stonington - Borough	Ensign Lane Pump Station	Zone AE	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Stonington - Borough	Flanders Road Pump Station	None	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
Stonington - Borough	Stonington (Borough) WWTF	Zone VE	Coastal	2	No	No	No	Yes	Yes	Yes
Stonington - Mystic	Boulder Avenue Pump Station	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Stonington - Mystic	Cutter Drive Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Stonington - Mystic	Hewitt Road Pump Station.	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Stonington - Mystic	Lindbergh Road Pump Station	Zone VE	Coastal	2	No	No	No	Yes	Yes	Yes
Stonington - Mystic	Maritime Drive Pump Station	None	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
Stonington - Mystic	Old Mystic Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Stonington - Mystic	Stonington (Mystic) WWTF	Zone VE	Coastal	1	No	No	No	Yes	Yes	Yes
Stonington - Mystic	Wolcott Avenue Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Stonington - Pawcatuck	Clarks Village Pump Station	None	Inland	N/A	Yes	N/A	N/A	Yes	Yes	Yes
Stonington - Pawcatuck	Extrusion Drive Pump Station	None	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
Stonington - Pawcatuck	Pump Station No. 1	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Stonington - Pawcatuck	Pump Station No. 2	None	Inland	N/A	No	N/A	N/A	Yes	Yes	Yes
Stonington - Pawcatuck	Pumping Station No. 3	Zone AE	Coastal	1	No	No	No	No	No	No
Stonington - Pawcatuck	Stonington (Pawcatuck) WWTF	None	Inland	N/A	No	Yes	Yes	Yes	Yes	Yes
Stonington - Pawcatuck	White Rock Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Waterford	Bolles Court Pump Station	Zone AE	Coastal	2	No	No	No	Yes	Yes	Yes
Waterford	Briarwood Drive Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Waterford	Colonial Drive Pump Station	Zone AE	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
Waterford	Dock Road Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Waterford	East Neck Road Pump Station	Zone X500	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
Waterford	Evergreen Avenue Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Waterford	Harvey Avenue Pump Station	None	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Waterford	Millstone Road East Pump Station	Zone AE	Coastal	4	No	Yes	Yes	Yes	Yes	Yes
Waterford	Niantic River Road Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Waterford	Oil Mill Road Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes

Appended Table 1: General Flooding and Sea Level Rise Risk to Pumping Stations and Wastewater Treatment Facilities

Town (Owner)	Name	Mapped FEMA Floodzone	Dominant Flood Risk	Hurricane Surge Zone	Infrastructure Above 0.2% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain +	Infrastructure Above 1% Annual Chance Floodplain + 20	Infrastructure Above Mean Higher High Water?	Infrastructure Above Mean High Higher Water + 1	Infrastructure Above Mean Higher High Water + 20 Inches?
Waterford	Old Barry Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Waterford	Old Colchester Road Pump Station	Zone X500	Coastal	2	No	Yes	No	Yes	Yes	Yes
Waterford	Old Norwich Road Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Waterford	Oswegatchie Road Pump Station	None	Coastal	N/A	No	Yes	Yes	Yes	Yes	Yes
Waterford	Parkway North Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Waterford	Richards Grove Road Pump Station	None	Coastal	N/A	Yes	Yes	Yes	Yes	Yes	Yes
Waterford	Rope Ferry Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Waterford	Seaside Drive Pump Station	Zone AE	Coastal	4	No	Yes	Yes	Yes	Yes	Yes
Waterford	Shore Drive Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Waterford	Shore Road Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Waterford	Springdale Road Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Waterford	Thames Landing Pump Station	Zone X500	Coastal	3	No	Yes	Yes	Yes	Yes	Yes
Waterford	Wadsworth Lane Pump Station	Zone AE	Coastal	1	No	No	No	Yes	Yes	Yes
Waterford	Wilcox Court Pump Station	Zone X500	Coastal	2	No	Yes	Yes	Yes	Yes	Yes
Windham	Cracow Avenue Pump Station	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Windham	George Street Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Windham	Mansfield Pump Station	None	Inland	N/A	Yes	N/A	N/A	N/A	N/A	N/A
Windham	Route 195 Pump Station	Zone X500	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A
Windham	Windham WWTF	Zone AE	Inland	N/A	No	N/A	N/A	N/A	N/A	N/A

Note: Analysis based on locational data only and data layers available in GIS. Site specific analyses were not performed. Local officials should supplement this planning-level information with as-built elevation surveys to determine actual risk.