SPENCER, MASSACHUSETTS

SEPTEMBER 2019

13927A

Final Comprehensive Wastewater Management Plan

WRIGHT-PIERCE
Engineering a Better Environment

FINAL COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

FOR THE

TOWN OF SPENCER, MA

SEPTEMBER 2019

PREPARED BY:

WRIGHT-PIERCE

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Phone: 978.416.8000 | Fax: 978.470.3558

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MARCH 2018

Comprehensive Wastewater Management Plan

13927A

Phase 1- Existing Conditions, Problem Identification & Needs Assessment

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TOWN OF SPENCER

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

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SECTION 1

INTRODUCTION

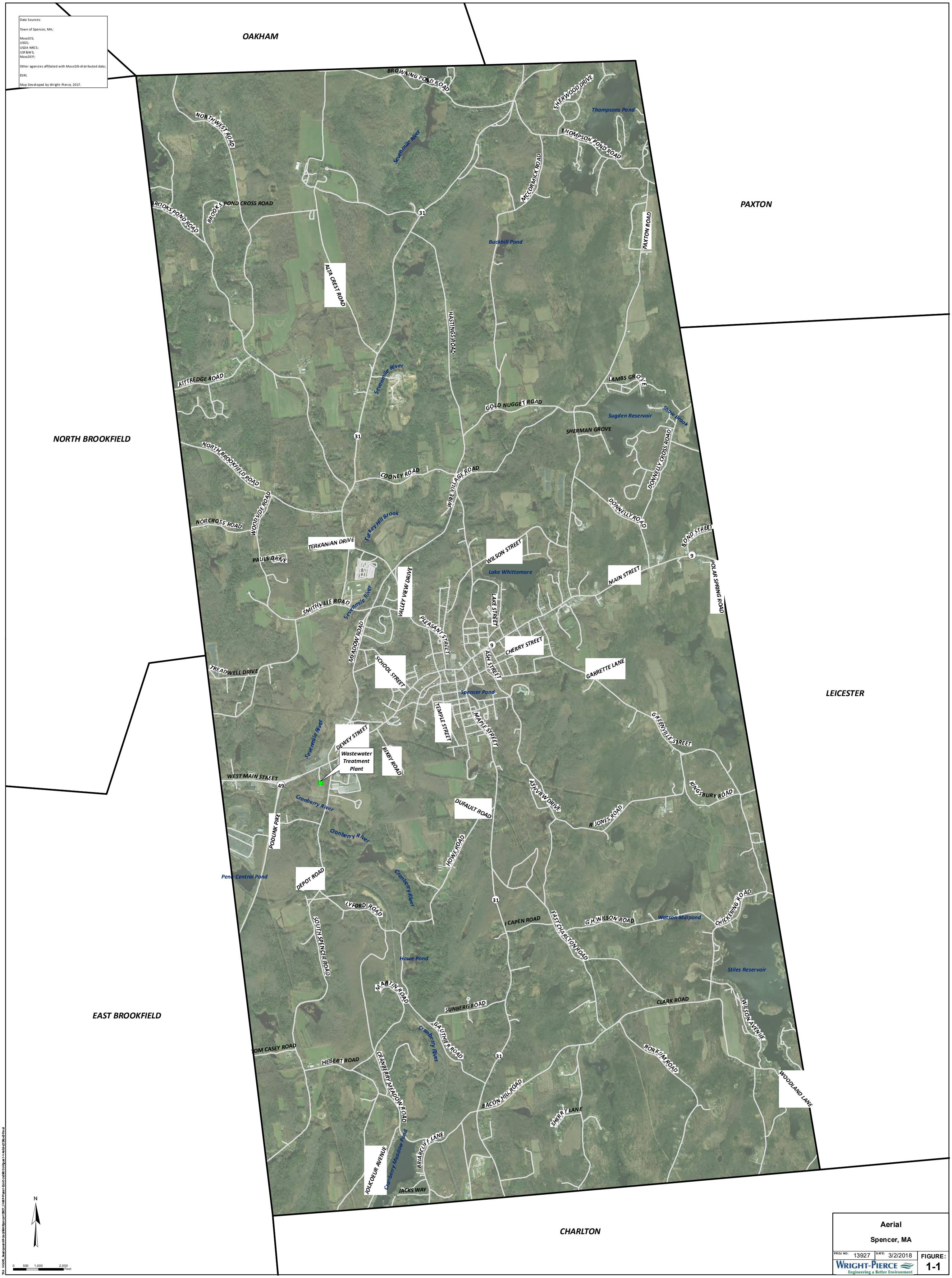
1.1 BACKGROUND INFORMATION

The Town of Spencer is primarily a rural community located in Worcester County, approximately 57 miles west of Boston and 12 miles west of Worcester. The Town is comprised of 34 square miles of land area and 1.2 square miles of water surface area. Spencer is bordered by New Braintree to the northwest; Oakham and Rutland to the north; Paxton to the northeast; Leicester to the east; Charlton to the south; and East and North Brookfield to the west. Refer to **Figure 1-1** for an aerial view of Spencer and its surrounding communities.

There are two divided state highways, Route 31 and Route 9, which serve the Town with access to and from the surrounding communities. In addition, State Route 49 provides access to and from the Town. The central part of the Town includes the town center and the northern and southern parts of the town includes wildlife management areas, farms, and forest, including the Spencer State Forest in the south part of Town.

1.2 PURPOSE AND SCOPE OF SERVICES

In September 2017, the Town of Spencer (the Town) retained Wright-Pierce to prepare a Comprehensive Wastewater Management Plan (CWMP), which will be used as a wastewater planning tool to guide the Town for the next few decades. A copy of the scope of services is included in **Appendix A**. The Town continues its efforts to evaluate, update, and improve its wastewater collection system and treatment facilities to remain in compliance with its regulatory requirements.



Data Sources:

Town of Spencer, MA;

MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;

Other agencies affiliated with MassGIS-distributed data;

ESRI;

Map Developed by Wright-Pierce, 2017.

Aerial

Spencer, MA

PROJ NO: 13927	DATE: 3/2/2018	FIGURE: 1-1

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1.3 REVIEW OF PRIOR PLANNING EFFORTS

The Town of Spencer has been involved in the wastewater planning process in various forms over the last 10 years. The Town has undertaken extensive sewer collection system studies including manhole inspections, GIS mapping, and Infiltration and Inflow (I/I) removal studies. The I/I removal studies started in 2017 and includes flow metering that will likely develop into a Sanitary Sewer Evaluation Survey (SSES). The Town has also undertaken treatment plant upgrades, including an aeration upgrade, UV disinfection, final clarifier rebuild, wet weather pump station upgrade, and upgrading the Meadow Road Pump Station.

The Town's current National Pollutant Discharge Elimination System (NPDES) permit, #MA0100919, was issued by the EPA in September 2007. The permit has expired and the Town has had ongoing discussion with the EPA and Massachusetts Department of Environmental Protection (MassDEP) regarding what the new draft permit will contain for new limits and possible treatment plant upgrades required to meet the new limits. The Town received the draft permit in February 2018 and the comment period will end at the end of March. The final permit is expected to be issued in the following months.

The draft permit includes stricter limits on phosphorus and a strong recommendation to optimize nitrogen removal. In preparation of pending plant upgrades (phosphorous, nitrogen, and copper removal), the Town is developing a Comprehensive Wastewater Management Plan (CWMP). This document satisfies the Phase 1 requirements of the three phase CWMP process and is prepared in accordance with the MassDEP's *Guide to Comprehensive Wastewater Management Planning (1996)*.

The three phases are:

Phase 1: Assessment of existing conditions, problem identification and needs assessment for the Town. The needs assessment will determine areas with a "need for further study" in Phase 2;

Phase 2: Alternatives Identification and Screening. Identify and short-list appropriate means of wastewater management alternatives to address any "needs areas" identified in Phase 1. The analysis will include a review of technical, environmental, institutional and economic factors; and

Phase 3: Detailed evaluation of alternatives short-listed in Phase 2 and development of recommended wastewater management plan.

This Phase 1 assessment summarizes the Town's existing wastewater collection and treatment systems and evaluates the near and long-term wastewater management "needs" of non-sewered areas.

The intent of the phased approach is to perform the increasingly complex tasks for Phases 2 and 3 based on the information developed from the previous phase(s).

1.4 STAKEHOLDERS

The Town of Spencer understands the importance of the involvement of the citizens and interested stakeholders in Spencer as part of the CWMP. The stakeholders include the Spencer Board of Selectman, Departments of Sewer, Water, Highway, Board of Sewer Commissioners, Board of Health, Conservation Commission, Planning Board; citizens of Spencer; MassDEP; Department of Fish, Wildlife and Environmental Law Enforcement (DFWELE) Natural Heritage Program; Water Resources Commission (WRC); Executive Office of Energy and Environmental Affairs (EOEEA); Quaboag and Quacumquasit Lake Association (QQLA); and officials from neighboring communities. Town of Spencer staff has provided input regarding the development of this Phase 1 CWMP effort. The report for each phase of the CWMP will be available for review and comment by all interested stakeholders. There also will be opportunity for the public and interested stakeholders to provide input for the CWMP during a public meeting as part of the CWMP effort.

1.5 REGULATORY REQUIREMENTS

This CWMP for the Town of Spencer has been prepared in compliance with the Massachusetts Department of Environmental Protection Guide to Comprehensive Wastewater Management Planning, published in January 1996.

1.6 PROJECT FUNDING

The Massachusetts State Revolving Fund Program provides low interest loans to communities to fund qualified wastewater projects. The Town of Spencer is funding the CWMP with Town resources, but intends to fund future upgrades to the WWTP utilizing SRF loan funding. The planned upgrades to the WWTP include new nutrient (nitrogen and phosphorous) treatment systems, tertiary treatment upgrades for nutrients and copper removal, relocation of the outfall to the Seven Mile River, and aging systems/equipment upgrades as needed.

2

SECTION 2

EXISTING CONDITIONS

Readily available reports, plans, initiatives and studies were reviewed to compile existing and future conditions that impact, or may affect, the CWMP for the Town of Spencer. The sources utilized include, but are not limited to, information from the following sources:

- The Town of Spencer (including the Water, Sewer, Planning, Assessor's, and Board of Health Departments);
- Chicopee River Watershed Action Plan (CRWAP)
- Central Massachusetts Regional Planning Agency (CMRPA)
- Executive Office of Energy and Environmental Affairs (EOEEA);
- United States Environmental Protection Agency (US EPA), and
- United States Geologic Survey (USGS)
- Other reports, evaluations or studies completed for the Town of Spencer.

2.1 CONDITIONS IN PLANNING AREA

2.1.1 Planning Area and Planning Period

The planning area includes the entire Town of Spencer, with a focus on areas that could potentially create additional demand on the Town's sanitary sewer system and WWTF. Currently, the existing collection system is being evaluated separately from the CWMP as part of an Infiltration/Inflow (I/I) and Sewer System Evaluation Survey (SSES) project. The focus areas include those areas that have been or may be impacted by failed or poorly performing on-site wastewater disposal systems (Title 5 septic tanks) and areas of existing development. In addition, the planning area takes into account the extent of the Chicopee (Seven Mile River, Upper Quaboag, Little River sub-watersheds), Quinebaug, and French (Upper French River sub-watershed) major watershed basins that may influence the CWMP. Some of the watershed sub-basin boundaries extend beyond the Town boundary, but the intent of the planning area is focused within the Town's boundaries. Refer to **Figure 1-1** for an Aerial Map of Spencer.

This CWMP is based on a planning period of 20 years. The initial (study) year of the CWMP is 2018 and the horizon of the planning period is therefore 2038.

2.2 BASIN WIDE INITIATIVES AND OTHER PLANS FOR THE TOWN'S WASTERSHED BASINS

At local, state and federal levels of government, initiatives have been established to promote a balance between economics and the environment. This section of the CWMP focuses on the environmental initiatives and plans that have been developed to minimize environmental impacts to the sub-watershed basins within the Town of Spencer.

Spencer has several water resources, as it contains 1.2 square miles of surface water and 480 acres of wetlands. After adding wetland areas, almost 10 percent of Spencer's surface, about 2 square miles, is covered by water resources (Town Master Plan). It has one major waterway, the Seven Mile River, and has a significant number of ponds, swamps, lakes, and other wetland areas. Below is a description of the sub-watershed basins, a list of initiatives and plans that have been established, and the impacts that those initiatives may have on the CWMP.

2.2.1 Description of the Town's Watersheds

Watersheds define the flow of surface waters and groundwater flow. Spencer lies primarily within the boundaries of the United States Geological Survey (USGS) designated Chicopee Basin and a small portion in the southeastern part of the Town is in the French Basin. The Chicopee Basin watershed empties into the Connecticut River. The Chicopee Basin has a total drainage area of 723 square miles. The main river that is part of the Chicopee Basin in Spencer is the Seven Mile River. Approximately 26 square miles of Spencer lie within the Chicopee Basin.

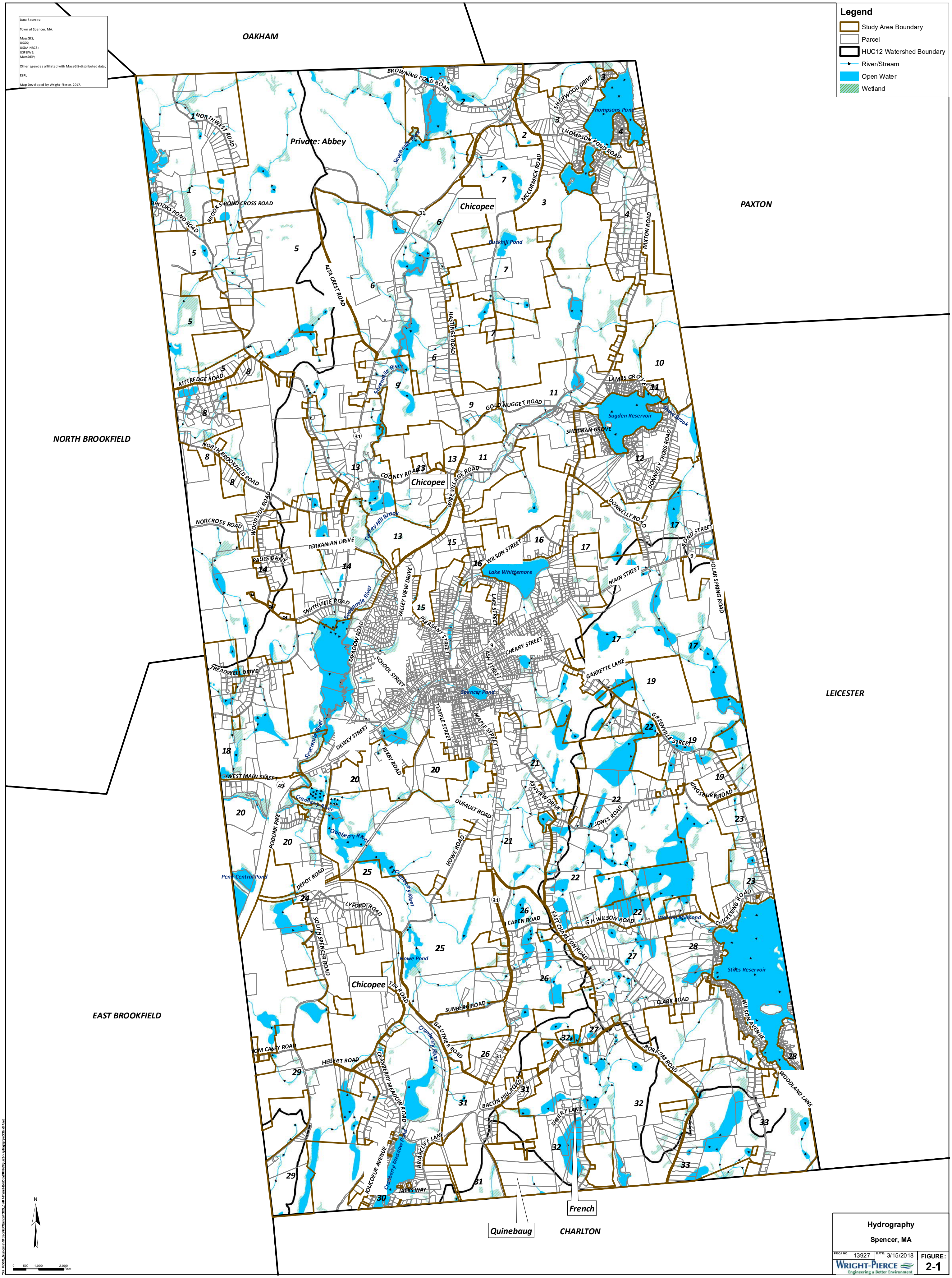
The Chicopee Basin is further partitioned into sub-watersheds whose boundaries are defined by USGS 12-digit Hydrologic Unit Codes (HUCs). The 12-digit HUCs are defined in the Watershed Boundary Dataset (WBD) GIS layer, jointly developed by the USGS and the USDA-Natural Resources Conservation Service (NRCS). The sub-watersheds in Spencer are shown in **Figure 2-1**. These watersheds are discussed in detail in the next section.

The term "watershed" can be further reduced to the local level, consisting of each river, brook, or stream in town and its associated drainage basin**. Figure 2-1**, illustrates the locations of the 3 local watersheds in Spencer, as well as their relationship to the Chicopee and French Basins. *The small brooks in Spencer are at the headwaters of each of these major basins. Brooks in the northwest corner of Town flow into the Five Mile River in North Brookfield. Further east, water is collected to the Seven Mile River, which joins with Turkey Hill Brook and flows through the Town center. After its confluence with the Cranberry River, the Seven Mile flows to Quaboag Pond in East Brookfield. The Quaboag River begins at Quaboag Pond, flowing westward until it combines with the Swift and Ware Rivers to form the Chicopee River. In southeast Spencer brooks flow to Burncoat Pond and Stiles Reservoir, thence to Town Meadow Brook in Leicester, then the French River. A small area on the south margin of Town drains to the Quinebaug River which joins the French River in Connecticut.* (2012 Town of Spencer Open Space & Rec Planning).

2.2.1.1 Seven Mile River Watershed

There are eleven lakes, ponds, and reservoirs in Town, most created by dams. Ponds wholly in Spencer include Buck Hill Pond, Howe Pond, Lake Whittemore, Sugden Reservoir and Thompson Pond. Brooks Pond, Browning Pond, Burncoat Pond, Cranberry Meadow Pond, Jones Pond, Moose Hill Reservoir, and Stiles Reservoir are shared with neighboring towns.

The Seven Mile River includes almost the entire drainage area of Spencer and is a significant subdivision within the Quaboag River basin. The river heads at Browning Pond at the Oakham and Spencer border and is fed from Turkey Hill Brook and the Cranberry River. It eventually joins the East Brookfield Five Mile River between Lake Lashaway and Quaboag Pond.


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
Parcel
HUC12 Watershed Boundary
River/Stream
Open Water
Wetland
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Chicopee
Quinebaug
French
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Penn Central Pond
Howe Pond
Stiles Reservoir
Sevenmile River
Turkey Hill Brook
Cranberry River
Cranberry Meadow Pond
BROWNING POND ROAD
NORTHWEST ROAD
SHERWOOD DRIVE
THOMPSON POND ROAD
MCCORMICK ROAD
BROOKS POND ROAD
BROOKS POND CROSS ROAD
PAXTON ROAD
ALTA CREST ROAD
HASTINGS ROAD
KITTREDGE ROAD
LAMBS GROVE
GOLD NUGGET ROAD
SHERMAN GROVE
DONNELLY CROSS ROAD
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
WOODSIDE ROAD
NORCROSS ROAD
DONNELLY ROAD
TERKANIAN DRIVE
WILSON STREET
BOND STREET
PAULS DRIVE
POLAR SPRING ROAD
MAIN STREET
SMITHVILLE ROAD
VALLEY VIEW DRIVE
LAKE STREET
MEADOW ROAD
PLEASANT STREET
CHERRY STREET
SCHOOL STREET
ASH STREET
TREADWELL DRIVE
GARRETTE LANE
TEMPLE STREET
MAPLE STREET
GREENVILLE STREET
DEWEY STREET
BIXBY ROAD
WEST MAIN STREET
KINGSBURY ROAD
DUFAULT ROAD
ASHVIEW DRIVE
PODUNK PIKE
R JONES ROAD
HOWE ROAD
DEPOT ROAD
LYFORD ROAD
CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
CHICKERING ROAD
SOUTH SPENCER ROAD
CLARK ROAD
SUNBERG ROAD
WILSON AVENUE
GAUTHIER ROAD
TOM CASEY ROAD
HEBERT ROAD
BORKUM ROAD
CRANBERRY MEADOW ROAD
BACON HILL ROAD
WOODLAND LANE
SHERRY LANE
BRIARCLIFF LANE
JOLICOEUR AVENUE
JACKS WAY
N
0 500 1,000 2,000 Feet
Hydrography
Spencer, MA
PROJ NO: 13927
DATE: 3/15/2018
FIGURE:
2-1
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Quaboag Lake

The Quaboag Pond TMDL report by MassDEP provides significant information on the status of the lake. Excerpts are italicized below.

Quaboag Pond in Brookfield/East Brookfield is a large 540-acre natural pond with a maximum depth of only 14 feet and a short annual retention time of about 12 days. The main inlet of the pond is the East Brookfield River and the outlet is the Quaboag River. The Seven Mile River is a tributary to the East Brookfield River and impacts Quaboag Lake. The watershed is 60 percent forested. The north and east shorelines are developed with housing.

Quaboag Pond has a long history of nutrient related impairment of recreation. The 1986 Diagnostic/Feasibility (D/F) study of 1986 noted a high weighted average total phosphorus concentration at the inlet to Quaboag Pond of 71 ppb. Much of the phosphorus at the time was coming from the Spencer WWTP, that at the time was discharging 45% of the total phosphorus loading to the pond. The WWTP had no specific total phosphorus limit in the discharge permit, but was estimated to discharge 3.25 mg/l. In the 1980's the pond itself had an average TP concentration of about 45 ppb and a summer Secchi disk transparency of about 1.25 m with some readings below the swimming target of four feet (1.2 m). The ESS (2000) report notes that after the upgrades to the Spencer WWTP between 1987 and 1990 the concentrations in Quaboag Pond dropped from about 0.045 mg/l to 0.020 mg/l. The pond also shows signs of high sedimentation, particularly in the area near the East Brookfield River inlet to the pond, where water depths are now so shallow it is difficult to maneuver motor boats in this area. Control of sedimentation (which is often associated with total phosphorus) is called for in this TMDL, even though the pond is not currently listed as impaired specifically by sediments.

Although the lake was not officially listed as impaired by nutrients on the 2002 Integrated List, in 2003 the Department began a 12-month study of the lake in preparation to develop a protective total phosphorus TMDL in response to concerns about continuing nutrient loads from the Spencer WWTP. The focus of the study is to determine how much phosphorus input to the ponds comes from point sources vs. nonpoint sources and how to reduce the sources to meet a target in-lake concentration. The discharge from the Spencer WWTP is complicated by the fact that about half of the discharge is lost to groundwater in the constructed wetlands and further retention of *phosphorus might occur in wetlands enroute to the pond. The study was designed to determine total phosphorus loads to the lakes with an emphasis on estimating the proportion of the load to Quaboag that is due to the Spencer WWTP (particularly during the summer period). The Town of Spencer also has an MS4 NPDES stormwater discharge permit (MAR041162) and has stormwater discharges to streams tributary to Quaboag Pond. Results of the study, using several different models, can be seen in the table below.*

Subwatershed	***Area (Ha)***	***TP export (kg/yr)***	***TP %***	***Export rate (kg/ha/yr)***
*Sevenmile Rt 9 SM01**	*8,083*	*1,147*	*31*	*0.14*
*Cranberry Br Rd CR01**	*1,461*	*203*	*5*	*0.14*
*Spencer WWTP SPEFF**	*0*	*131*	*4*	
*Extrapolated area to SM02***	*295*	*41*	*1*	*0.14*
*Unknown Source SM02****	*0*	*167*	*5*	
*Subtotal to SM02**	*9,839*	*1,690*		*0.17*
*Lashaway Rt 9 EB04**	*6,390*	*815*	*22*	*0.13*
*Extrapolated area to Inlet EB04a***	*2,248*	*313*	*8*	*0.14*
*Unknown Source EB04a****	*0*	*120*	*3*	
*Subtotal to Inlet EB04a**	*18,477*	*2,937*		*0.16*
*Net export of South Pond**	*466*	*42*	*1*	*0.09*
*Extrapolated area to Quaboag***	*925*	*129*	*3*	*0.14*
Total fluvial input to Quaboag	*19,868*	***3,107***		*0.16*
*Unknown internal source****		*603*	*16*	
Annual Total*		***3,710***	***100***	

** Measured TP and flow*
*** TP estimated from Cranberry Br. Export rate x area*
****TP estimated by difference between upstream sources and TP measured at site.*

By difference of inputs and outputs the mass balance results in the table suggest an unknown source to Quaboag Pond of 603 kg/yr. This internal source may be phosphorus release from sediments or macrophytes or resuspension of particulate phosphorus from the sediments and some (about 48 kg/yr) may be due to septic system inputs that were not included in the fluvial mass balance study. Rather than using the Table to allocate loads to Quaboag Pond subwatersheds, the TMDL process requires that loads be allocated to point and non-point sources. The total loads from the Table were taken and reallocated based on the known point source contribution and on the remaining proportion of nonpoint loads estimated from the modified NPSLAKE model. The *resulting allocation tables are shown below with the best estimate of current loading shown in the left column.*

Wasteload allocations include all point sources. In this case point sources include the loading from the Spencer wastewater treatment plant (NPDES permit MA0100919) and loading from urban stormwater runoff that may or may not be specifically included in stormwater Phase II permits. The only area included within a Phase II permit is the urbanized area of parts of downtown Spencer, which has submitted a Notice of Intent (NOI transmittal number W039544) for a NPDES Phase II permit (MAR041162).

The current loading from the Spencer WWTP is based on flow and concentrations reported in the DMR reports by the facility. Because the plant contributes a minor portion of the nutrient load to either pond during the summer the allocation for the WWTP for May-October will remain at current loading levels (131 kg/yr or 0.79 lb/day) which can be achieved at the 0.2 mg/l as long as discharge flow rates are 0.47 MGD or less. This represents a significant reduction compared to the current permit with the interim limit of 0.3 mg/l and permit flow rate of 1.08 MGD. This will require any future increases in flow at the plant during May-October to be compensated by proportional decreases in effluent TP concentrations. Because Quaboag Pond has a short retention time and winter loadings are not expected to directly impact the pond during the critical summer period, the Spencer WWTP may be allowed to operate with somewhat relaxed winter limits. There is no specific information concerning the possible effect of winter adsorption or storage of phosphorus with subsequent release and so it is prudent to continue to reduce winter phosphorus concentrations and loads somewhat. Because winter stream flows are typically 50 percent higher, the winter limits (November-April) can be set 50% higher (1.19 lb/day).

Source	*Current TP Loading (kg/yr)*	*Current TP Loading (kg/day)*	*Target TP Load Allocation (kg/yr)*	*Target TP Load Allocation (kg/day)*
Load Allocation				
Forest	1,378	3.77	938	2.57
Wetland	64	0.18	63	0.17
Agriculture	590	1.62	402	1.10
Open Land	163	0.44	111	0.30
Residential (Low den.)	375	1.03	255	0.70
Septic System	48	0.13	33	0.09
Internal recycling	603	1.65	411	1.13
Waste Load Allocation				
Spencer WWTP NPDES(MA0100919)*	131	0.36	131	0.36
Urban & road stormwater.	358	0.99	244	0.67
Total Inputs	3710	10.16	2,588	7.09

**The Target load for the Spencer WWTP is set at the current phosphorus load of 0.79 lb/day (0.36 kg/day) or approximately 0.2mg/l at a flow of 0.47 MGD during May-October as shown above. Recommended winter limits of 1.19 lb/day are not reflected in the table. Note for NPDES permits the seasonal values should be used.*

2.2.2 Initiatives/Plans Relating to the Town's Watershed Basin and their Potential Impacts to the CWMP

As previously discussed, a bibliography of reports, plans, initiatives, and studies that relate to this CWMP are compiled in Appendix D. The following bylaws, regulations, and studies will be taken into consideration for preserving and protecting the watersheds within the Town of Spencer. A summary of the initiatives and their potential impacts to this CWMP follows.

2.2.2.1 Local Level – Town of Spencer

Spencer has the following additional regulatory mechanisms to protect natural and historic resources:

- 2012 Open Space and Recreation Plan: An Open Space and Recreation Plan is a blueprint for how a community will grow without losing its valued open space and recreational assets. Factors that affect open space are identified and examined during the planning process, and strategies the community may use to protect and enjoy its character, natural resources and open spaces are identified. Among other benefits, open space protection can provide profound economic benefits by helping to avoid the costly mistakes of misusing or overwhelming available resources.

- Open Space and Recreation Plans are an eligibility requirement for participation in EOEEA's open space grant programs offered through the Division of Conservation Services (DCS). Open space grants are partnerships between state and local agencies and are based on recommendations the applicant community makes independently in its Open Space and Recreation Plan.

2.2.2.2 Regional Level

There are several regional agencies including watershed and lake associations including:

- Lake Whittemore Association
- Sugden Reservoir Association
- Quaboag Quacumquasit Lake Association (QQLA)
- Cranberry Meadow Pond Association

2.2.2.3 State Level

At the State level, MassDEP has studied several water bodies in the Town of Spencer. Not all of Spencer's waterbodies meet state and federal water quality standards. Most have not been assessed by MassDEP including Cranberry Meadow Pond, Howe Pond, Moose Hill Reservoir, Burncoat Pond, and Stiles Reservoir. The following were assessed by MassDEP with the results listed: Brooks Pond and Thompson's Pond are identified as impaired by exotic weeds rather than pollutants. Browning Pond is impaired by low oxygen levels in warm weather, high phosphorus levels, weeds, and exotic weeds. Sugden Reservoir is impaired by high phosphorus. The Seven Mile River from Browning Pond until it flows out of Spencer to East Brookfield at the town line is listed as impaired by pathogens.

2.2.2.4 Federal Level

The 1972 enactment of the Federal Water Pollution Control Act Amendments, currently referred to as the Clean Water Act (CWA), is the founding act for surface water quality protection for the United States. Regulatory statutes are in place to reduce direct pollutant discharges into waterways, to finance wastewater treatment facilities and to manage polluted runoff. In the 1980s, favorable funding created improvements to wastewater treatment facilities and EPA-State partnerships were formed. Evolution of CWA programs over the last decade have shifted from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired water bodies. A full array of issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of EPA's approach.

2.3 THE BUILT AND HUMAN ENVIRONMENT

2.3.1 Town Government

Spencer's form of government is a Board of Selectmen, which consists of an elected body of five members who comprise the Chief Executive Branch of the local government. A Town Administrator, who is appointed by the Board of Selectmen, is responsible for day-to-day operations of the town government. Spencer has open town meetings, scheduled at least twice annually.

The Spencer Health Department enforces Massachusetts General Laws, State Environmental and Sanitary Codes, and Town of Spencer Ordinances and Regulations. The Health Department has the primary responsibility of protecting and improving the public health and well-being of the Spencer community. The enforcement and inspection activities ensure a safe and healthy environment in which to live and work. The Health Department has jurisdiction over all on-site wastewater disposal systems in the Town. The Department maintains the records for these systems and is responsible for enforcing state and local regulations.

The Planning Board is responsible for creating and implementing the Spencer Master Plan, which lays out the way the town wishes to grow over a twenty-year period. The Planning Board is also responsible for reviewing and approving all subdivisions in the town, thus ensuring appropriate design of roadways, stormwater drainage systems, utilities, neighborhood parks and other open space areas. The office of inspectional services provides assistance to individuals and contractors wishing to do construction in the town of Spencer. The office also serves to enforce regulations of the towns bylaws and the Commonwealth of Massachusetts State Building Code.

2.3.2 Population/Demographic Characteristics

The Town of Spencer is broken down by the entire Town and a subset Census Designated Place (CDP). The CDP mostly consists of the Town center. United States Census Bureau (USCB) information based on results of the 2010 census states the population of the entire Town of Spencer to be 11,688 with a density of 340 persons per square mile. The demographic breakdown in 2000 was 49% male and 51% female; 97.93% white, 0.59% black or African American, 0.24% American Indian and Alaska Native, 0.33% Asian, 0.26% "some other race", and 0.64% two or more races. The median age was 37. Spencer's historical and projected future growth population is shown in **Table 2-1** and is depicted in **Figure 2-2**.

As of the census of 2000, there were 11,691 people, 4,583 households, and 3,093 families residing in Spencer. The population density was 355.9 inhabitants per square mile. There were 4,938 housing units at an average density of 150.3 per square mile.

There were 4,583 households out of which 31.7% had children under the age of 18 living with them; 53.0% were married couples living together; and 32.5% were non-families. 25.9% of all households were made up of individuals and 10.3% had someone living alone who was 65 years of age or older. The average household size was 2.53 and the average family size was 3.05.

Age Distribution

The population was spread out with 24.6% under the age of 18, 8.7% from 18 to 24, 29.9% from 25 to 44, 24.4% from 45 to 64, and 12.4% who were 65 years of age or older. The median age was 37 years.

Median Income

The median income for a household in the town was $46,598, and the median income for a family was $56,763. Males had a median income of $40,581 versus $29,837 for females. The per capita income was $21,017. About 5.9% of families and 8.6% of the population were below the poverty line, including 10.2% of those under age 18 and 10.1% of those age 65 or over.

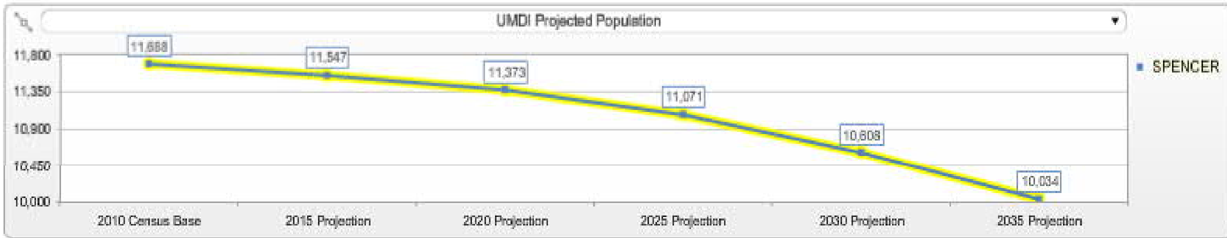
TABLE 2-1
ESTABLISHED AND PROJECTED POPULATION CHANGES
(1950-2030)

Year	Population	Increase in Population from Previous Decade
1950	7,027	+5.8%
1960	7,838	+11.5%
1970	8,779	+12.0%
1980	10,774	+22.7%
1990	11,645	+8.1%
2000	11,691	+0.4%
2010	11,688	−0.0%
2020*	11,373	-3.7%
2030*	10,808	-4.97%
2035*	10,034	-7.2%

*Future Population and Build-out provided by UMASS Donahue Institute

FIGURE 2-2

PROJECTED POPULATION CHANGES 1950-2035



2.3.3 Economy

The majority of Spencer's employed residents work within the Town or in Worcester. The largest sources of employment in Spencer are educational services, health care, and social assistance; retail; construction; professional, scientific, management, and administrative and waste management services; and manufacturing. The labor and employment rates are included in **Table 2-2**.

TABLE 2-2

LABOR FORCE, EMPLOYMENT AND UNEMPLOYMENT

Year	Labor Force	Employed	Unemployed	Unemployment Rate
2017	5,711	245	4.1	3.3
2016	5,653	284	4.8	3.7
2015	5,598	360	6	4.9
2014	5,571	429	7.2	5.8
2013	5,459	487	8.2	6.7
2012	5,444	499	8.4	6.7
2011	5,407	554	9.3	7.3
2010	5,358	693	11.5	8.3

Source: Massachusetts Executive Office of Labor and Workforce Deve

2.3.4 Land Use

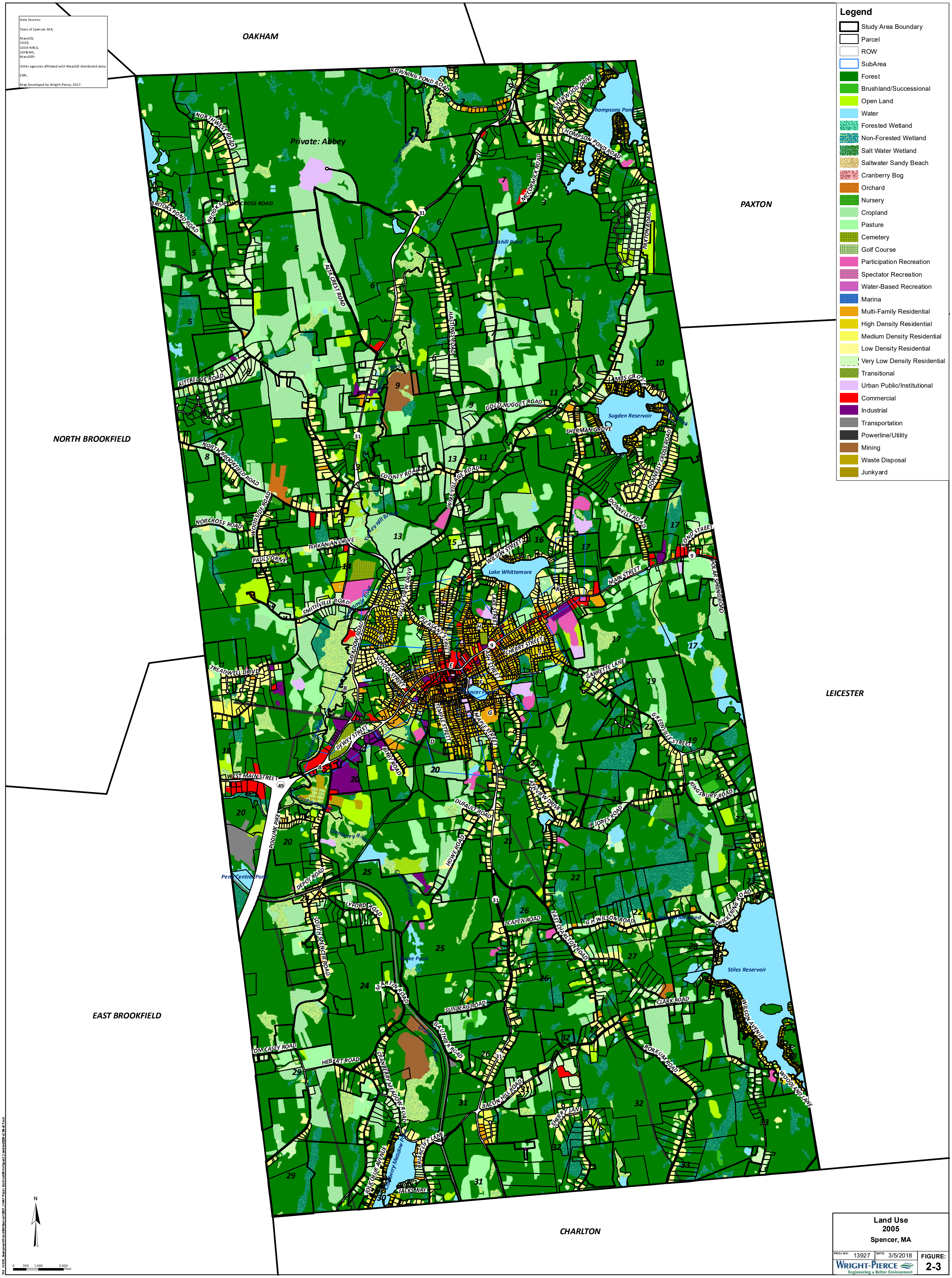
The major land uses within the Town of Spencer are included in **Table 2-6** and shown in **Figure 2-3**.

TABLE 2-3

LAND USE (2010 UPDATE)

Land Classification	Total Acres	Percent of Total Area in Town
Brushland/Successional	21.3	0.34%
Cemetery	38.6	0.14%
Commercial	141.4	2.80%
Cropland	1,611.3	7.09%
Forest	13,024.9	4.10%
Forested Wetland	910.3	15.69%
High Density Residential	358.4	1.74%
Industrial	104.7	1.21%
Low Density Residential	1,190.2	11.78%
Medium Density Residential	173.1	1.25%
Mining	86.7	0.19%
Multi-Family Residential	257.2	6.85%
Non-Forested Wetland	783.0	13.03%
Nursery	20.7	0.19%
Open Land	261.7	3.67%
Orchard	23.6	0.10%
Participation Recreation	91.6	1.06%
Pasture	756.2	4.97%
Powerline/Utility	83.7	2.03%
Transitional	57.0	0.48%
Transportation	84.1	0.10%
Urban Public/Institutional	78.4	0.77%
Very Low Density Residential	736.6	15.30%
Waste Disposal	17.2	0.14%
Water	820.3	4.87%
Water-Based Recreation	2.5	0.10%
Total	21,734.4	100%

Source: Mass GIS


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
Parcel
ROW
SubArea
Forest
Brushland/Successional
Open Land
Water
Forested Wetland
Non-Forested Wetland
Salt Water Wetland
Saltwater Sandy Beach
Cranberry Bog
Orchard
Nursery
Cropland
Pasture
Cemetery
Golf Course
Participation Recreation
Spectator Recreation
Water-Based Recreation
Marina
Multi-Family Residential
High Density Residential
Medium Density Residential
Low Density Residential
Very Low Density Residential
Transitional
Urban Public/Institutional
Commercial
Industrial
Transportation
Powerline/Utility
Mining
Waste Disposal
Junkyard
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Sugden Reservoir
Lake Whittemore
Stiles Reservoir
Browning Pond Road
Northwest Road
Thompson Pond Road
Mccormick Road
Paxton Road
Brooks Pond Road
Alta Crest Road
Hastings Road
Kittredge Road
Gold Nugget Road
Sherman Grove
North Brookfield Road
Cooney Road
Wire Village Road
Donnelly Road
Norcross Road
Woodside Road
Terkanian Drive
Pauls Drive
Wilson Street
Bond Street
Main Street
Smithville Road
Meadow Road
Pleasant Street
Cherry Street
Treadwell Drive
School Street
Garrette Lane
Greenville Street
Dewey Street
Kingsbury Road
West Main Street
Dufault Road
Ash View Drive
R Jones Road
Podunk Pike
Howe Road
Depot Road
Lyford Road
Capen Road
East Charlton Road
G H Wilson Road
Chickering Road
South Spencer Road
Martin Road
Sunberg Road
Clark Road
Gauthier Road
Wilson Avenue
Tom Casey Road
Hebert Road
Cranberry Meadow Road
Borkum Road
Bacon Hill Road
Woodland Lane
Sherry Lane
Jacks Way
N
0 500 1,000 2,000 Feet
Land Use
2005
Spencer, MA
PROJ NO: 13927
DATE: 3/5/2018
FIGURE:
2-3
Wright-Pierce
Engineering a Better Environment

2.3.4.1 Chapter 61 Land

Chapter 61 lands are privately held properties governed for tax purposes by Massachusetts General Law (MGL) Chapter 61. Chapter 61, 61A, and 61B are designed to encourage the preservation and enhancement of the Commonwealth's forests, valuable farmland and recreational open space. It offers significant local tax benefits to property owners willing to make a long-term commitment to forestry, farming and preserving land for outdoor activities. In exchange for these benefits, the municipality in which the land is located is given the right to recover some of the tax benefits afforded the owner when the land is removed from classification and an option to purchase the property should the land be sold or used for non-classified uses.

The owner must notify by certified mail the selectmen, assessors, planning board and conservation commission of the town of any intention to sell or convert the land for those uses. If the owner plans to sell the land, the town has the right to match a bona fide offer to purchase it. If the owner plans to convert it, the town has the right to purchase it at its fair market value, which is determined by an impartial appraisal. The town may also assign its option to a nonprofit, conservation organization. The owner cannot sell or convert the land until at least 120 days after the mailing of the required notices or until the owner has been notified in writing that the option will not be exercised, whichever is earlier.

The Town has a demonstrated history of purchasing land under Chapter 61A, and 61B. As of 2016, there were 80 parcels totaling 3,884 acres that contained Chapter 61A (Agriculture) Land, and 37 parcels totaling 893 acres that contained Chapter 61B (Recreational) Land.

2.3.5 Town Planning Efforts/Proposed Developments

2.3.5.1 Chapter 40B/40R Planning

Massachusetts Law Chapter 40B enables local Zoning Boards of Appeals (ZBAs) to approve affordable housing developments under flexible rules if at least 20 percent of the units have long-term affordability restrictions. Its goal is to encourage the production of at least 10 percent of the housing units to be affordable housing in all communities throughout the Commonwealth. There are no 40B/R plans in development for Spencer.

2.3.5.2 New and Proposed Developments in Spencer

The Town of Spencer does not currently have any proposed developments. In speaking with the Planning Department, there are initiatives that the Town would like to complete, such as industrial development near the Route 49 and 9 intersections; development of senior housing; and revitalizing downtown Spencer. However, no projects are in the official planning stages at this time.

2.3.6 Zoning

The Town's Master Plan contains a comprehensive discussion regarding zoning; therefore, additional information was not compiled for this report. Pertinent information from the Master Plan has been included in this section.

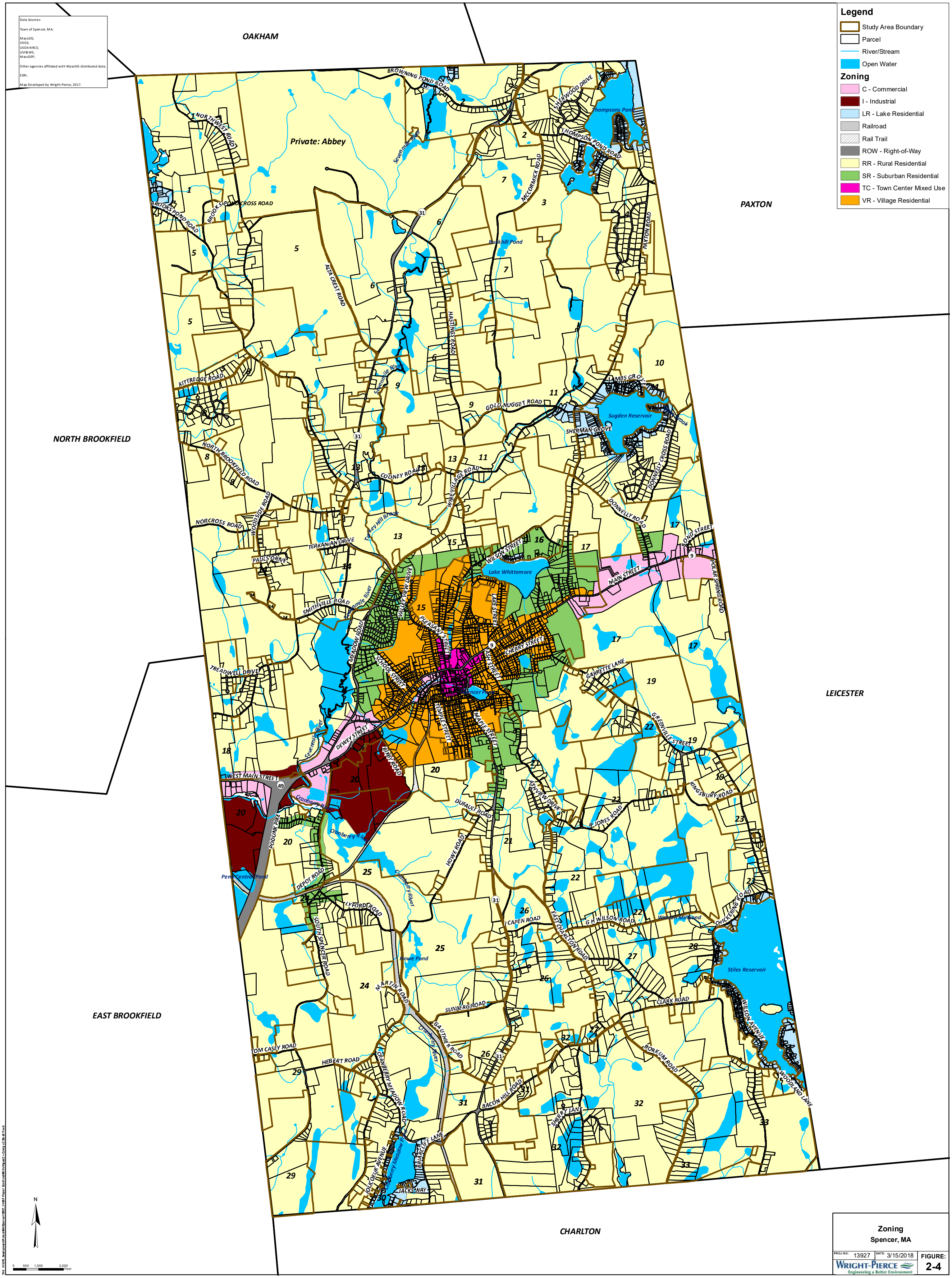
The Spencer Zoning By-law establishes guidelines for development of specific areas. It includes provisions for special circumstances, including "overlay zones", which are designed to provide additional zoning restrictions/allowances for certain areas in town. The relevant attributes of the zoning by-law are summarized below to provide a context for planning discussions. **Figure 2-4** is an overview of the town's zoning districts.

2.3.6.1 Residential Zones

The three zoning designations predominantly for residential uses are as follows (Town Master Plan 2003):

- *Residential 10 (RES-10) – This district radiates outward from the downtown. This district requires the smallest lot size of Spencer's residential zoning districts (10,000 sq. ft.), and thus has the highest density of people per square mile. Municipal water and sewer is available for the entirety of the RES-10 district. This district is fully built out and contains 570 acres of land.*
- *Residential 22.5 (RES-22.5) – This district is also intended for single-family dwelling and accessory structures. It has a minimum lot area of 22,500 square feet. There is 1,921 acres of developed land in these zones and 446 acres that can be developed. This zoning district can be found surrounding RES-10 and the major water bodies in Town and along Route 9.*

- <u>*Residential 45 (RES-45)*</u> *– This district is intended to provide for large lot, single-family development, permits homes of lots with minimum size of 45,000 square feet. There are 18,381 acres developed land in this zone (North and South Spencer) and 10,812 acres of developable land.*



Legend
Study Area Boundary
Parcel
River/Stream
Open Water
Zoning
C - Commercial
I - Industrial
LR - Lake Residential
Railroad
Rail Trail
ROW - Right-of-Way
RR - Rural Residential
SR - Suburban Residential
TC - Town Center Mixed Use
VR - Village Residential
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Sugden Reservoir
Lake Whittemore
Stiles Reservoir
Howe Pond
Buckhill Pond
Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Zoning
Spencer, MA
PROJ NO: 13927
DATE: 3/15/2018
FIGURE: 2-4
WRIGHT-PIERCE
Engineering a Better Environment

2.3.6.2 Commercial, Industrial and Business Districts

The six zoning designations that provide for commercial and mixed uses are as follows:

- *Local Business District (L-B), Central Business District (C-B) and Commercial District (COM) – The downtown consists of two business districts the Central Business (C-B) district with frontage along Route 9 and a Commercial (COM) district which fronts on Pearl Street and a portion of Mechanic Street. Both of the downtown commercial districts are fully built out in a technical sense (no more remaining vacant developable land).*

  The Local Business District appears in two locations in Spencer: the first is located on the north side of Route 9 in the vicinity of proctors Corner and the second is located west of the downtown on the north side of Route 9 between South Spencer Road and Route 49.

  In addition to the downtown, the Commercial district can be found at six other locations. The largest COM district is located east of downtown on the south side of Route 9 between the Leicester town line and Sibley's Corner. The other COM districts are small and lie on major routes. Total land zoned C-B is 39 acres, L-B is 70 acres, and Com is 225 acres. The developable land in each district is 0 for C-B, 43 acres for L-B, and 106 acres for COM.

- *Industrial District (I) – Spencer's Industrial zoning districts can be found in eight locations throughout town. The industrial districts lie along Route 9 and 49 for the most part and have available water and sewer. The total land zoned industrial is 386 acres with developable land of 248 acres remaining in those zones.*

2.3.6.3 Overlay Districts and Other Special Use Provisions

Current zoning practice employs special "overlay zones" or other special use provisions to direct land uses where normal zoning mechanisms are difficult to apply. Spencer currently employs two of these mechanisms.

- *Residential Business (RB)* – This district allows small businesses to be operated out of a home, within a residential district.

The Residential Business District appears along Route 31 from the North border of Town to the intersection of Route 9 in downtown Spencer.

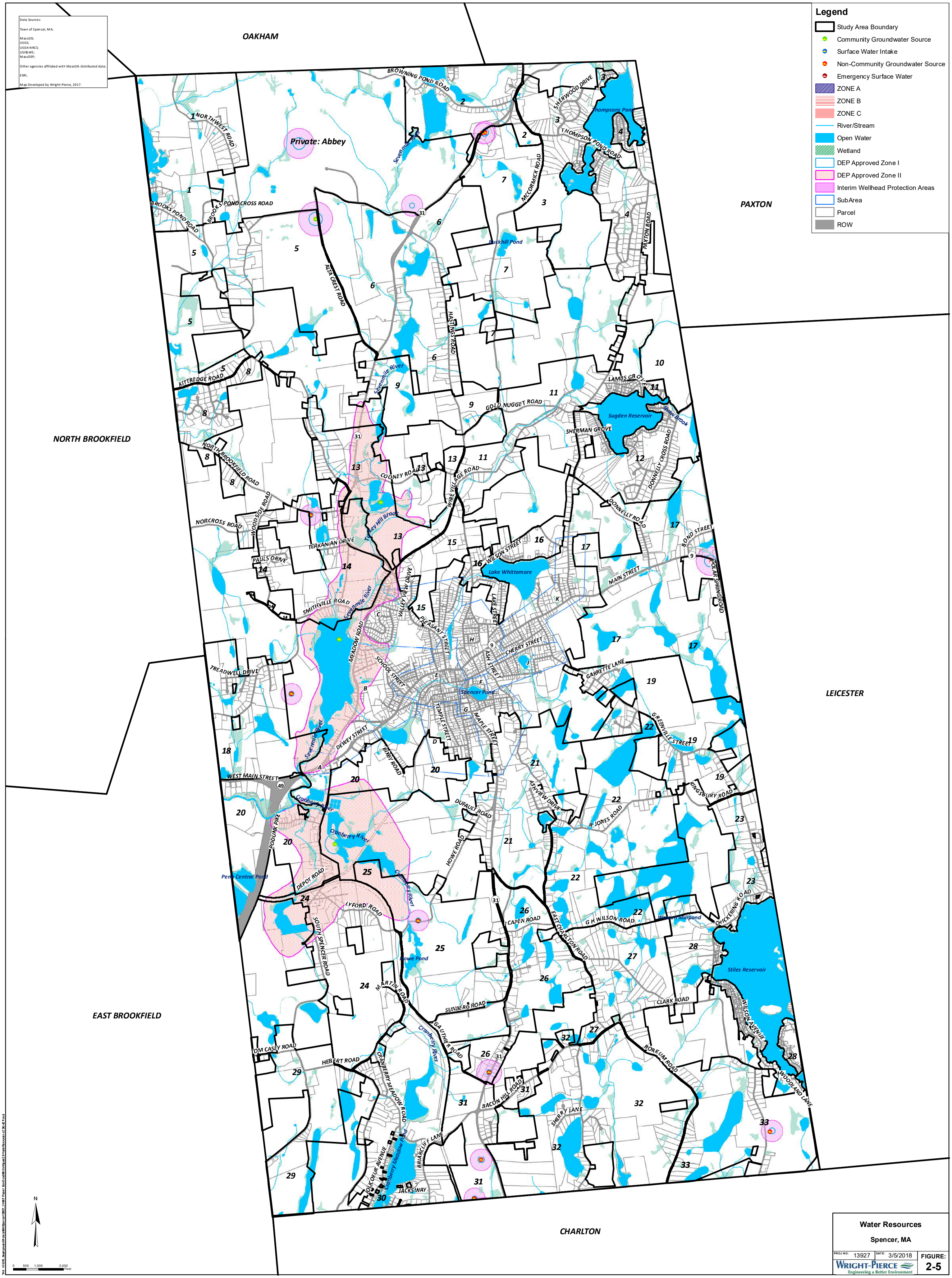
- *Aquifer Protection, Zone 2 District* – This overlay district has been created to protect water quality for water supplies. It is intended to specifically protect natural water resources and areas hydraulically linked to public water supplies. It contains relevant conditions on development, notable a 100-foot setback requirement from qualifying rivers, brooks and ponds. Refer to **Figure 2-5** showing a map of the Water Resource Protection District.

2.3.7 Build-out Analysis

A town wide build-out analysis was conducted by the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) in 1999. **Table 2-4** lists the general results of the study.

TABLE 2-4
BUILD-OUT IMPACT ON TOWN OF SPENCER

Parameter	Unit
Additional Developable Area	11,655 acres
Additional Residential Units	6,108 Units
Additional Residents	14,917 capita
Additional School Children	3,017 capita


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
Community Groundwater Source
Surface Water Intake
Non-Community Groundwater Source
Emergency Surface Water
ZONE A
ZONE B
ZONE C
River/Stream
Open Water
Wetland
DEP Approved Zone I
DEP Approved Zone II
Interim Wellhead Protection Areas
SubArea
Parcel
ROW
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Howe Pond
Sevenmile River
Turkey Hill Brook
Cranberry River
Shaw Brook
BROWNING POND ROAD
NORTHWEST ROAD
BROOKS POND ROAD
BROOKS POND CROSS ROAD
SHERWOOD DRIVE
THOMPSON POND ROAD
MCCORMICK ROAD
PAXTON ROAD
ALTA CREST ROAD
HASTINGS ROAD
KITTREDGE ROAD
GOLD NUGGET ROAD
LAMBS GROVE
SHERMAN GROVE
DONNELLY CROSS ROAD
DONNELLY ROAD
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
NORCROSS ROAD
WOODSIDE ROAD
TERKANIAN DRIVE
PAULS DRIVE
SMITHVILLE ROAD
WILSON STREET
MAIN STREET
BOND STREET
POLAR SPRING ROAD
VALLEY VIEW DRIVE
PLEASANT STREET
LAKE STREET
CHERRY STREET
ASH STREET
MEADOW ROAD
SCHOOL STREET
GARRETTE LANE
TREADWELL DRIVE
DEWEY STREET
TEMPLE STREET
MAPLE STREET
GREENVILLE STREET
WEST MAIN STREET
BIXBY ROAD
KINGSBURY ROAD
DUFAULT ROAD
ASHVIEW DRIVE
R JONES ROAD
PODUNK PIKE
HOWE ROAD
DEPOT ROAD
LYFORD ROAD
SOUTH SPENCER ROAD
J CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
CHICKERING ROAD
M MARTIN ROAD
SUNBERG ROAD
CLARK ROAD
GAUTHIER ROAD
WILSON AVENUE
BORKUM ROAD
WOODLAND LANE
TOM CASEY ROAD
HEBERT ROAD
CRANBERRY MEADOW ROAD
BACON HILL ROAD
SHERRY LANE
BRIARCLIFF LANE
COLCOEUR AVENUE
JACKS WAY
Cranberry Meadow Pond
N
0 500 1,000 2,000 Feet
Water Resources
Spencer, MA
PROJ NO: 13927
DATE: 3/5/2018
FIGURE: 2-5
WRIGHT-PIERCE
Engineering a Better Environment

2.3.8 Open Space

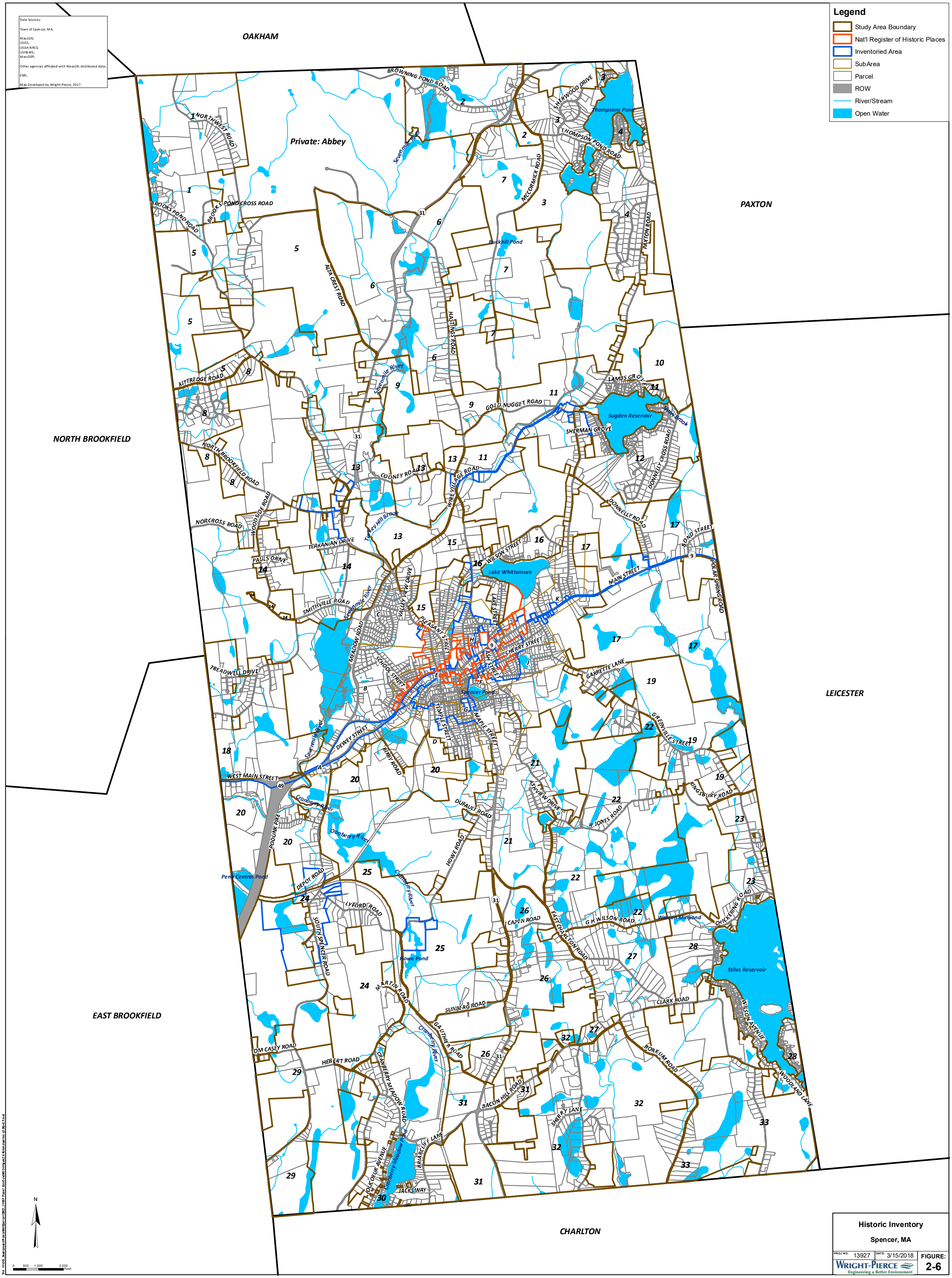
The Town of Spencer has made great efforts to procure land to have those lands become protected open spaces. Currently the Town has 10,600 acres designated as lands of conservation or recreation interest. Parcels were considered open space if they met one of the following criteria:

- Considered open space by Mass GIS
- Designated Chapters 61, 61A, and 61B
- Owned by the Town
- Listed as a priority protection area

2.3.9 Historic Areas

*Due to its rich industrial history (mills) and as a historical stop along the route to Connecticut, Spencer has areas throughout downtown with historic significance. A map showing historical areas of Town is shown in **Figure 2-6**. Review of the National Register of Historic Places indicates that Spencer has a few nationally recognized areas.*

The Massachusetts Historical Commission administers the National Register program in Massachusetts. The Spencer Historic Commission is the local organization tasked with identifying and protecting Spencer's historic assets.


Legend
Study Area Boundary
Nat'l Register of Historic Places
Inventoried Area
SubArea
Parcel
ROW
River/Stream
Open Water
Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Howe Pond
Watson Millpond
Penn Central Pond
Sevenmile River
Turkey Hill Brook
Cranberry River
Cranberry Meadow Road
BROWNING POND ROAD
SHERWOOD DRIVE
THOMPSON POND ROAD
NORTHWEST ROAD
MCCORMICK ROAD
BROOKS POND CROSS ROAD
BROOKS POND ROAD
ALTA CREST ROAD
HASTINGS ROAD
PAXTON ROAD
KITTREDGE ROAD
GOLD NUGGET ROAD
LAMBS GROVE
SHERMAN GROVE
DONNELLY CROSS ROAD
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
NORCROSS ROAD
WOODSIDE ROAD
DONNELLY ROAD
BOND STREET
TERKANIAN DRIVE
PAULS DRIVE
WILSON STREET
MAIN STREET
POLAR SPRING ROAD
SMITHVILLE ROAD
VALLEY VIEW DRIVE
PLEASANT STREET
LAKE STREET
MEADOW ROAD
SCHOOL STREET
ASH STREET
CHERRY STREET
GARRETTE LANE
TREADWELL DRIVE
TEMPLE STREET
MAPLE STREET
GREENVILLE STREET
DEWEY STREET
BIXBY ROAD
WEST MAIN STREET
KINGSBURY ROAD
ASHVIEW DRIVE
DUFAULT ROAD
R JONES ROAD
PODUNK PIKE
HOWE ROAD
DEPOT ROAD
LYFORD ROAD
CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
CHICKERING ROAD
SOUTH SPENCER ROAD
MARTIN ROAD
SUNBERG ROAD
CLARK ROAD
GAUTHIER ROAD
WILSON AVENUE
TOM CASEY ROAD
HEBERT ROAD
CRANBERRY MEADOW ROAD
BORKUM ROAD
BACON HILL ROAD
WOODLAND LANE
SHERRY LANE
BRIARCLIFF LANE
OLD COEUR AVENUE
JACKS WAY
Historic Inventory
Spencer, MA
PROJ NO: 13927
DATE: 3/15/2018
FIGURE: 2-6
WRIGHT-PIERCE
Engineering a Better Environment

2.4 NATURAL ENVIRONMENT

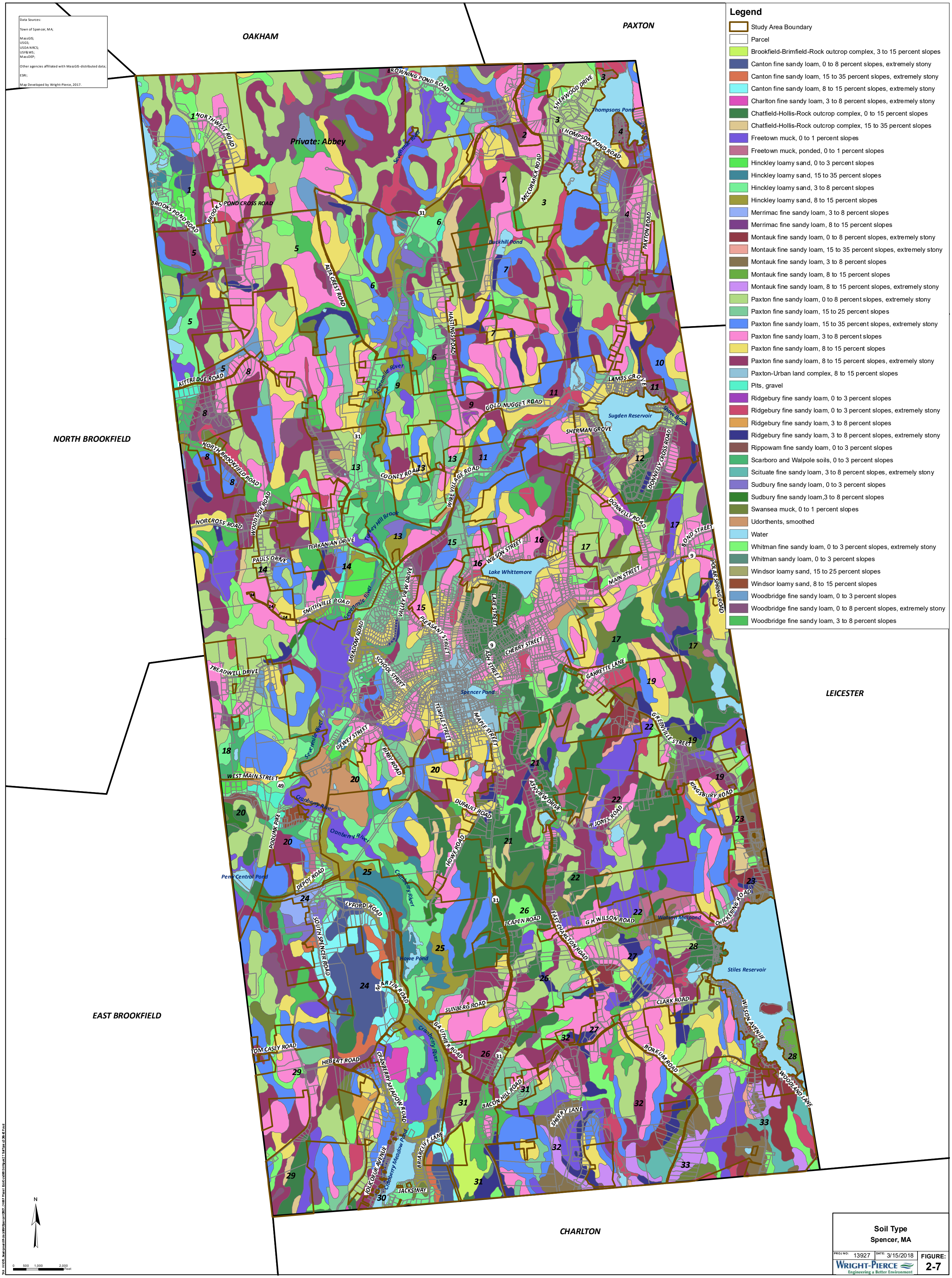
2.4.1 Climate

According to the 1981-2010 Normals Data Access provided by the National Oceanic and Atmospheric Administration’s National Climatic Data Center, the historical average temperature in Worcester (closest station to Spencer with data) from 1981 through 2010 was 47.9°F with an average low of 26.8°F and an average maximum of 76.8°F. The average precipitation for Spencer is 48.07 inches per year.

2.4.2 Soils

The topography of the town is rolling country with significant elevations rising up to 500 feet above the low point. The MassGIS Soil Map for Spencer is included as **Figure 2-7**. *Most of Spencer is now covered by till soils made up of unsorted rocks, stones, sands and finer particles. These soils are generally found on ridges and side slopes. Many of the till soils have layers with low permeability limiting their suitability for septic systems. Their position on slopes makes them easily subject to erosion. When on milder slopes they are often suitable for agriculture. The great majority of Spencer’s prime agricultural soils are of this type.*

In the valleys, extensive sand and gravel banks were left where glaciers melted. Depressions and valleys carved out by the glaciers are today’s ponds, bogs, wetlands, and stream. Wind and water erosion continue to add deposits in low areas, and flood plains. These soils lie largely along the Seven Mile and Cranberry Rivers. They are very permeable to water and carry large quantities of groundwater to the Big Meadow and Cranberry Meadow municipal wells.


Data Sources:
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Map Developed by Wright-Pierce, 2017.
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Watson Millpond
Stiles Reservoir
Howe Pond
Legend
Study Area Boundary
Parcel
Brookfield-Brimfield-Rock outcrop complex, 3 to 15 percent slopes
Canton fine sandy loam, 0 to 8 percent slopes, extremely stony
Canton fine sandy loam, 15 to 35 percent slopes, extremely stony
Canton fine sandy loam, 8 to 15 percent slopes, extremely stony
Charlton fine sandy loam, 3 to 8 percent slopes, extremely stony
Chatfield-Hollis-Rock outcrop complex, 0 to 15 percent slopes
Chatfield-Hollis-Rock outcrop complex, 15 to 35 percent slopes
Freetown muck, 0 to 1 percent slopes
Freetown muck, ponded, 0 to 1 percent slopes
Hinckley loamy sand, 0 to 3 percent slopes
Hinckley loamy sand, 15 to 35 percent slopes
Hinckley loamy sand, 3 to 8 percent slopes
Hinckley loamy sand, 8 to 15 percent slopes
Merrimac fine sandy loam, 3 to 8 percent slopes
Merrimac fine sandy loam, 8 to 15 percent slopes
Montauk fine sandy loam, 0 to 8 percent slopes, extremely stony
Montauk fine sandy loam, 15 to 35 percent slopes, extremely stony
Montauk fine sandy loam, 3 to 8 percent slopes
Montauk fine sandy loam, 8 to 15 percent slopes
Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony
Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony
Paxton fine sandy loam, 15 to 25 percent slopes
Paxton fine sandy loam, 15 to 35 percent slopes, extremely stony
Paxton fine sandy loam, 3 to 8 percent slopes
Paxton fine sandy loam, 8 to 15 percent slopes
Paxton fine sandy loam, 8 to 15 percent slopes, extremely stony
Paxton-Urban land complex, 8 to 15 percent slopes
Pits, gravel
Ridgebury fine sandy loam, 0 to 3 percent slopes
Ridgebury fine sandy loam, 0 to 3 percent slopes, extremely stony
Ridgebury fine sandy loam, 3 to 8 percent slopes
Ridgebury fine sandy loam, 3 to 8 percent slopes, extremely stony
Rippowam fine sandy loam, 0 to 3 percent slopes
Scarboro and Walpole soils, 0 to 3 percent slopes
Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony
Sudbury fine sandy loam, 0 to 3 percent slopes
Sudbury fine sandy loam,3 to 8 percent slopes
Swansea muck, 0 to 1 percent slopes
Udorthents, smoothed
Water
Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony
Whitman sandy loam, 0 to 3 percent slopes
Windsor loamy sand, 15 to 25 percent slopes
Windsor loamy sand, 8 to 15 percent slopes
Woodbridge fine sandy loam, 0 to 3 percent slopes
Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony
Woodbridge fine sandy loam, 3 to 8 percent slopes
N
0 500 1,000 2,000 Feet
Soil Type
Spencer, MA
PROJ NO: 13927
DATE: 3/15/2018
FIGURE: 2-7
WRIGHT-PIERCE
Engineering a Better Environment

2.4.3 Topography and Hydrology

Spencer has many named hills with steep grades dipping to winding valleys of small rivers. Large, low-lying areas are found along the floodplains of the Seven Mile River, the Cranberry River and in the large wetland systems of Alder Meadow and Morgan Swamp. Elevations in Town range from 620 feet to 1,063 above sea level. Eight to fifteen percent (8-15%) slopes predominate, but slopes range up to 35%. Slopes greater than 15% are more susceptible to erosion and have severe limitations for septic suitability and buildings. Figure 2-8 shows the topography in Spencer. (2012 Town of Spencer Open Space & Rec Planning).

Spencer's surface drainage network of streams, ponds and wetlands is the direct result of its topography and soils. These surface waters are important to consider in open space planning. They connect ponds, wetlands, wildlife habitats, rich flood plain soils, historic sites and other important community resources. Roadways have followed stream and river valleys or hill ridge ways. (See Figure 2-9)

This network is divided into drainage basins, also known as watersheds. A watershed is the land from which rain or snow melt flows to a waterway. Drainage basins can be subdivided into smaller sub-watersheds for the tributaries of a larger river system. Two of the state-defined 27 major river basins receive water draining from Spencer. Most of the town lies within the Chicopee River Watershed with the remainder in the French River Watershed.

The small brooks in Spencer are at the headwaters of each of these major basins. Brooks in the northwest corner of Town flow into the Five Mile River in North Brookfield. Further east, water is collected to the Seven Mile River, which joins with Turkey Hill Brook and flows through the Town center. After its confluence with the Cranberry River, the Seven Mile flows to Quaboag Pond in East Brookfield. The Quaboag River begins at Quaboag Pond, flowing westward until it combines with the Swift and Ware Rivers to form the Chicopee River.

In the southeast, Spencer brooks flow to Burncoat Pond and Stiles Reservoir, thence to Town Meadow Brook in Leicester, then the French River. A small area on the south margin of town drains to the Quinebaug River which joins the French River in Connecticut.

There are eleven lakes, ponds, and reservoirs in Town, most created by dams. This discussion follows New England custom and calls all these open water bodies "ponds" when referring to them collectively. Ponds wholly in Spencer include Buck Hill Pond, Howe Pond, Lake Whittemore, Sugden Reservoir and Thompson Pond. Brooks Pond, Browning Pond, Burncoat Pond, Cranberry Meadow Pond. Jones Pond, Moose Hill Reservoir, and Stiles Reservoir are shared with neighboring towns. Moose Hill Reservoir is an 81.6-acre flood control pond constructed to recently to appear on the most recent USGS topographic quadrangle maps. Browning Pond is the only pond recognized as a Great Pond. These open waters are valued open space and have been popular recreation and scenic amenities for generations of town residents. They also draw people from the region and tourists who contribute to the Town's economy.

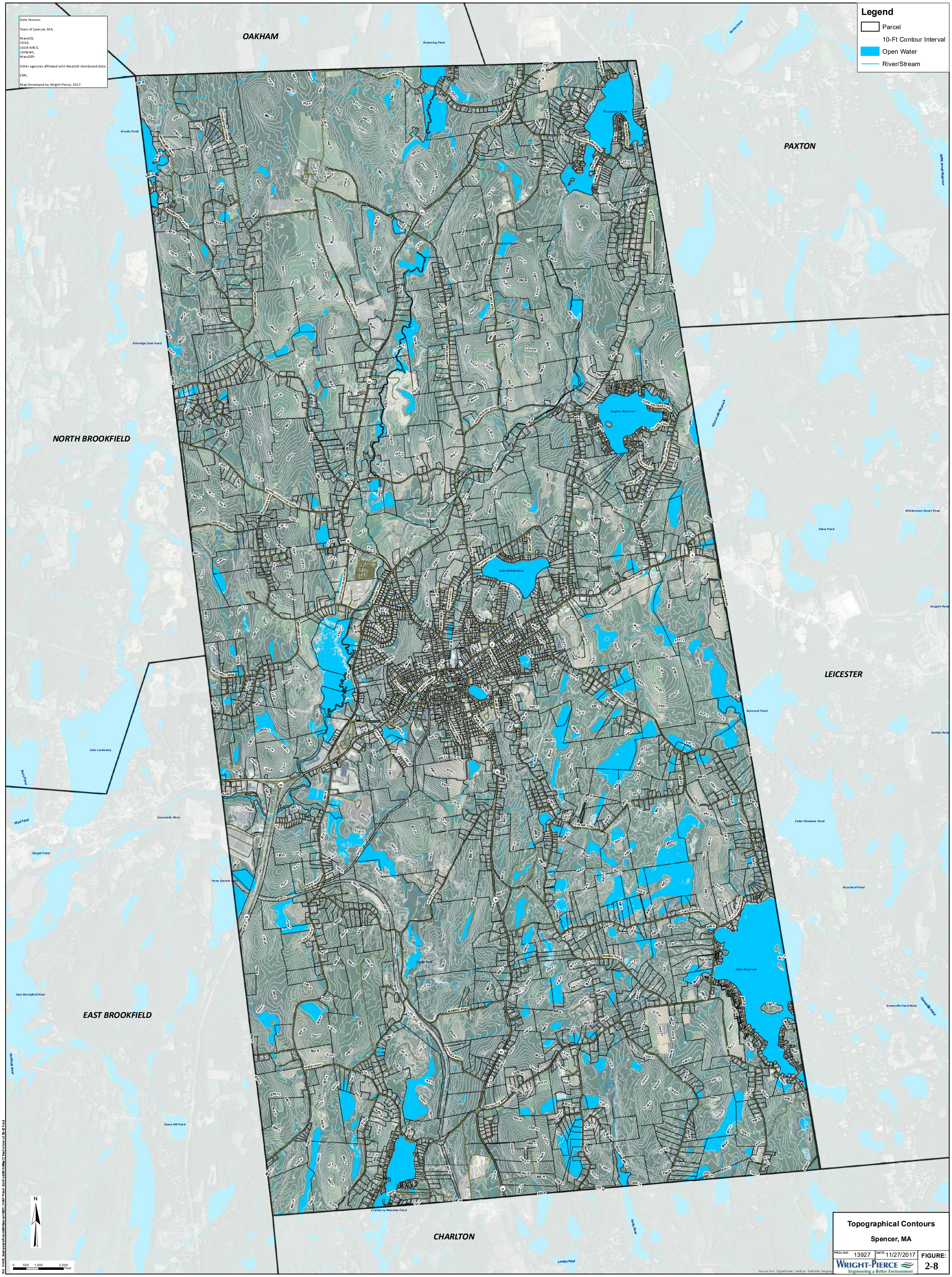

Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Parcel
10-Ft Contour Interval
Open Water
River/Stream
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
N
0 500 1,000 2,000
Feet
Topographical Contours
Spencer, MA
PROJ NO: 13927
DATE: 11/27/2017
FIGURE:
2-8
WRIGHT-PIERCE
Engineering a Better Environment

Figure 2-9 - ACEC's. There are no ACEC's in Spencer. As such, no figure was created

2.4.4 Environmentally Sensitive Areas

2.4.4.1 ACEC

The Areas of Critical Environmental Concern (ACEC) Program falls under the Department of Environmental Management, EOEEA, and was established in 1975. Since that time, 30 ACECs, comprised of 268,000 acres, have been designated in Massachusetts covering from the Berkshires to the North Shore, to Cape Cod. Currently, no ACECs are designated in the Town of Spencer.

2.4.4.2 Wetlands

The Town's Master Plan contains a comprehensive discussion regarding wetlands; therefore, additional information was not compiled for this report. Pertinent information from the Master Plan has been provided in this section.

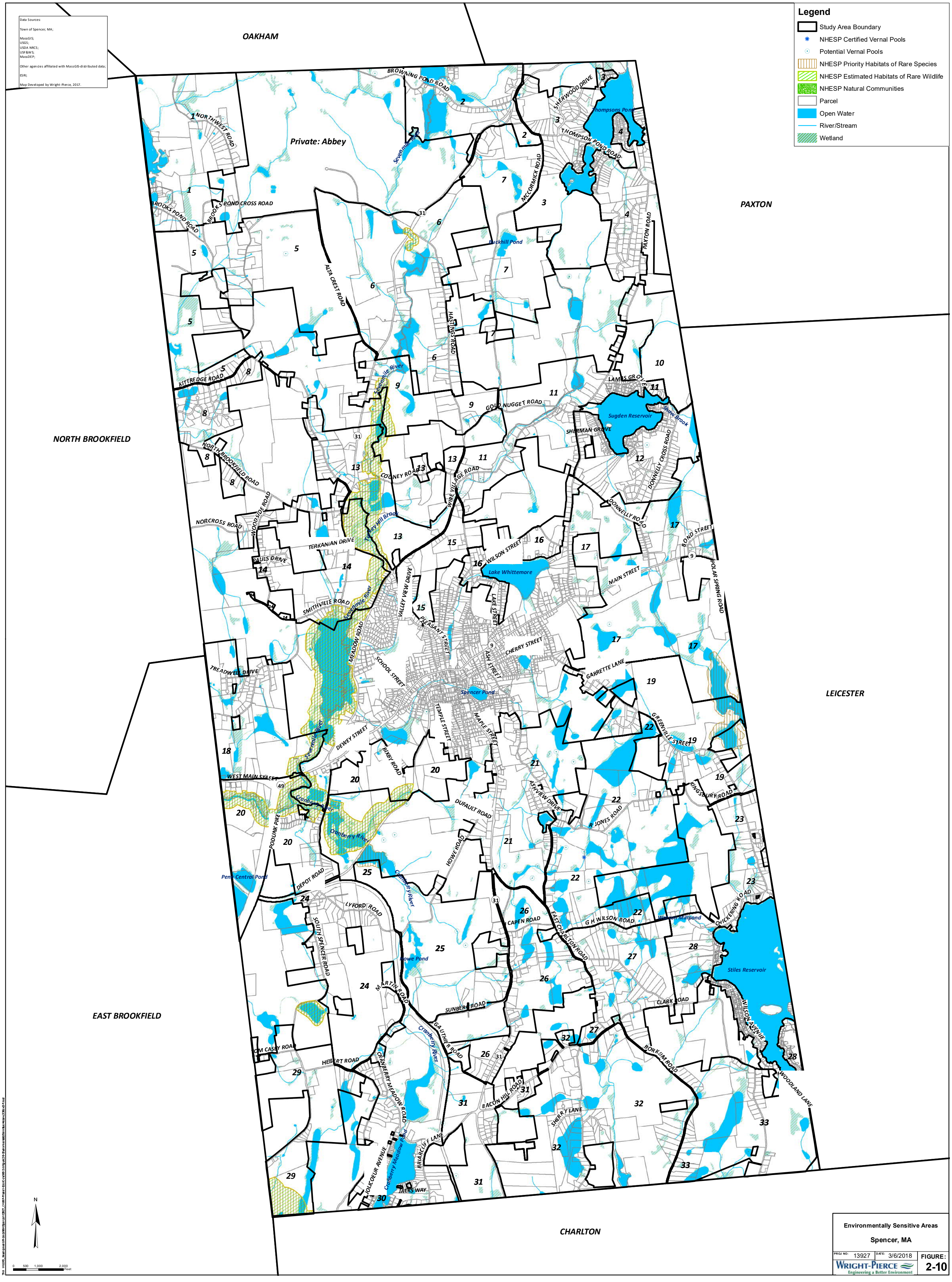
There are about 480 acres of wetlands throughout the Town. Two of the largest are the Big Meadow area along Seven Mile River, and Alder Meadow northwest of Stiles Reservoir. All wetlands are important for water purification, groundwater recharge, flood control, and wildlife habitat.

2.4.4.3 Species Habitat

The Massachusetts Division of Fisheries and Wildlife, Natural Heritage & Endangered Species Program (NHESP) has a goal to protect the state's native biological diversity through a comprehensive program of biological inventory and scientific research, species and habitat management and restoration, environmental impact review, and conservation planning. This agency oversees the official vernal pool certification program.

There is one certified vernal pool in the Town of Spencer, and there are numerous potential vernal pools identified through the Program's aerial photographs (Massachusetts Aerial Photo Survey of Potential Venial Pools, spring 2001). Vernal pools are unique wetlands that support diverse and valuable wildlife communities, including many state-listed rare species. Although they come in a diversity of forms, they are all characterized by springtime ponding, a lack of reproducing fish populations, and the wildlife communities that are adapted to these conditions (Bob Durand, *Secretary of EOEEA, "Letter to Concerned Citizens", Spring, 2001). Refer to* ***Figure 2-10*** *for the NHESP estimated habitat for rare species and vernal pool locations.*

The NHESP is also responsible for the protection of all rare plant and animal species listed under the Massachusetts Endangered Species Act (MESA). The NHESP web-site provides a listing of all endangered, threatened and special concern plants and animals by town. Data following is based on observations over the past 25 years. Any native species listed as endangered or threatened by the U.S. Fish and Wildlife Service are included on the state list. The Rare Species Occurrences for Spencer, are listed in ***Table 2-10****.*


Data Sources:
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USGS;
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USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
NHESP Certified Vernal Pools
Potential Vernal Pools
NHESP Priority Habitats of Rare Species
NHESP Estimated Habitats of Rare Wildlife
NHESP Natural Communities
Parcel
Open Water
River/Stream
Wetland
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Howe Pond
Browning Pond Road
Northwest Road
Brooks Pond Road
Brooks Pond Cross Road
Sherwood Drive
Thompson Pond Road
McCormick Road
Paxton Road
Alta Crest Road
Hastings Road
Kittredge Road
Gold Nugget Road
North Brookfield Road
Cooney Road
Wire Village Road
Donnelly Road
Donnelly Cross Road
Norcross Road
Woodside Road
Terkanian Drive
Pauls Drive
Smithville Road
Valley View Drive
Wilson Street
Bond Street
Main Street
Polar Spring Road
Pleasant Street
Lake Street
Meadow Road
School Street
Cherry Street
Ash Street
Garrette Lane
Treadwell Drive
Temple Street
Maple Street
Greenville Street
Dewey Street
Bixby Road
West Main Street
Kingsbury Road
Dufault Road
Ashview Drive
R Jones Road
Podunk Pike
Howe Road
Depot Road
Lyford Road
South Spencer Road
Capen Road
East Charlton Road
G H Wilson Road
Chickering Road
Martin Road
Sunberg Road
Clark Road
Wilson Avenue
Galiuther Road
Borkum Road
Hebert Road
Cranberry Meadow Road
Bacon Hill Road
Woodland Lane
Sherry Lane
Briarcliff Lane
Jolicoeur Avenue
Jacks Way
Cranberry River
Sevenmile River
Turkey Hill Brook
Shaw Brook
Cranberry Meadow Pond
Environmentally Sensitive Areas
Spencer, MA
PROJ NO: 13927
DATE: 3/6/2018
FIGURE: 2-10
WRIGHT-PIERCE
Engineering a Better Environment
N
0 500 1,000 2,000 Feet

TABLE 2-5

RARE, THREATENED, AND ENDANGERED SPECIES, SPENCER

Taxonomic Group	Scientific Name	Common Name	MESA Status*	Most Recent Observation
Amphibian	Ambystoma laterale	Blue-spotted Salamander	SC	1991
Bird	Ammodramus savannarum	Grasshopper Sparrow	T	2008
Bird	Botaurus lentiginosus	American Bittern	E	1996
Bird	Podilymbus podiceps	Pied-billed Grebe	E	2005
Fish	Notropis bifrenatus	Bridle Shiner	SC	2007
Mussel	Alasmidonta undulata	Triangle Floater	SC	1999
Mussel	Strophitus undulatus	Creeper	SC	1999
Reptile	Emydoidea blandingii	Blanding's Turtle	T	1993
Reptile	Glyptemys insculpta	Wood Turtle	SC	2009
Reptile	Terrapene carolina	Eastern Box Turtle	SC	1985
Vascular Plant	Ophioglossum pusillum	Adder's-tongue Fern	T	1890
Vascular Plant	Ranunculus pensylvanicus	Bristly Buttercup	SC	2006

E = Endangered T = Threatened SC = Special Concern

* Massachusetts Endangered Species Act. There currently are no Federally Listed Species in Spencer.

Source: MassWildlife (http://www.mass.gov/dfwele/dfw/nhesp/species_info/species_home.htm)

2.4.4.4 Wildlife Management Areas

Spencer has two designated Wildlife Management Areas (WMAs) protected through State legislation for the purpose of wildlife conservation and open space preservation. These areas contain native game such as deer, fox, coyote, rabbit, squirrel and grouse. Numerous non-game species are also present. The areas are not stocked for non-indigenous game. Under the management of the Massachusetts Fish and Wildlife Service, the WMAs are open to the public for fishing, hunting, trapping and other passive outdoor recreation activities. The WMAs are:

- *Four Chimneys WMA: This is a 213-acre WMA. It is almost entirely undeveloped, with only a few old logging trails.*
- *Moose Hill WMA: This is a 250-acre WMA. It is almost entirely undeveloped, with only a few old logging trails.*

Connections between habitats, providing wildlife corridors, are also important. Habitats that overlap into abutting towns, especially to the less developed north and west, allow movement of the larger animals which need relatively large ranges. Spencer has several large tracts of open space (with a range of protection levels) including the Spencer State Forest, Four Chimneys Wildlife Management Area (WMA), Moose Hill WMA, Burncoat Pond Wildlife Sanctuary, and St.

Joseph's Abbey property. In addition, Seven Mile River, Turkey Hill Brook, Alder Meadow and Morgan swamp provide significant areas of wildlife habitat. These properties provide wildlife corridors within the Town of Spencer. The developed Route 9 corridor severs the north and south ends of town. Nonetheless, bear and moose occasionally cross and coyotes regularly manage to cross. The river and wetland systems allow the spread of smaller animals across the divide.

In addition to designated WMAs, Spencer has several other areas that are protected, but open to the public for restricted use. Recreational uses of the forests include camps run by non-profit organizations, hunting, trapping, and use of trails for hiking, snowmobiles, horseback riding, trail bikes, and cross-country skiing. Trapping takes fisher, raccoon, bobcat, and coyote. Recreational hunting is primarily for deer and turkey.

2.4.4.5 Flood Plains

Flood plains located in Spencer have been identified through the Federal Emergency Management Agency (FEMA). FEMA is an independent federal agency under the U.S. Department of Homeland Security, with the charge of reducing the loss of life and property from all types of hazards. FEMA's Federal Insurance Administration runs the National Flood Insurance Program. This program offers federally backed flood insurance coverage to residents in more than 19,000 participating communities. As part of this program, Flood Insurance Rate Maps (FIRMs) are used to distinguish flood plains and determine the need for insurance. Refer to **Figure 2-11** for the floodplain map for the Town.

The flood zones are delineated for the 100-year flood boundary (Zone A), the 500-year flood boundary (Zone B), areas of minimal flooding (Zone C), and areas of undetermined but possible flood hazards (Zone D). According to FEMA, the most recent mapping available dates back to the early eighties. Since extensive development has occurred in the past two decades, the mapping may be a better guide to areas considered for potential flooding rather than for the actual limits of the flooding. The most extensive flood plain areas are found along the Seven Mile and Cranberry Rivers. Widths of flood plains vary according to topography. Change in the types of land uses in

Town will influence the size of the flood plains. Careful review of drainage controls for proposed developments will be necessary to avoid increasing flood problems.

2.4.5 Regional Water Quality

Refer to descriptions above for Water Quality issues in the areas around and within Spencer.

2.4.6 Air Quality

Air quality problems can be associated with poor surface water quality, vehicular emissions, failing onsite wastewater disposal systems, certain industrial and commercial activities, and improper operation of wastewater conveyance or treatment systems. As of the date of this report, the Commonwealth of Massachusetts 2012 Air Quality Report could be viewed on the state website. The report explains that the regulations set forth in the Code of Federal Regulations (Title 40, Part 58) require each state to establish an air-monitoring network. During 2012, the Air Assessment Branch operated a monitoring network of 27 monitoring stations located in 19 cities and towns, and oversaw a separate privately funded site in the Boston area. MassDEP also received data from the Wampanoag Tribe of Gay Head (Aquinnah), which operates an air monitoring station on Martha's Vineyard, and from the U.S. EPA, New England Regional Laboratory, which operates an air monitoring station in Chelmsford.

The seven criteria pollutants that are subject to National Ambient Air Quality Standards (NAAQS) are sulfur dioxide (SO2), ozone (03), carbon monoxide (CO), nitrogen dioxide (NO2), lead (Pb), particulate matter 10 microns (PMio), and particulate matter 2.5 microns (PM25). In addition to these seven criteria pollutants, non-criteria pollutants and meteorological parameters are also monitored.

Massachusetts is in compliance with all criteria pollutants except for ozone. Ground level ozone irritates mucous membranes, is toxic to vegetation, weakens materials such as rubber and fabrics, and often builds up far downwind of the original source.

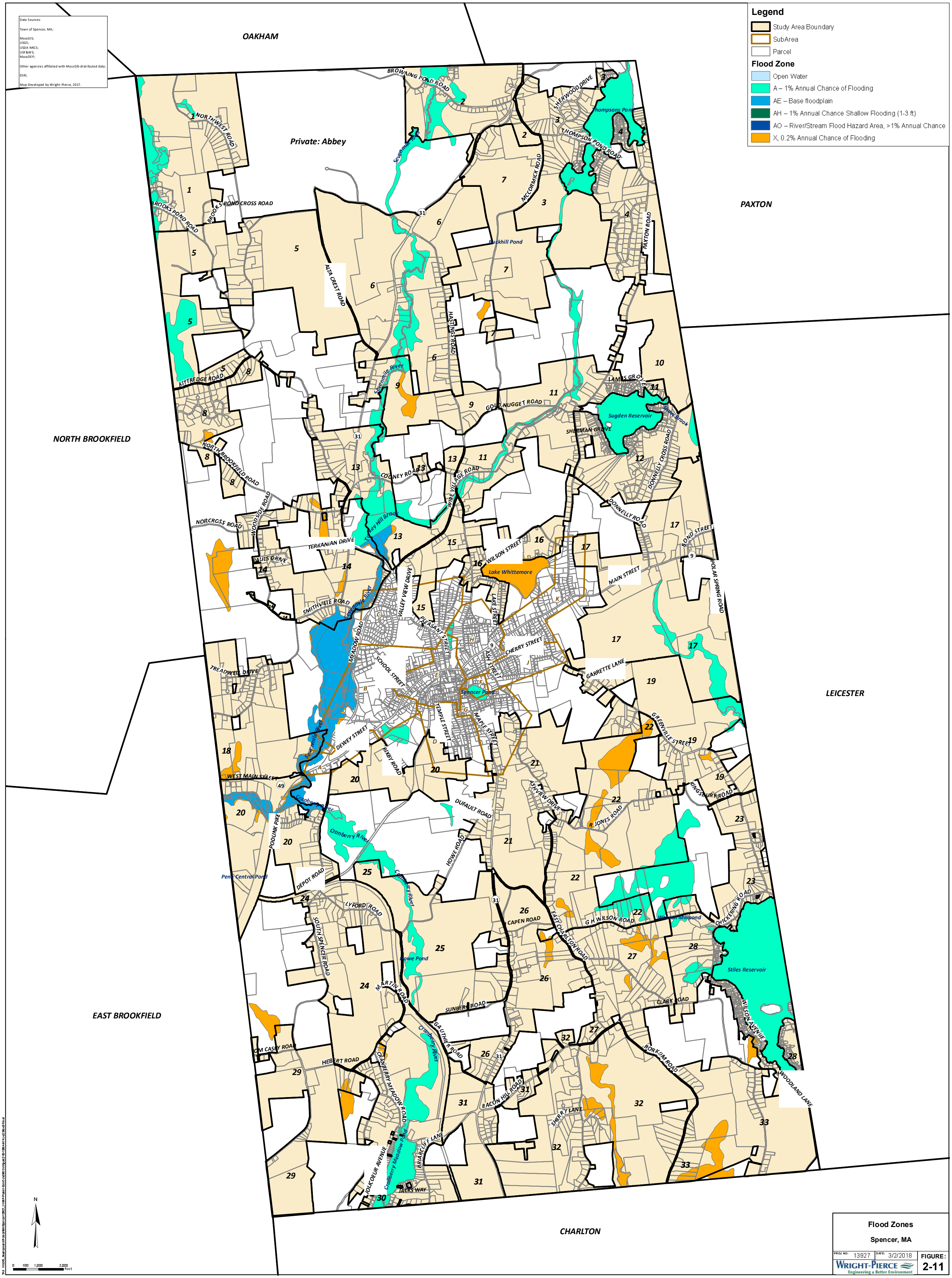
Massachusetts has violated the 1-hour ozone standard for many years. However, with the adoption of numerous control programs, progress has been made. The number and severity of the exceedances has declined significantly in recent years. From 1999-2001, Eastern Massachusetts was in violation of the 1-hour standard due to exceedances in the Fairhaven and Truro monitors. The U.S. Environmental Protection Agency (EPA) is expected to designate area's attainment status for the new 8-hour ozone standard (2003). According to representatives from air quality permitting at the DEP, Massachusetts is expected to be "non-attainment" for the 8-hour standard.

2.4.7 Groundwater

Spencer's town water supply comes from groundwater. Sand and gravel deposits underlying local rivers can produce high yields of water. The town's primary wells are in the Big Meadow area and a secondary source is near the Cranberry River. The Big Meadow well has an expected yield of 2 million gallons per day. Large areas adjacent to Town wells are delineated as Zone II protection districts. (A Zone II is the area that contributes to the recharge of a public groundwater supply.)

Shaw Pond in Leicester is an emergency backup water supply for the Town of Spencer but its use is not currently contemplated. Shaw Pond is identified as "attains some uses, others not assessed" by the Massachusetts Department of Environmental Management Division of Watershed Management 303(d) List. For use as drinking water, Shaw Pond water would require some treatment. Over time, surface activities influence the water quality in even the deepest wells.

Town residents living outside the central area rely on their own wells and yields vary. The average residential well is around 100 to 150 feet deep, although well depths can be much deeper if low yields require additional storage capacity. Some of Spencer's bedrock is soft and can break down into clays that hold water tightly making it less available to residential wells though adequate water is available in most locations for residential development.


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
SubArea
Parcel
Flood Zone
Open Water
A – 1% Annual Chance of Flooding
AE – Base floodplain
AH – 1% Annual Chance Shallow Flooding (1-3 ft)
AO – River/Stream Flood Hazard Area, >1% Annual Chance
X, 0.2% Annual Chance of Flooding
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Howe Pond
Cranberry River
Sevenmile River
MAIN STREET
WEST MAIN STREET
PLEASANT STREET
MEADOW ROAD
SCHOOL STREET
MAPLE STREET
TEMPLE STREET
CHERRY STREET
ASH STREET
LAKE STREET
VALLEY VIEW DRIVE
WILSON STREET
GREENVILLE STREET
EAST CHARLTON ROAD
PAXTON ROAD
THOMPSON POND ROAD
BROWNING POND ROAD
NORTH BROOKFIELD ROAD
SOUTH SPENCER ROAD
WILSON AVENUE
Flood Zones
Spencer, MA
PROJ NO: 13927
DATE: 3/2/2018
FIGURE:
2-11
WRIGHT-PIERCE
Engineering a Better Environment
N
0 500 1,000 2,000 Feet

2.4.8 Noise

DEP has a Sound Policy that includes sound impact analyses for certain applications. In Spencer, DEP's regulations on sound are enforced by the Health Department. According to the Health Department, the primary source of potential noise problems in Spencer is from vehicular traffic; particularly, areas near Route 9, 31, and 49. The Health Department also investigates noise impacts (along with odor impacts) of potential businesses in town. In some cases, the town may require a mitigation plan. The town has access to sound monitoring equipment through DEP.

WRIGHT-PIERCE
Engineering a Better Environment

3

SECTION 3

EXISTING WASTEWATER MANAGEMENT SYSTEMS

3.1 INTRODUCTION

The purpose of this section of the CWMP is to describe the existing wastewater collection, pumping and treatment systems in the Town of Spencer. The Town owns and operates a Wastewater Treatment Plant (WWTP), located on Main Street, which services the greater downtown area and a majority of the residential development. The WWTP collects both wastewater and septage from the Town of Spencer and other communities adjacent to the Town. The WWTP currently treats 750,000 gallons of wastewater per day (annual average) from the Town of Spencer and discharges to the Cranberry Brook.

3.2 WASTEWATER COLLECTION SYSTEM

The current wastewater collection system for the Town of Spencer is shown in Figure 3-1. The 1978 Infiltration/Inflow Analysis divided the Town of Spencer's sewer system into 10 separate sewer subsystems (A through H, J and K) with a manhole numbering system corresponding to the subsystem area letters. The collection system is composed of one main trunk sewer that runs south of Main Street until the line crosses Main Street at the West Main/Main Street intersection. This trunk sewer follows West Main Street from this point until the line intersects Dewey Street just prior to entering the wastewater treatment plant. The trunk sewer ranges in size from 8 to 24-inches in diameter at the treatment plant.

Muzzy Pond is located near the center of Town and is surrounded on three sides by the existing collection system. The sewer pipes in this area collect flows from the outmost reaches of the collection system. From Muzzy Pond, the main sewer runs along the stream before reaching the wastewater treatment plant.

The overall length of the gravity collection system is approximately 115,000 linear feet and consists of 462 sanitary sewer manholes. Indicated in the 2007 National Pollutant Discharge Elimination System (NPDES) Permit, Permit No. MA0100919, the West Main Street (Route 9) interceptor receives flows from the other collector and interceptor sewers, as well as the Meadow Road force main and conveys such to the WWTP. The collection system includes both new and old sewer piping. No combined sewers are believed to be connected to the collection system. Wastewater collected is comprised of mostly domestic flow with some septage, commercial, and industrial wastewater. There are two small discharges of industrial wastewater received at the WWTP consisting of (1) heated non-contact process water and boiler blowdown from Flexcon and (2) cleaning water used in the preparation of jams and jellies from the St. Joseph's Abbey.

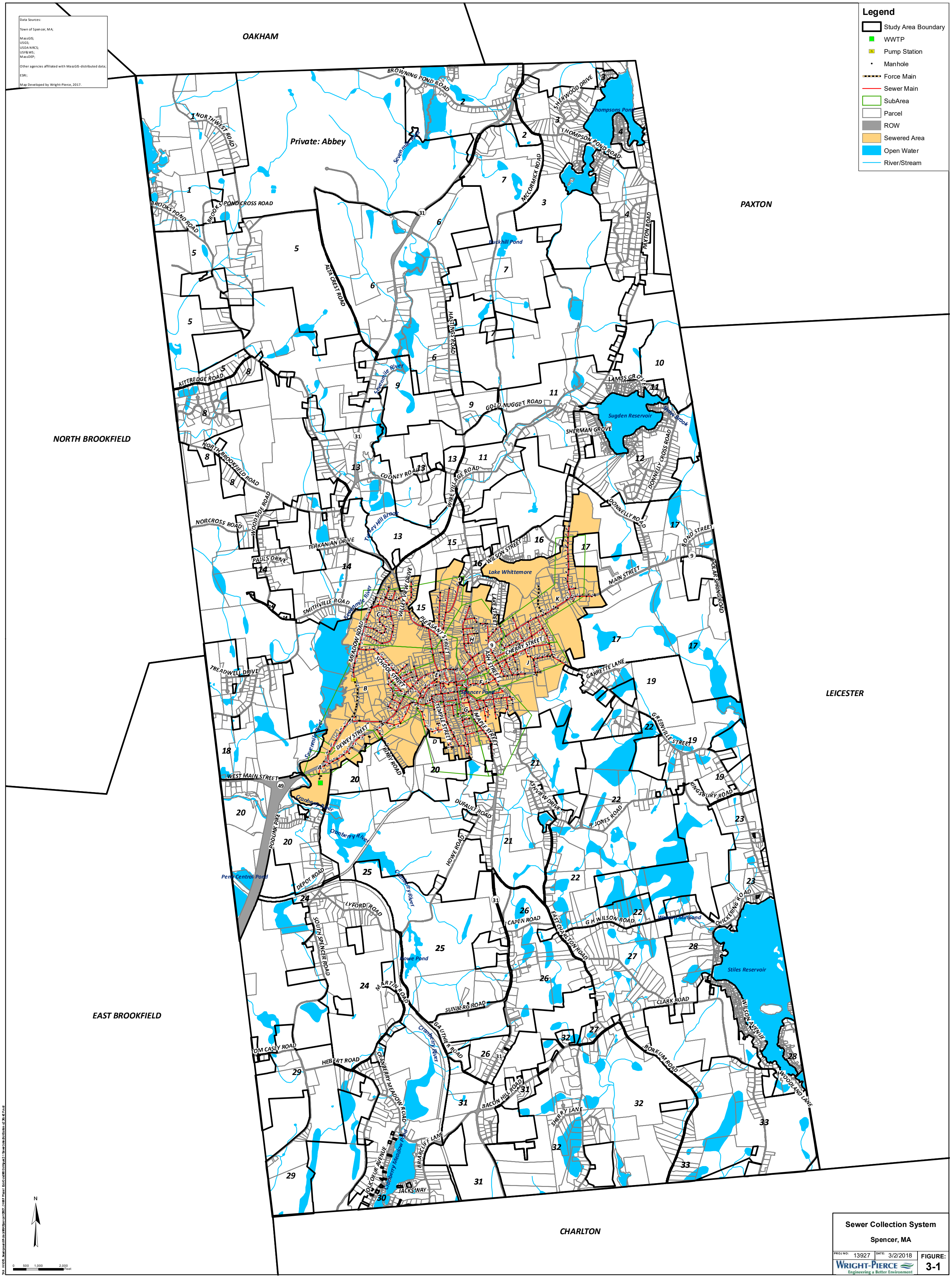
3.2.1 WASTEWATER PUMPING STATIONS

There is one pumping station currently being operated and maintained by the Town's WWTP staff and is located on Meadow Road. The pump station was recently upgraded in 2012. The Meadow Road pump station is located adjacent to the Seven Mile River wetlands area. The force main from the pump station passes under a tributary to the Seven Mile River and ties into the main trunk sewer on West Main Street. The total force main length is 1,730 feet and is 8-inches in diameter.

TABLE 3-1

SPENCER'S WASTEWATER PUMPING STATION

Pumping Station Location/Name	Type	No. Pumps	Pump Type	Capacity (ea)	Motor (Hp)	Generator
Meadow Road	Gorman-Rupp T36	2	Self-Priming, Non-Clog, Centrifugal, air release valve	520 gpm @ 33 TDH	7.5	Permanent, Propane



Sewer Collection System

Spencer, MA

PROJ NO: 13927 DATE: 3/2/2018

WRIGHT-PIERCE Engineering a Better Environment

FIGURE: 3-1

3.3 WASTEWATER TREATMENT PLANT

The 2003 Master Plan states that the Town of Spencer constructed its first wastewater treatment plant in 1897, which consisted of eleven sand filter beds off Main Street and South Spencer Road. The plant's primary treatment system was built in the 1940's, and the secondary system was built in 1970. The constructed wetlands for advanced treatment were built in 1988. Treated wastewater is discharged into the wetlands for settling before it empties into Cranberry Brook (a monitoring well is in place at each wetland although the WWTP is not required to monitor them). The plant's aeration system was updated in 1996. The wastewater treatment plant was privately operated until the Town took over its management in 1992.

Under the 2007 NPDES Permit (NPDES #MA0100919, the Town of Spencer's WWTP has a permitted design flow of 1.08 MGD. Wastewater flows into the treatment plant through a 24-inch diameter gravity sewer directly to the screening and grit removal facilities where it receives preliminary treatment to remove large solids and grit. Septage is also added at this point. Flow continues to the lime slurry tank where lime is added and mixed. Flow then continues to the screw pump lift station and is pumped to the aeration basins for biological treatment, including nitrification. Following aeration, the wastewater flows through a chemical feed manhole where alum is introduced, as needed, to enhance phosphorus removal and adjust pH, respectively. The biomass and chemicals are blended in a rapid-mix splitter box prior to flowing into the final clarifier. Settled solids (RAS) are returned to the aeration tanks. Excess sludge is removed as thickened waste sludge by a belt filter press. Clarifier effluent enters wetland beds for tertiary treatment and then is disinfected using ultraviolet radiation. The final effluent is aerated and replenished with dissolved oxygen (DO) as it flows down a cascade outfall to Cranberry Brook. **Figure 3-2** shows an aerial photo of the WWTP.

FIGURE 3-2

SPENCER WASTEWATER TREATMENT PLANT

Since 1987, there have been several minor upgrades at the WWTP, intended to meet increasingly stringent discharge limitations as part of the NPDES discharge permit renewals. The 2018 draft NPDES permit has been received and is currently being reviewed. The permit is discussed in further detail later in this section. Currently the treatment plant has an annual average influent flow of 0.75 mgd and incorporates the following treatment processes: pretreatment (screening and grit removal), aeration, secondary clarification, ultraviolet (UV) disinfection, chemical addition, and solids removal through gravity belt thickening.

As shown in **Figure 3-3**, the process flow schematic for the Spencer WWTP includes the general flow pattern and main treatment processes units as identified below:

- **Preliminary Treatment**
  - One manually cleaned coarse bar rack and one automatic fine bar screen
  - Aerated Grit tank with Pista Grit removal
  - Septage Receiving - Holding tank
  - Lime Slurry Tank
- **Influent Pump Station**
  - Two Screw Pumps

- **Primary Treatment**
    - None
- **Secondary Treatment**
    - Two Aeration Tanks that utilize fine bubble diffusers
    - Two secondary clarifiers
    - Rapid Mix tank that has been redesigned to include a blower for mixing
- **Disinfection/Reaeration**
    - One UV contact tank with two chambers
    - Reaeration steps in outfall to increase dissolved oxygen (DO) levels
- **Solids Handling**
    - A belt filter press is currently used to process sludge for disposal but is used as a gravity belt thickener
    - Sludge holding tank

Influent flow typically exceeds the effluent flow at the facility, indicating that a portion of the flow that enters the facility is being lost to groundwater and/or used in recycle, septage addition is captured by the influent flowmeter. The loss of flow is most likely occurring in the wetland treatment system through groundwater recharge. The loss of flow from the wetland system to groundwater has been as high as high 45 percent or 0.5 MGD (April 2005), while on average, the loss of flow to ground water has been approximately 0.2 MGD.

Occasionally, secondary treatment process bypass events occur at the facility when influent flows exceed the capacity of the screw pump lift station (5.48 MGD). Influent flows exceeding 5.48 MGD discharge to the wet weather pump station and are pumped to the last two constructed wetland beds for treatment. Bypassed flows mix with the fully treated flows prior to disinfection. For the bypass events, flow data from the facility indicate that instantaneous peak influent flows exceeding 5.48 MGD occur for only short periods of time during the day of the event. The volumes of the bypassed flow during these events have ranged between 1.2 and 6.7 percent of the total influent flow volume received at the WWTP on the day of that the bypass occurred. In all cases, the bypass events were caused by wet weather conditions that resulted in high I/I in the collection system.

Sludge Processing

Waste sludge from the secondary clarifiers is thickened by gravity to approximately 7% solids, and then pumped to the sludge holding tank for temporary storage. The sludge is then trucked to Woonsocket, Rhode Island for incineration by SYNAGRO.

Nutrient Removal

Phosphorus removal is accomplished by chemical precipitation using liquid alum. Alum is stored in a 6,000-gallon tank located in the solids building. The alum is injected into the process at the chemical manhole located after the aeration tanks and then mixed at the rapid mix/splitter box.

Nitrification is accomplished biologically in the aeration tanks. Lime is stored in a 2,000-cubic foot silo located outside the solids building. Lime is used for pH control to enhance nitrification, effluent pH adjustment, and to control septage odors. Lime slurry mix tanks are located inside the solids building where lime slurry is pumped to the aerated septage tank for process addition.

Constructed Wetlands

The wetland beds were originally constructed as sand filtration beds, but over time, vegetation had grown in the beds creating a wetlands type of environment. As part of the treatment plant upgrade completed in 1988, six of the beds, Bed C through Bed H, were converted into constructed wetlands by removing existing vegetation and the top layer of soil, and installing inlet and outlet structures, underdrains, six inches of top sand and wetland vegetation. Four different types of vegetation were planted for phosphorus removal. Bed D and Bed F were planted with cattails and wool grass, Bed C and Bed E with reed grass and Bed G and Bed H with reed canary grass. The wetland beds are utilized throughout the year.

Septage Treatment

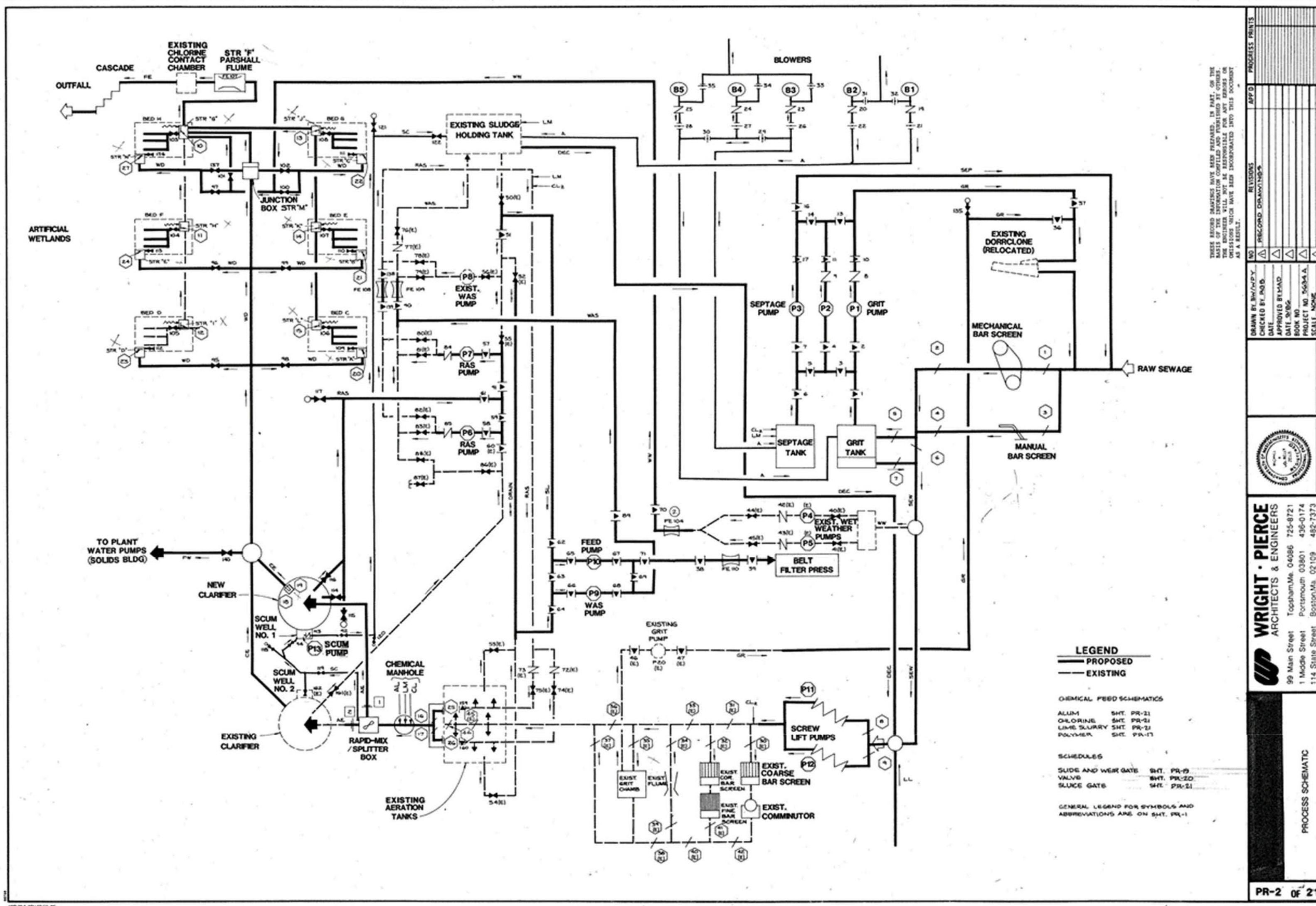
Septage facilities are located just outside the solids building. A receiving trough with a coarse bar screen empties into a 10,000-gallon aerated storage tank. Lime is added to control odors and for pH adjustment. Plant water is pumped at 20 gpm to dilute and feed the septage/lime mixture into the process through the septage tank overflow pipe that empties into the aerated grit tank.

Ultraviolet Radiation - Disinfection

Final effluent is disinfected using ultraviolet radiation. Effluent collected by the underdrain system in the wetland cells passes “through” ultraviolet lamps for disinfection prior to discharge to Cranberry Brook

FIGURE 3-3

WWTP PROCESS FLOW SCHEMATIC



3.3.1 Hydraulic and Loading Conditions

Wastewater influent flows and loads to the treatment facility were developed using operations and reporting data collected from January 2012 to November 2017 as presented in **Table 3-2**.

TABLE 3-2

CURRENT INFLUENT FLOWS AND LOADS

SPENCER WWTP (2012-2017)

PARAMETER	FLOW		BOD_5		TSS		NH_3-N		Total-P	
	mgd	P.F.	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
Annual Average	0.75	—	259	1,424	355	1,855	22	117	5.0	27.1
Maximum Month (BOD_5 Based)[1]	0.61	—	407	2,071	481	2,447	34	173	7.52	38
Peak Day	3.57	4.76	—	—	—	—	—	—	—	—

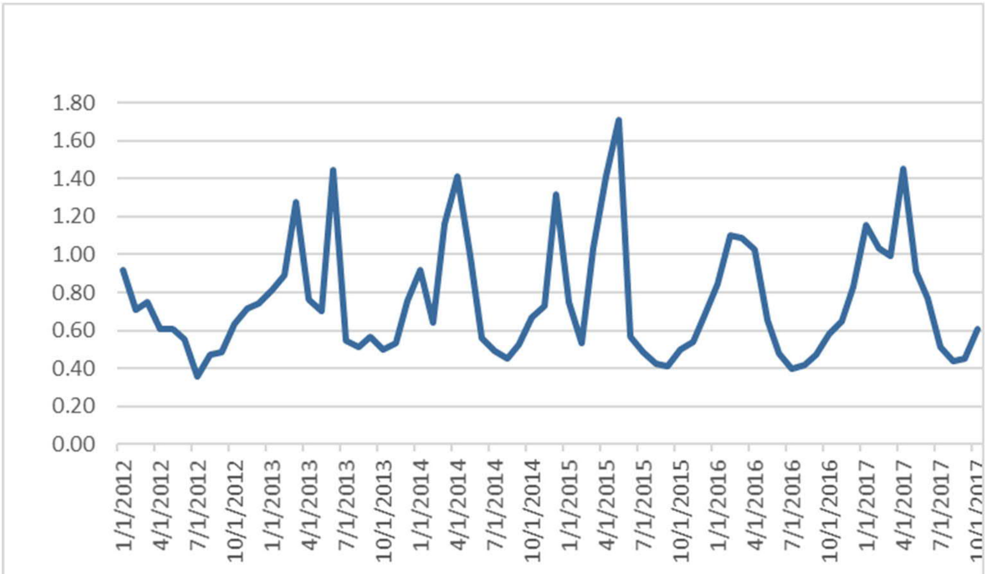
Notes:

1. The maximum month BOD_5 loading condition represents the maximum 30-day BOD_5 loading received at the WPCF. The associated flow rate, TSS loading, NH_3-N loading, and TP loading are the actual influent loads of each parameter that occurred concurrently with the historical 30-day maximum BOD_5 load. Thus, the values presented above for all parameters (except BOD_5) may or may not be the historical maximum 30-day influent loading condition for each parameter.

The Spencer WWTP currently treats an average daily flow of 0.75 MGD, or approximately 70% of the facility's permitted capacity. In addition, as shown in **Figure 3-4**, the average daily influent flow increased from 2012 to 2015, and then decreased from 2015 to 2016.

FIGURE 3-4

WWTP AVERAGE MONTHLY FLOW (MGD) (2012-2017)



3.3.2 WWTP Performance

The Spencer WWTP is currently permitted to discharge 1.08 mgd of flow to Cranberry Brook. **Table 3-4** summarizes the current permit limits for the Spencer WWTP. The permit is up for renewal and a draft permit was issued by EPA to the Town in February 2018. Stricter nutrient limits are included as part of the new permit, including a stricter TP limit. A complete copy of the draft NPDES permit is included in **Appendix E**.

The most recent WWTP data (2012 through 2017) was used in this CWMP for the evaluation of flows and loads in respect to the performance of the WWTP. Monthly data for the WWTP is presented in **Appendix F**. A summary of the 2012-2017 influent data is presented in Table 3-2 above. A summary of the 2012-2017 effluent data is presented in **Table 3-3**.

TABLE 3-3

CURRENT EFFLUENT FLOWS AND LOADS

SPENCER WWTP (2012-2017)

PARAMETER	FLOW	BOD_5		TSS		NH_3-N		Total-P	
	mgd	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
Annual Average	0.28	3.0	6.0	1.0	3.0	0.19	0.93	0.17	0.38

From 2012 through 2017, the influent BOD concentration at the WWTP has averaged 259 mg/l (1,424 lbs/day), while the effluent concentration averaged 3.0 mg/l (6.0 lbs/day). This equates to a 99 percent treatment efficiency for BOD removal.

Influent TSS concentrations have averaged 355 mg/l (1,855 lbs/day), while the effluent concentration averaged 1.0 mg/l (3.0 lbs/day). This equates to greater than 99 percent treatment efficiency for TSS removal.

Influent ammonia (NH3-N) concentrations have averaged 22 mg/l (117 lbs/day), while the effluent concentration averaged 0.19 mg/l (0.93 lbs/day). This equates to greater than 99 percent treatment efficiency for NH3 removal.

Influent total phosphorus concentrations have averaged 5.0 mg/l (27.1 lbs/day), while the effluent concentration averaged 0.17 mg/l (0.38 lbs/day). This equates to greater than 96 percent treatment efficiency for total phosphorus removal.

The Town has been operating the facility under their 2007 NPDES permit, which is shown in Table 3-4.

The Town is currently required to treat to a Total Phosphorus limit of 0.2 mg/L (May 1 to October 31) and 0.3 mg/L (November 1 to April 30). The Town is also required to treat Ammonia-Nitrogen to 0.56 mg/L (May 1 to October 31), 15.2 mg/L (November 1 to 30), and 8.5 mg/L (December 1 to April 30) and they are only required to report on Total Nitrogen.

The draft NPDES permit was recently issued by EPA and includes a stricter seasonal total phosphorous limit of 0.10 mg/L (May 1 to October 31) and 0.2 mg/L (November to April). For the

Town of Spencer to be able to comply with the stricter total phosphorus limits, the Town is currently planning to upgrade and construct a new tertiary treatment system along with other upgrades to the WWTP.

TABLE 3-4

NPDES PERMIT LIMITS (EXISTING, 2007)

Effluent Characteristic	**Units**	**Discharge Limitation**		
		Average Monthly	**Average Weekly**	**Maximum Daily**
Influent Flow	MGD	1.08	-	Report
Effluent Flow	MGD	Report	-	-
BOD_5				
May 1 to October 31	mg/L	5.6	7.5	Report
	lbs/day	50	68	Report
November 1 to April 30	mg/L	30	45	Report
	lbs/day	270	405	Report
TSS				
May 1 to October 31	mg/L	5.6	7.5	Report
	lbs/day	50	68	Report
November 1 to April 30	mg/L	30	45	Report
	lbs/day	270	405	Report
pH	S.U.	Not less than 6.5 mg/L nor greater than 8.3	Not less than 6.5 mg/L nor greater than 8.3	Not less than 6.5 mg/L nor greater than 8.3
Dissolved Oxygen	mg/L	Not less than 6.0 mg/L	Not less than 6.0 mg/L	-
Fecal Coliform	cfu/100 mL	200	-	400
Escherichia Coli Bacteria	cfu/100 mL	126	-	669
Ammonia – Nitrogen				
May 1 to October 31	mg/L	0.56	0.84	Report
	lbs/day	5	7.5	Report
November 1 to 30	mg/L	15.2	-	-
	lbs/day	136	-	-
December 1 to April 30	mg/L	8.5	-	-
	lbs/day	76	-	-
Total Nitrogen	mg/L	Report	-	-
	lbs/day	Report		
Total Phosphorous				
May 1 to October 31	mg/L	0.2	-	Report
	lbs/day	Report	-	Report
	lbs/day	0.79	-	-
November 1 to April 30	mg/L	0.3	1	Report
	lbs/day	Report	-	Report
	lbs/day	1.19	-	-
Copper	µg/L	10.3	-	15.3
LC_{50}	%	100%		
Chronic NOEC	%	92%		

3.3.3 WWTP's Proposed Improvements

EPA has issued a new draft NPDES permit that includes stricter nutrient limits (ammonia nitrogen and phosphorous). These limits, and aging equipment, form a basis for the improvements that are being planned to be undertaken at the WWTP. Proposed WWTP Upgrade/Improvements include, but are not limited to:

- Solids Handling Building & headworks roofing, electrical, lighting, mechanical and facility improvements.
- Sludge Thickening/Dewatering Upgrade
- Grit Pump and plant water equipment and piping improvements.
- Chemical handling, storage, piping and pumping system improvements/upgrades.
- New septage receiving station complete with receiving, fine screening, dewatering/compaction, septage pumping and waste sludge pumping.
- Control Building electrical, lighting, mechanical and facility improvements.
- RAS and WAS pump equipment and piping improvements.
- Aeration Basins structural and process (aeration piping modification, anoxic zone, mixing and recycle for P and TN removal) modifications.
- Solids Handling Building incoming service, switchgear, motor control systems & emergency generator upgrade.
- Remove/replace Influent Screw Pumps (installed in 1986) structure with new Influent Wet/Dry Well Pump Station with fine screen headworks, grit removal and chemical addition.
- Chemical Manhole chemical addition and piping improvements.
- Rapid Mix/Splitter Box mixing improvements.
- Clarification improvements by adding a second 60’ +/- diameter covered final clarifier.
- Construct tertiary treatment for P, TN, aluminum and copper removal.
- Relocate effluent flow meter & UV Chamber system & UV Building from Cranberry Brook to the end of Tertiary Treatment.
- Relocate effluent outfall from Cranberry Brook to Seven Mile River. Construct new outfall structure after UV system into the Seven Mile River.
- Abandon and repurpose wetland area berms, roadway and potentially wetland area for renewable energy solar array project.

3.4 ONSITE SUBSURFACE WASTEWATER DISPOSAL SYSTEMS

The total acreage for the Town of Spencer is approximately 21,800 acres. Approximately 1,300 acres, or 6 percent, of the total land area is sewered leaving the remaining 94 percent to be serviced by onsite Title 5 wastewater disposal systems. The majority of the sewered area is located in the downtown portion of Spencer.

The Spencer Board of Health is responsible for enforcing Massachusetts General Laws, State Environmental and Sanitary Codes, Town Ordinances and Regulations. Further, the Board of Health has the primary responsibility of protecting and improving the public health and well-being of the Spencer Community. The Board of Health maintains all records of Title 5 system construction, repair, and inspections.

Regulations such as Title 5 have been used to institute standards for design, construction and operations of septic tanks.

As stated in MassDEP's 310 CMR 15, the purpose of Title 5 provisions are *intended to provide safe, efficient, and economical means of collecting, transporting and disposing of septage. Title 5 also maintains an affiliation with the Environmental Protection regulations which determine the siting constraints within which wastewater handling systems may be installed.*

Parameters that must be considered for inclusion in elevation criteria include: soil classification, structure, texture, depth, drainage and permeability, ground and surface water location and season high elevation, geology, topography and climate. Each of these factors plays a role in the proper treatment of effluent from a septic system, and if not considered appropriately, can contribute to improper or incomplete treatment. Additionally, the hydraulic conductivity and the hydraulic gradient at the disposal site should be appropriately assessed to determine whether the site is capable of transmitting the volume of water that will be discharged from the system.

According to 310 CMR 15.03 (7), *Title 5 regulations currently require that in siting septic tanks, leaching structures, and the other appurtenances associated with a septic tank/soil absorption system, certain minimum horizontal separation distances must be maintained.*

Setbacks distances refer to the horizontal or lateral distance between the various components of the septic tank/soil absorption system and areas, or items of concern. Generally, the specified separation distances are intended to provide adequate transport time for the passage of the effluent through the soil where the concentrations of contaminants are expected to be reduced by filtration, straining, physical-chemical processes, biological activity and dilution and dispersion.

Setbacks from surface water bodies are generally considered necessary to reduce the risk of contamination by pathogenic micro-organisms and the harmful eutrophication effects instilled by the introduction of high concentrations of nitrates and phosphates. The only conventional means of protecting surface water bodies is through designs which promote proper treatment in the unsaturated zone and the maintenance of low septic system densities which allow for adequate dilution.

The majority of states use a distance of 100 feet for private wells and between 100 to 200 feet for public wells.

A Zone II is a wellhead protection area that has been determined by hydro-geologic modeling and approved by the Department of Environmental Protection's (DEP) Drinking Water Program (DWP). Zone II was developed for predicting future nitrate loading under steady state conditions in zones of contribution to water supplies. The Drinking Water Regulations require Wellhead Protection By-Laws to prohibit the use of individual sewage disposal systems which discharge more than 440 gallons per acre.

If a septic system is not properly maintained, failures that impact the homeowner and environment may occur. Failed septic systems can lead to sewage back-up in one's home, groundwater contamination and/or private well contamination and wastewater surfacing onto their property. In terms of the public's wellbeing, a failed septic system can lead to water supply contamination and impacts on surrounding water bodies, which may include, algae blooms, dead fish and closing of public swim areas (beaches, lakes etc.).

Education and public relations is an important aspect of septic system management; when the public is aware of the environmental consequences, they can help prevent ground water contamination and understand the proper siting, design, installation and maintenance of septic systems.

Signs that a septic system may be failing include:

- Sewage surfacing over the drainfield (especially during wet weather events)
- Sewage back-up
- Algae growth over the drainfield
- Slow draining toilets or drains, and
- Sewage odors in and around the household.

Historical failures of Title 5 septic systems in the Town of Spencer can be found in Appendix D.

3.5 EXISTING INTERMUNICIPAL AGREEMENTS

The Town of Spencer does not have any Intermunicipal Agreements.

3.6 SEWER USE REGULATIONS

As with many communities, Spencer has a variety of local bylaws, regulations, and policies designed to control wastewater disposal to the ground and to the Town's wastewater system. The following departments and/or regulatory mechanisms specific to wastewater disposal were identified, and are discussed further below:

- Board of Health Regulations and Procedures
- Sewer Connection and Extension Policy
- Sewer Use Regulation

3.6.1 Board of Health Regulations and Procedures

The Board of Health in Spencer is responsible for regulating all on-site disposal systems in Town. They utilize the DEP, State Environmental Code (Title 5, 310 CMR 15.00), along with related sections of the regulations exclusively to regulate disposal systems. The State regulations outline general provisions and enforcement; siting of systems; design, construction, repair, and replacement; inspection and maintenance; procedures for local upgrade approvals and variances; and transportation and disposal of septage.

Only haulers approved by the Board of Health are permitted to perform septic tank pumping in Spencer. Pumping records for tanks located within Spencer are submitted to the Board of Health as required by Title 5 regulations. Pumping records are reviewed and sent to the WWTP to be filed.

3.6.2 Sewer Extension and Connection Policy

The Sewer Commissioners established a Sewer Connection and Extension Policy in 1992.

The sewer extension policy allows for additional connections to the sewer system within the sewer service area, providing that the property has access to an existing sewer line and meets the other requirements stated in the policy. Specifically, the developer must comply with the following:

- A permit must be obtained from Superintendent of Sewers before any person may connect to the Town sewer line
- The fee for such a permit shall be set by the Sewer Commissioners.
- All connections to the Town sewers shall be inspected by the Superintendent of Sewers before connections are covered over
- All fees collected by the Superintendent of Sewers shall be remitted to the Town Treasurer.

Sewer connections and additions will be charged $5.00 per gallon of design flow based on Massachusetts 310 CMR 15.203.

A sewer bank fee of $4.00 multiplied by 4 ($16.00) per gallon of design flow based on Massachusetts 310 CMR 15.203 will be charged for all new flow to the sewer system to assist in the removal of infiltration and inflow.

3.6.3 Sewer Use Regulations

Properties which are connected to the Town of Spencer's wastewater collection system are governed by the Town's sewer regulations. The regulations were adopted as "Regulation of

Sewer" at the November 17, 1982 Annual Town Meeting. The objective of these sewer regulations is:

- To prevent the introduction of pollutants into the municipal wastewater system, which will interfere with the operation of the WWTP.
- To prevent the introduction of pollutants into the municipal wastewater system, which will pass through the system inadequately treated, into receiving waters or atmosphere or otherwise be incompatible with the system.

The Sewer Department is responsible for administrating the provisions outlined in the Sewer Regulations.

3.7 INFILTRATION/INFLOW

Wright-Pierce completed an Infiltration/Inflow (I/I) study for the Town in 1990 that made a number of recommendations to reduce I/I. Since that time the Town has completed the following I/I projects:

- 1987 PL 92-500 funded SS Rehabilitation/Construction Project based on 1981 SSES.
- 1990 conducted follow up Spencer Sewer System I/I Study.
- 1991 developed Sewer Bank to provide for repairs of sewer system with known I/I.
- 2000 thru 2006 evaluated/modeled major sewer truck line through Spencer for existing and future development capacity and I/I.
- 2006 recommended existing Spencer sewer manhole & sewer line improvements.
- Televise Spencer Street and cross-country sewers with known I/I issues.
- 2006 evaluated/modeled existing Bixby Estates private sewer system and deficiency letter. Repair work completed by Contractor.
- 2008 Maple Street (Rte 31) Smoke Testing & Sewer Manhole Inspection from Manhole H-22 at Main (Rte 9) & Maple (Rte 31) Street to Manhole G-5 by school on Maple Street.
- 2009 conducted Maple Street sewer lining improvements and replaced Manholes G-5 thru G-1, G-1A, F-3A, F-3 thru F-1, H-1, H-2 & H-22.
- 2010 WWTP Wet Weather Pump Upgrade – Provided for a more effective/environmentally sound processing of pumped wet weather flows through the WWTP process than the blending

of wet weather flows with treated effluent within the last two wetland beds as approved and installed as part of the 1987 Upgrade.

- 2011 replaced Water Street Manholes B-14A, B-15A and E-15 and 280' of 18" line from B-14 thru B14A, B-15A, B-15 to B-55.
- 2015 Meadow Road Pump Station Replacement – Provided for the removal/replacement of a 1971 constructed dry well/wet well below ground pump station with an above ground self-priming pump station and enlarged wet well to contain & pump wet weather flows.
- 2015 replaced Mechanic Street manholes, sewer line and service connections.
- 2017 Route 9 SMH replacement E-13, E-14, E-14A, E-14B, E-15, E-16 and E-17; SMHs frame/cover replacement E-25, E-15B and E-15A; new SMH E-13A with 6" sewer to SMH E-13; replace between E-14 and E-14A 15" sewer line with 26' of PVC; relay 223' of 8' sewer between E-15A and E-15B; and install 92' of new 6" PVC service line.

During the spring and winter of 2017 and the spring of 2018, the Town of Spencer is performing a I/I Analysis with the installation of flow meters and will submit an I/I Control Plan to MassDEP by the end of 2018. Twelve flow meters have been installed throughout all sub-areas of the collection system.

3.8 PLANS FOR SEWER EXPANSION

The Town of Spencer currently has no planned sewer expansions.

4

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SECTION 4

EXISTING WATER SUPPLY, TREATMENT, AND DISTRIBUTION SYSTEMS

The information provided in this section describes the Town of Spencer’s water supply system, along with physical infrastructure components of the water system. Water system information has been obtained through previous reports and studies along with data provided by the Town. The italicized excerpts below are from the Capital Efficiency Plan Update report of 2015, completed by Tata and Howard.

4.1 INTRODUCTION

The Town of Spencer lies within the Chicopee River and French River Watersheds. The Town’s active water supply sources are the Meadow Road Well and the Cranberry Brook Well. The Meadow Road Well is the Town’s primary source for meeting system demands. There is an emergency backup supply in Leicester from Shaw Pond.

4.2 PUBLIC WATER SUPPLY SYSTEM

4.2.1 Public Groundwater Supply Sources

The town's water supply is derived solely from groundwater sources. The town owns and operates 2 groundwater wells; both gravel-packed. **Figure 4-1** is a map of the Spencer water system showing the location of the Town’s wells, storage tanks, and water mains.

Meadow Road Well

The Meadow Road Well is located west of Old Meadow Brook Road adjacent to the Water Department headquarters. The well has an approved daily pumping volume of 1.74 million gallons per day (mgd). The well is constructed to a depth of 72 feet below ground surface (bgs) with 15 feet of screen.

Cranberry Brook Well

The Cranberry Brook Well is located east of South Spencer Road. This is a gravel pack well, with an approved daily pumping volume of 1.15 mgd. The well has a 20-foot-long screen and is constructed to a depth of 66 feet. The well is used minimally, due to its location relative to a landfill on South Spencer Road.

Shaw Pond

Shaw Pond, located off Watson Street in Leicester, is currently inactive. The safe yield of this source is 0.3 mg. In the event of an emergency, Shaw Pond may be activated and used as a supply source, with Massachusetts Department of Environmental Protection's (MassDEP) approval.

4.2.2 Public Water Distribution System

The Spencer water distribution system consists of approximately 34 miles of water mains ranging in size from two to sixteen inches in diameter. Approximately six percent of the system is 16-inch diameter pipe, approximately one percent is 14-inch diameter pipe, approximately 23 percent is 12-inch diameter pipe, approximately six percent is 10-inch diameter pipe, approximately 50 percent is 8-inch diameter pipe, approximately 13 percent is 6-inch diameter pipe, and approximately one percent of the system is 4-inch diameter pipe or less.

These mains are constructed of various materials including ductile iron, cast iron, cement lined cast iron, Universal, asbestos concrete (AC), galvanized steel and polyvinyl chloride (PVC). The system is made of approximately 52 percent cement lined ductile iron water main installed after 1972; approximately 15 percent is factory cement lined cast iron installed between 1958 and 1973; and approximately seven percent is unlined cast iron installed between 1901 and 1957. Approximately 25 percent of the distribution system is Universal water main installed between 1917 and 1965. The remaining two percent consists of AC, galvanized steel and PVC pipe. The existing system has two active supply sources, and two water storage facilities.

The Town completed the Two Zone Pressure System Project in June of 2011 dividing the system into the East Service Area and the West Service Area. The hydraulic gradeline elevation in the

East Service Area is based on the water level in the Moose Hill Tank. The hydraulic gradeline elevation in the West Service Area is based on the overflow elevation of the Highland Street Tank.

Since the completion of the Capital Efficiency Plan (CEP) in March of 2011, the Town has completed several improvements to the water distribution system. In 2012, a new 12-inch diameter ductile iron water main was installed along Pleasant Street from High Street to Valley View Drive and a new 12-inch diameter ductile iron water main was installed along Meadow Road from Old Farm Road to Bay Path Road. In 2013, a new 8-inch diameter ductile iron main was installed along the entire length of Langevin Street and a new 4-inch diameter ductile iron water main was installed along Pleasant View Drive from Langevin Street to approximately 150 feet south of Langevin Street. In 2014, new 8-inch diameter ductile iron mains were installed along Craig Road and Grant Street and along Chestnut Street, from Maple Street to Temple Street. In 2015, a new 8-inch diameter ductile iron main was installed along Chestnut Street from Elm Street to Early Street.

The town has one boost pump station. The Highland Street Booster Pump Station was completed as part of the Two Zone Pressure System Project. The booster pump serves the Eastern Service Area. The booster pump station has two 40 hp pumps, with a design flow of 600 gallons per minute (gpm) at 165 feet of head. This booster pump station pumps water from the lower gradient Western Service Area to the Moose Hill Tank.

The town has two storage tanks. The Moose Hill Tank is located in the eastern portion of the distribution system south of the David Prouty High School. It has a capacity of 1.5 mg and an overflow elevation of 1,120 feet United States Geological Survey (USGS). The concrete tank is 70 feet in diameter, 52 feet in height, and is connected to the distribution system by a 12-inch diameter water main and a 14-inch diameter water main in series. The tank is currently operated at an elevation of 1,090 feet USGS in an effort to minimize high system pressures, while maintaining a minimum pressure of approximately 30 pounds per square inch (psi) at the highest areas currently served in the distribution system. A second storage tank, located off Highland Street, was constructed as part of the Two Zone Pressure System Project. The new tank is a partially buried, dual chambered, cast-in-place concrete storage tank with a total capacity of 500,000 gallons. The *overflow elevation is 957.5 feet USGS. The Moose Hill Tank serves the Eastern Service Area and the Highland Street Tank serves the Western Service Area.*

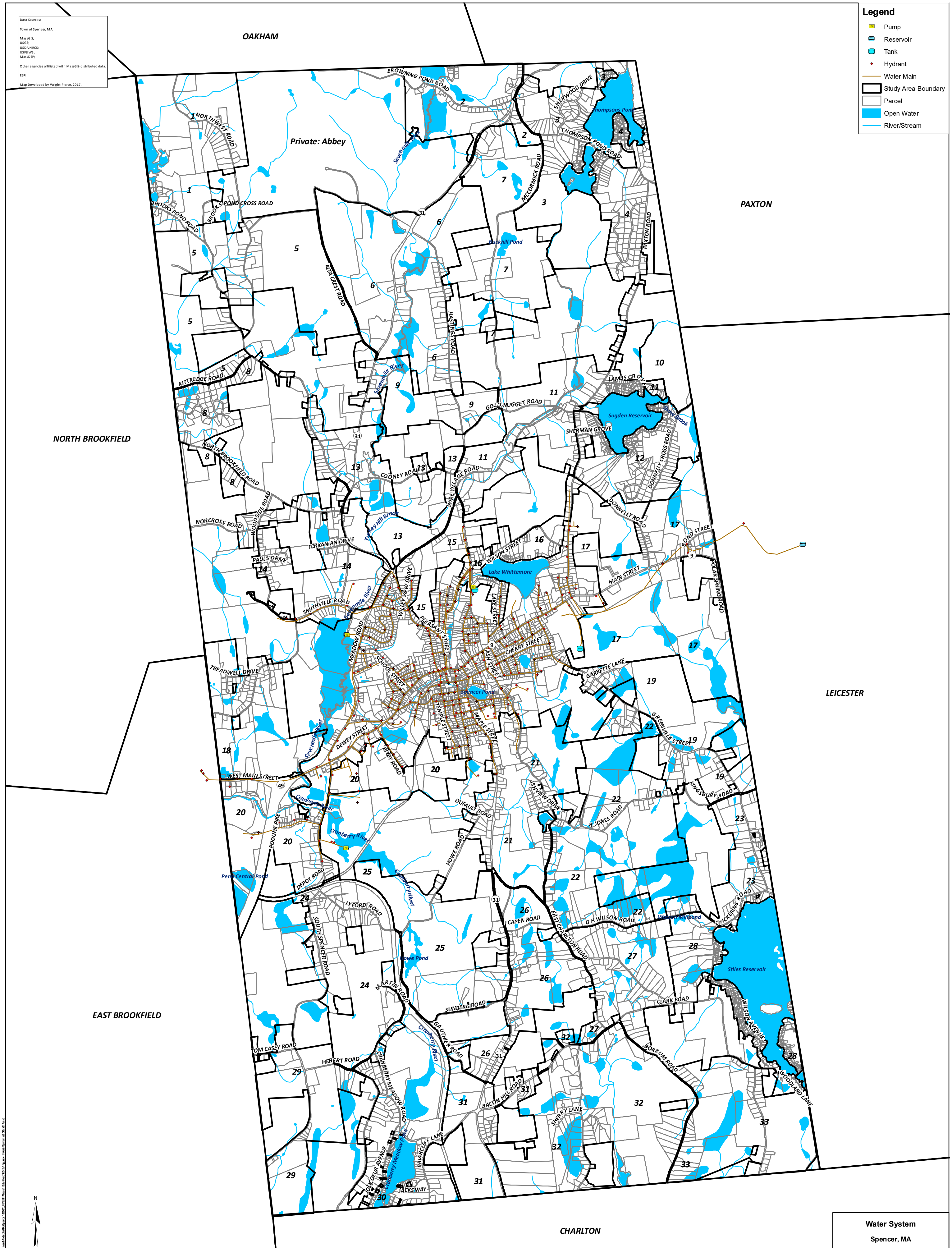
4.2.3 Public Water Treatment Facilities

In general, the water quality of the groundwater in Spencer is good. At the Meadow Road Well Treatment Facility, a green sand rapid sand filtration treatment system is used for iron and manganese removal with sodium hydroxide addition for pH control, sodium hypochlorite for disinfection, and potassium permanganate for oxidation. The Cranberry Brook Well does not have a treatment facility, but adds sodium hydroxide and sodium hypochlorite. Refer to **Table 4-1** for the water system supply sources.

TABLE 4-1

WATER SYSTEM SUPPLY SOURCES

Source Name	DEP Source ID#	Year Constructed	Location
Meadow Road Well	228000002G	1995	Old Meadow Brook Road
Cranberry Brook Well	228000001G	1980	South Spencer Road
Shaw Pond	228000001S	1883	Watson Street, Leicester



Water System

Spencer, MA

PROJ NO: 13927 DATE: 3/2/2018 FIGURE: 4-1

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4.3 WATER USE DEMAND

Under the authority of the DEP-Bureau of Resource Protection, Public Water System Operators are required to submit an Annual Statistical Report on the operation of their water supply system. These annual reports allow the DEP to determine if the authorized withdrawals regulated under the town's Water Management Act (WMA) permit are being exceeded. These reports include the volume of water being withdrawn from each source, the population served, and the number and type of service connections in the distribution system. This information is a critical component in the determination of existing conditions and historical trends, and is a useful tool for developing future conditions.

A review of Spencer's Annual Statistical Reports was conducted for the years 2012 through 2016 to determine how the historical operation of Spencer's municipal wells compared to the registered and permitted average day and total annual volumes. From 2012 through 2016, the town's allowable average day and total annual values under the WMA were 0.97 MGD and 354.05 million gallons per year (MGY), respectively. The analysis showed that Spencer did not exceed either the allowable average day or total annual volumes at any time between the years 2012-2016. Therefore, Spencer has been operating within the parameters of the WMA registered/permitted capacities since the WMA became effective. The historical water usage for the Town is shown in **Table 4-2**.

TABLE 4-2
HISTORICAL WATER USAGE

Year	Average Day Demand (MGD)	Maximum Monthly Demand (MGD)	Total Production (MGY)
2012	0.49	0.63	180.6
2013	0.42	0.46	177.84
2014	0.42	0.46	175.17
2015	0.45	0.52	171.23
2016	0.44	0.50	167.01

Source: Town of Spencer Annual Water Quality Reports 2012-2016

4.4 WATER CONSUMPTION

As of 2016, there were an estimated 1,794 individual customer (metered) accounts. The total number of customer accounts has not increased per year from 2012 to 2016 as demonstrated in **Table 4-3**.

TABLE 4-3

WATER CUSTOMER ACCOUNTS

Year	Total Number of Customer Accounts	Differential in Customer Accounts (+)
2012	1793	0
2013	1794	1
2014	1793	-1
2015	1788	-5
2016	1794	6
TOTAL	-	1

Source: Town of Spencer Annual Water Quality Reports 2012-2016.

4.5 FUTURE WATER SUPPLY SITES

The Town has reviewed a variety of potential future sites for groundwater wells and there are currently no future well sites being considered.

4.6 WATER CONSERVATION EFFORTS

As part of ongoing water conservation efforts, the Town of Spencer's Water Department has taken several steps to conserve water; including a leak detection program, reduction in unaccounted water, posting water saving tips in the Town Annual Water Quality Reports, and enforcing a water ban during the summer months, which limits water use during the day for activities such as washing the car or watering the lawn.

There has also been an emphasis from conservation organizations in recent years to retro-fit plumbing in bathrooms with newer more efficient fixtures, toilets, and showerheads. Along with newer fixtures, better practice in personal hygiene, including using less water when brushing, bathing, and showering will ultimately help to conserve water use. Residents are also encouraged to use these principles when doing laundry by only washing full loads, and replacing older machines with newer more energy-efficient models.

For tips and information on this topic, the following is a partial list of organizations and agencies that promote educational awareness in the conservation of clean drinking water:

- MWRA - Massachusetts Water Resource Authority (*www.mwra.state.ma.us/water*/)
- AWWA - American Water Works Association (*www.waterwiser.org*/)
- EPA's EnergyStar Program - (*www.energystar.gov*)
- DEP Model Water Use Restriction Bylaw Ordinance (*www.state.ma.us/dep/brp/*)

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5

SECTION 5

NEEDS ASSESSMENT

5.1 INTRODUCTION AND APPROACH

As previously presented in this report, approximately forty percent of Spencer residents rely upon the Town's collection system to collect, transport, treat and dispose of its wastewater at the WWTP. The remaining residents, which reside outside of the municipal sewer areas, rely upon onsite Title 5 wastewater disposal systems. If operated under the right conditions, Title 5 systems can provide a cost-effective solution for reliable wastewater treatment and disposal. Those favorable conditions include ideal soils, adequate depth to groundwater, sufficient depth to bedrock, and spatial lot sizes.

Under this phase of the CWMP, a Town-wide needs assessment was conducted for the non-sewered areas to evaluate whether or not conventional, on-site septic systems can provide adequate treatment for sanitation and environmental protection now and through the 20 year planning period. The non-sewered areas were divided into 33 study areas based on location and various physical and environmental criteria. Each study area was assessed using a two tiered system. For Tier 1, each parcel of land within the study area was examined for soil/drainage conditions, on-site private water systems, depth to groundwater, depth to bedrock, and lot size. In the Tier 2 analysis, other criteria, such as existing Title 5 information and zoning restrictions, were used to supplement the Tier 1 analysis. After the two tiered analysis was completed, specific "needs areas" were identified. A more detailed discussion of the methodology used to rank the study areas is presented in the following sections.

5.2 DETERMINATION OF STUDY AREA BOUNDARIES

As shown in **Figure 5-1**, a total of 33 study areas were created and analyzed as part of this CWMP. The study areas are all located in non-sewered areas located outside of the Town's existing sanitary sewer collection system. The boundaries for each of the study areas are based on a number of criteria and environmental conditions. Protected open space parcels and other non-developable parcels (including the Abbey, Chapter 61, 61A and 61B lands) were removed from the development of study areas. Study areas were also developed based on surrounding physical characteristics such as location of streets, lot sizes, topography, surface water, watersheds or other visual observations made while visiting the areas. A summary of the study areas' number of parcels and area is shown below in **Table 5-1.**

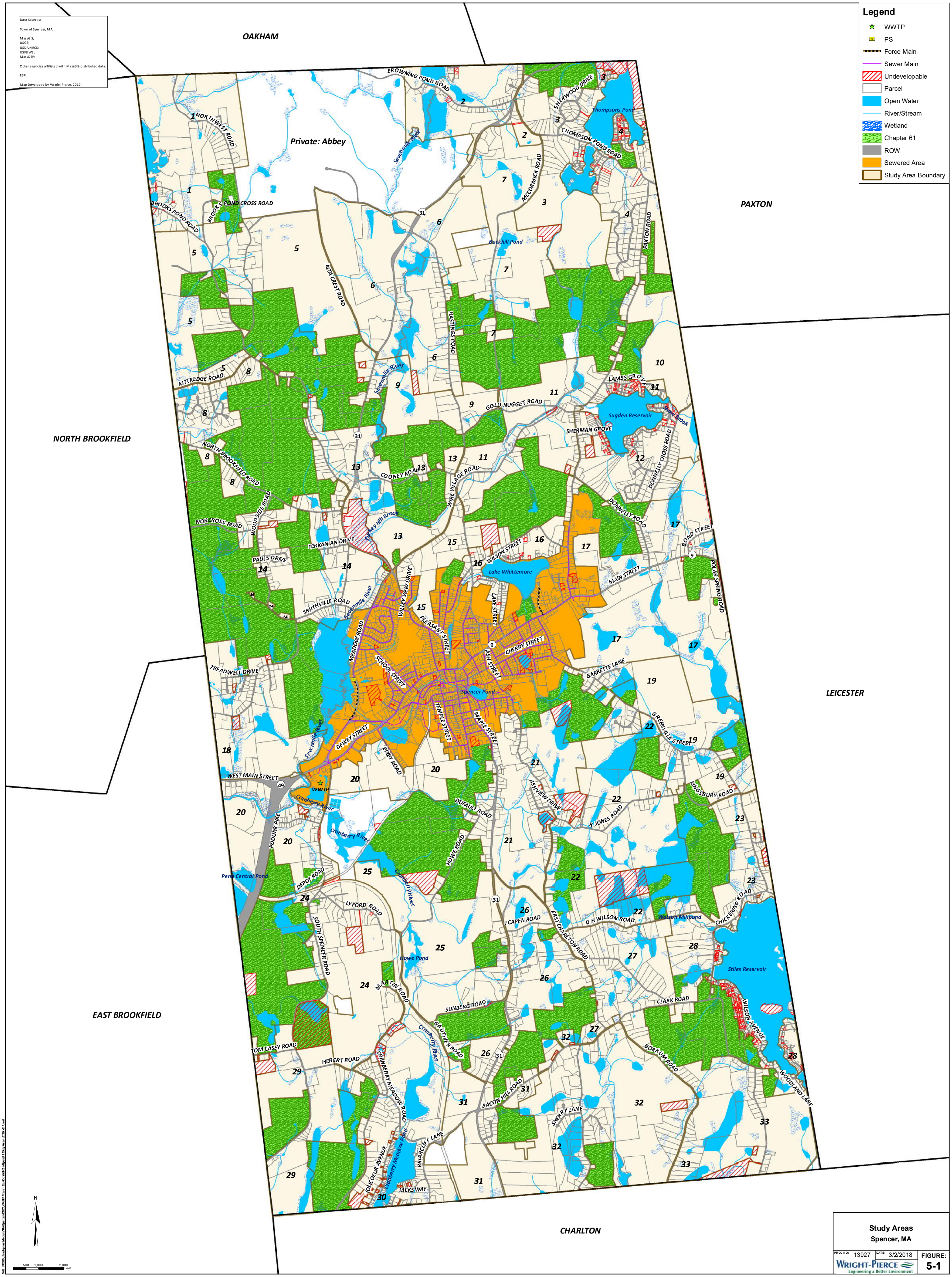
Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
WWTP
PS
Force Main
Sewer Main
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Chapter 61
ROW
Sewered Area
Study Area Boundary
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Watson Millpond
Howe Pond
Pena Central Pond
Sevenmile River
Cranberry River
Turkey Hill Brook
BROWNING POND ROAD
NORTHWEST ROAD
SHERWOOD DRIVE
THOMPSON POND ROAD
MCCORMICK ROAD
BROOKS POND ROAD
BROOKS POND CROSS ROAD
PAXTON ROAD
ALTA CREST ROAD
HASTINGS ROAD
KITTREDGE ROAD
GOLD NUGGET ROAD
LAMBS GROVE
SHERMAN GROVE
DONNELLY CROSS ROAD
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
WOODSIDE ROAD
NORCROSS ROAD
TERKANIAN DRIVE
DONNELLY ROAD
BOND STREET
WILSON STREET
PAULS DRIVE
SMITHVILLE ROAD
VALLEY VIEW DRIVE
MAIN STREET
POLAR SPRING ROAD
LAKE STREET
MEADOW ROAD
PLEASANT STREET
CHERRY STREET
SCHOOL STREET
ASH STREET
TREADWELL DRIVE
GARRETTE LANE
TEMPLE STREET
MAPLE STREET
DEWEY STREET
GREENVILLE STREET
BIXBY ROAD
WEST MAIN STREET
WWTP
ASHVIEW DRIVE
KINGSBURY ROAD
DUFAULT ROAD
R JONES ROAD
PODUNK PIKE
HOWE ROAD
DEPOT ROAD
LYFORD ROAD
CHICKERING ROAD
CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
SOUTH SPENCER ROAD
MARTIN ROAD
CLARK ROAD
SUNBERG ROAD
WILSON AVENUE
GAUTHIER ROAD
TOM CASEY ROAD
HEBERT ROAD
CRANBERRY MEADOW ROAD
BORKUM ROAD
WOODLAND LANE
BACON HILL ROAD
SHERRY LANE
BRIARCLIFF LANE
OLDCOEUR AVENUE
JACKS WAY
N
0 500 1,000 2,000 Feet
Study Areas
Spencer, MA
PROJ NO: 13927
DATE: 3/2/2018
FIGURE: 5-1
WRIGHT-PIERCE
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TABLE 5-1

STUDY AREAS SUMMARY

Study Area	Number of Parcels	Area (acres)
1 – Brooks Pond	72	486
2 – Browning Pond Road	66	291
3 – Thompson Pond, west	124	387
4 – Thompson Pond, east	230	268
5 – Alta Crest Road	49	669
6 – Hastings Road	64	725
7 – Buckhill Pond	26	449
8 – Deer Run Road	76	175
9 – Gold Nugget Road	25	224
10 – Sugden Reservoir, northeast	7	171
11 – Wire Village Road and Sugden Reservoir, north and west	190	423
12 – Sugden Reservoir, south and east	250	280
13 – Cooney Road	73	325
14 – Woodside Road	124	366
15 – High Ridge Road	31	135
16 – Lake Whittemore	143	138
17 – East Main Street	71	774
18 – Route 9 and 49 Intersection, north	74	362
19 – Greenville Street	85	432
20 – Route 49	85	480
21 – Ash Street	121	451
22 – R Jones Road	80	649
23 – Stiles Reservoir, north	73	180
24 – Lyford Road	76	473
25 – Howe Pond	27	471
26 – Charlton Road (Route 31)	72	311
27 – Marble Road	91	326
28 – Stiles Reservoir, west	375	217
29 – South Spencer Road	28	341
30 – Cranberry Meadow Pond	173	485
31 – Bacon Hill Road	41	273
32 – East Charlton Road	93	736
33 – Buteau Road	60	459

5.3 NEEDS RATING METHODOLOGY

The needs assessment rating methodology focused on avoiding sanitary problems, protecting the Town’s drinking water supplies, reducing nutrients to surface waters, and maintaining community character. Each of these study areas was evaluated using a two-tiered approach to assess the wastewater needs for that study area. Each study area received a score based on the analysis criteria. Then, all study areas were ranked based on the scores. The highest scoring study areas (>28) became "needs areas", which will be further reviewed as part of Phase 2 - Alternatives Identification and Screening for the CWMP. Depending on several evaluative criteria, a "needs area" may or may not be well suited to utilize a conventional, onsite Title 5 septic system to provide adequate means of treatment and environmental protection throughout the 20-year planning period. During CWMP Phases 2 and 3, specific recommendations for each "needs area" will take into account the appropriateness of utilizing septage management plans, nutrient (i.e. nitrogen and phosphorus) management plans, innovate/alternative (I/A) systems, communal systems, decentralized collection and treatment facilities, and connection to the Town's existing sewer collection system and WWTP. After meeting with the Spencer Sewer Commission, an additional area (Study Area 15), was added for further analysis in the Phase 2 and Phase 3 CWMP, because of the potential for future development and proximity to the existing collection system.

5.3.1 Tier 1

For the Tier 1 assessment, each study area was evaluated based on a study-area-wide approach. This assessment was derived from the data received from various stakeholders, including the Town of Spencer's Departments of Water, Sewer, Health, Planning, and Assessors' Office, and Massachusetts Geographical Information System (MassGIS), and the Natural Resources Conservation Services (NRCS). Under the Tier 1 evaluation, the evaluative criteria were established as either primary criteria or secondary criteria, as summarized below:

Primary Criteria (Ranking 0 to 10)	**Secondary Criteria (Ranking 0 to 5)**
• Soil Type / Drainage Class	• Drinking Water Protection Districts
• Depth to High Groundwater Elevation	• Surface Water Protection - Areas with Regulated Setbacks (Title 5 restrictions)
• Depth to Bedrock	• Flood Plains
• Lot Sizes	• Priority/ Estimated Habitat Areas
• Private Wells	• Historic Districts

Each of the above listed primary criteria were ranked from 0 to 10. A score of "0" represents that a criterion had no negative impact, while a score of "10" means that the criterion had the most negative impact. To differentiate the importance of primary criteria from secondary criteria, the scoring for the secondary criteria ranged only from 0 to 5 points. The maximum number of points that a study area could receive was 75 points. After all of the study areas were analyzed and each study area received its total score, the study areas were placed into prioritized needs categories as discussed later on in this section.

The following sections provide a detailed discussion for each of the primary and secondary evaluative criteria and their scoring systems.

5.3.2 Primary Criteria

There were five primary criteria conditions that were analyzed as part of the Tier 1 evaluation to determine if the parcel's onsite septic system would remain a viable option for wastewater disposal over the 20-year planning period. A brief discussion of each one of those evaluative criteria is presented in the following paragraphs.

5.3.2.1 Soil Type / Drainage Class

Each of the study areas were evaluated based on its soil drainage qualities. Soil classifications were determined using NRCS data. Each soil type in the Town of Spencer was classified using NRCS drainage categories. Drainage classes are described and each term is defined in Appendix L.

It is noted that the NRCS data considers soils classified as excessively drained as a severe soil type. These gravelly soils are often noted to have 'fast percs' of less than 2 minutes per inch (mpi). Title 5 does allow septic systems to be constructed under these conditions, but it must have a 5-foot separation to groundwater. Only a 4-foot separation to groundwater is required for perc rates above 2 mpi. The soil drainage class ranking system is included in **Table 5-2**. **Figure 5-2** shows the Soil Type / Drainage class.

TABLE 5-2

SOIL DRAINAGE CLASS RANKING SYSTEM

Soils/Drainage Class	Score
Very Poorly Drained	10
Excessively Drained	8
Poorly Drained	6
Somewhat Excessively Drained	4
Moderately Well Drained	2
Well Drained	0

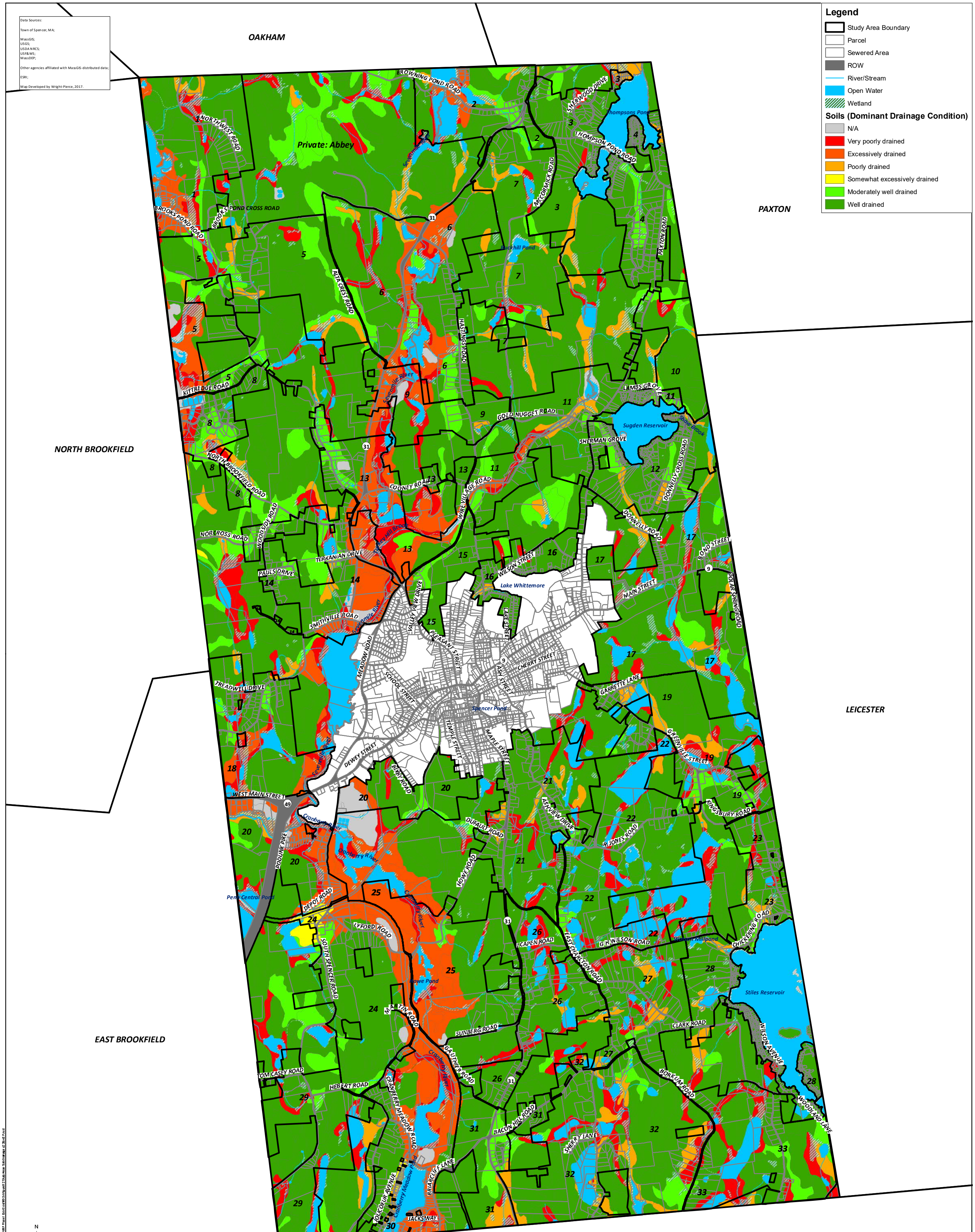
5.3.2.2 Depth to High Groundwater Elevation

An estimate of the annual maximum high groundwater elevation was determined from the best available information obtained from NCRS. The State's Title 5 regulations mandate particular requirements for on-site wastewater disposal systems in regard to groundwater elevation. Specifically, these regulations require a minimum vertical separation distance from the bottom of the on-site wastewater disposal system to the top of the seasonal high groundwater elevation of 4 feet in soils where the percolation rate is greater than 2 mpi and 5 feet in soils where the percolation rate is less than or equal to 2 mpi. The ranking system for the depth to water table is included in **Table 5-3** below. **Figure 5-3** shows the High Groundwater elevation map.

TABLE 5-3

DEPTH TO HIGH WATER TABLE RANKING SYSTEM

Depth to High Groundwater Elevation	Score
Less than 4 feet	10
4 - 6 feet	5
Greater than 6 feet	0



Soils Drainage

Spencer, MA

PROJ NO: 13927 | DATE: 3/5/2018 | FIGURE: **5-2**

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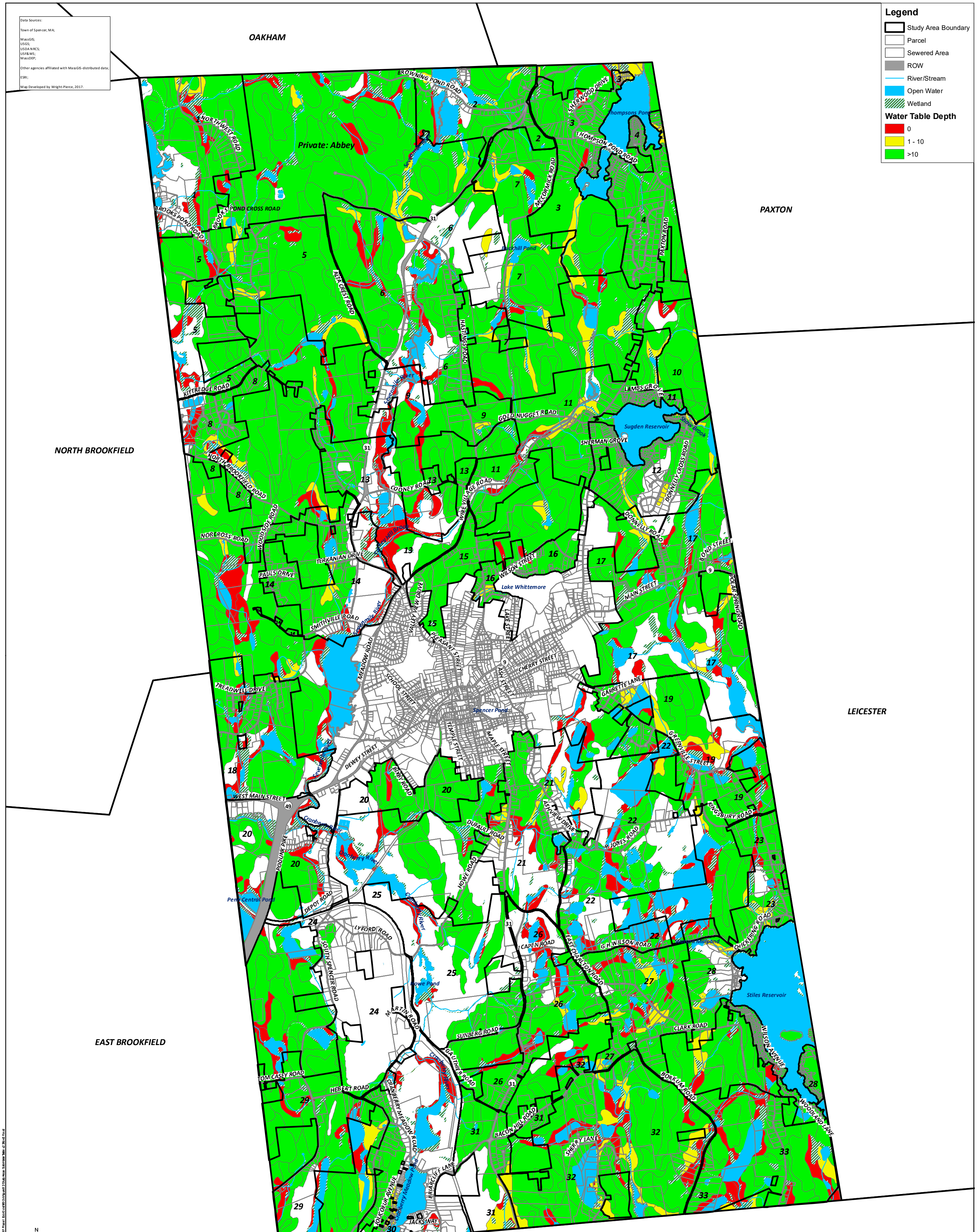

Water Table Depth

Spencer, MA

PROJ NO: 13927 DATE: 3/2/2018

FIGURE: 5-3

Wright-Pierce
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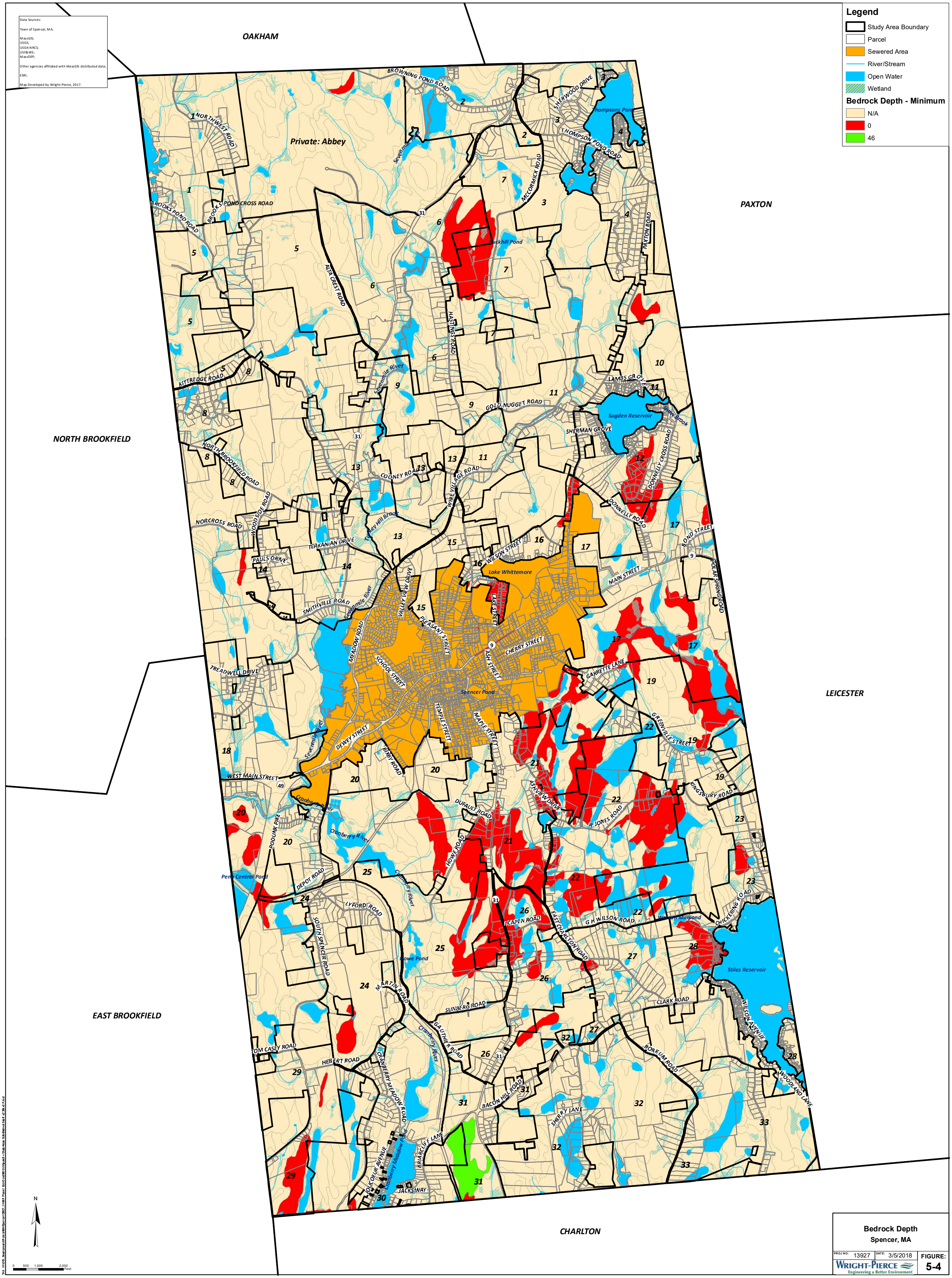
5.3.2.3 Depth to Bedrock

Another primary criterion used as part of the Tier 1 evaluation ranking system was the depth to bedrock as shown in **Table 5-4** below. NCRS typical soil type descriptions relative to bedrock depth were used for each of the Study Areas as appropriate to approximate the depth to bedrock. No soil exploration (borings) were performed as part of this evaluation. Engineering design standards/practices recommend a depth to bedrock greater than 6.5 feet or it could negatively impact the septic system design. The 6.5-foot depth to bedrock is derived from standards that recommend 6-inches of top soil (cover), four feet for the subsurface disposal system and two feet of aggregate below the system. While it is possible to install septic systems in areas with shallow bedrock, these septic systems are generally costlier to design and build. **Figure 5-4** shows the Depth to Bedrock map.

TABLE 5-4

DEPTH TO BEDROCK RANKING SYSTEM

Depth to Bedrock	Score
Less than 4 feet	10
4-6.5 feet	5
Greater than 6.5 feet	0



Bedrock Depth

Spencer, MA

PROJ NO:	DATE:	FIGURE:
13927	3/5/2018	5-4

WRIGHT-PIERCE
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5.3.2.4 Lot Size

Each of the parcel's size (area) was a primary criterion that was included as part of the Tier 1 evaluation. Smaller lot sizes, less than ½ acre, rated higher in the ranking system, as shown in **Table 5-5**, for its anticipated inability to comply with all of the Title 5 requirements. Further complicating smaller lot sizes is whether or not a failed on-site septic system could be repaired to meet current Title 5 standards. Therefore, it is a reasonable assumption that under less than ideal soil and groundwater conditions, the smaller lots sizes could require a variance to Title 5 in order to repair the on-site septic system. **Figure 5-5** shows the lot size map.

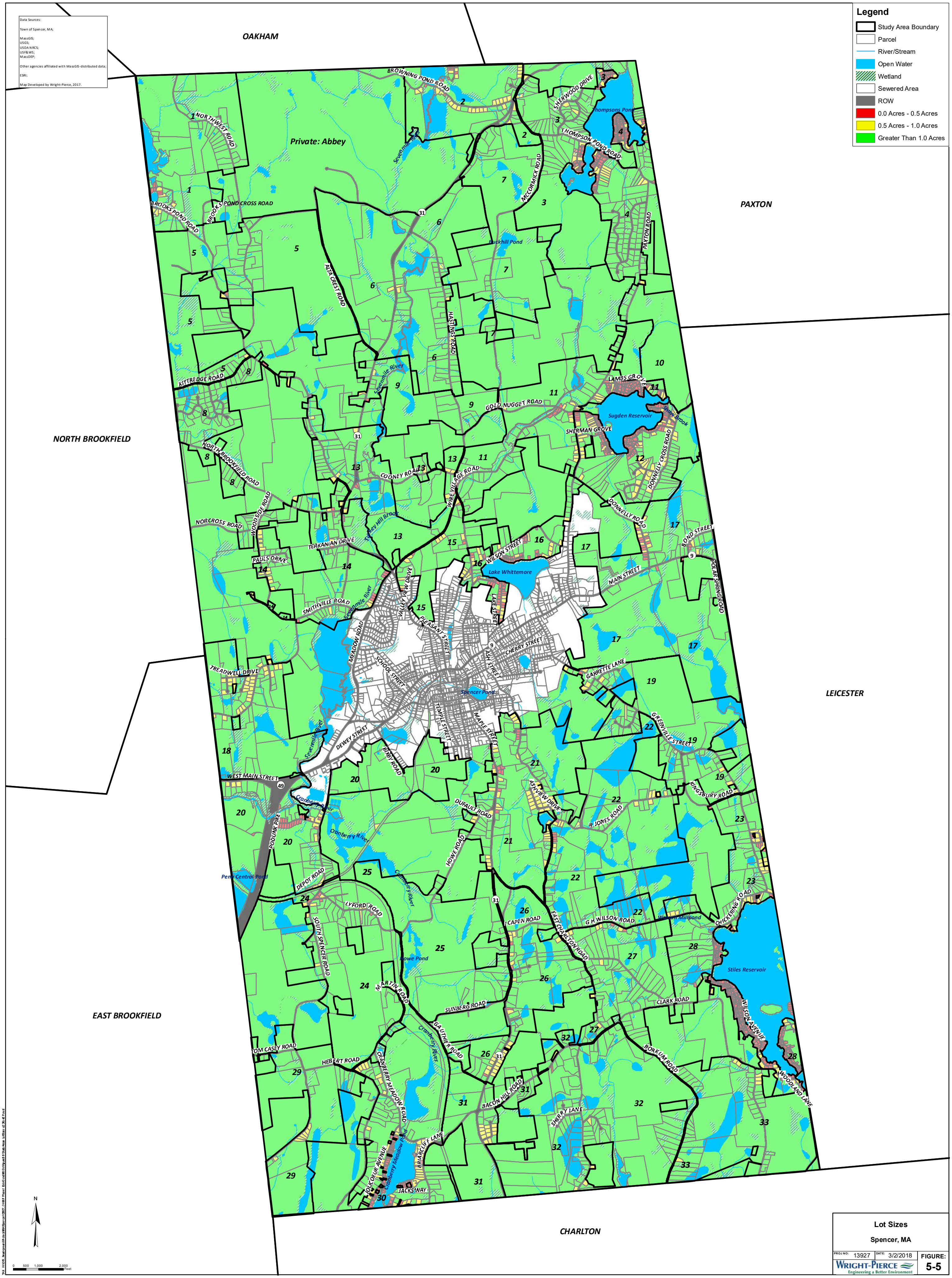
TABLE 5-5

LOT SIZE RANKING SYSTEM

Lot Sizes	Score
Less than 0.5 acre	10
0.5 - 1.0 acre	6
Greater than 1 acre	0

5.3.2.5 Private Wells

The final primary criterion for the Tier 1 analysis is the location of private wells. In order to properly evaluate lots with private wells, it is also necessary to evaluate lot size at the same time. Further, if a particular parcel has a private well and it is less than a ½ acre, it scored the highest possible points for this evaluation (as shown in **Table 5-6** below). With smaller lots, it becomes more difficult to repair failed septic systems and still comply with Tile 5 requirements. More specifically, the protection radius (100 feet) around a private well eliminates potential areas where a new septic system could be installed. **Figure 5-6** shows the private well map.


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
Study Area Boundary
Parcel
River/Stream
Open Water
Wetland
Sewered Area
ROW
0.0 Acres - 0.5 Acres
0.5 Acres - 1.0 Acres
Greater Than 1.0 Acres
OAKHAM
PAXTON
NORTH BROOKFIELD
LEICESTER
EAST BROOKFIELD
CHARLTON
Private: Abbey
Thompsons Pond
Buckhill Pond
Sugden Reservoir
Lake Whittemore
Spencer Pond
Stiles Reservoir
Howe Pond
Penn Central Pond
Sevenmile River
Cranberry River
BROWNING POND ROAD
SHERWOOD DRIVE
THOMPSON POND ROAD
NORTHWEST ROAD
BROOKS POND ROAD
BROOKS POND CROSS ROAD
MCCORMICK ROAD
PAXTON ROAD
ALTA CREST ROAD
HASTINGS ROAD
KITTREDGE ROAD
GOLD NUGGET ROAD
LAMBS GROVE
SHERMAN GROVE
DONNELLY CROSS ROAD
DONNELLY ROAD
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
NORCROSS ROAD
WOODSIDE ROAD
TERKANIAN DRIVE
PAULS DRIVE
SMITHVILLE ROAD
VALLEY VIEW DRIVE
WILSON STREET
BOND STREET
POLAR SPRING ROAD
MAIN STREET
LAKE STREET
PLEASANT STREET
MEADOW ROAD
SCHOOL STREET
ASH STREET
CHERRY STREET
GARRETTE LANE
TREADWELL DRIVE
TEMPLE STREET
MAPLE STREET
DEWEY STREET
BIXBY ROAD
GREENVILLE STREET
KINGSBURY ROAD
WEST MAIN STREET
PODUNK PIKE
DUFAULT ROAD
ASHVIEW DRIVE
R JONES ROAD
HOWE ROAD
DEPOT ROAD
LYFORD ROAD
SOUTH SPENCER ROAD
J CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
CHICKERING ROAD
M MARTIN ROAD
SUNBERG ROAD
CLARK ROAD
WILSON AVENUE
GAUTHIER ROAD
BORKUM ROAD
WOODLAND LANE
TOM CASEY ROAD
HEBERT ROAD
CRANBERRY MEADOW ROAD
BACON HILL ROAD
SHERRY LANE
BRIARCLIFF LANE
JACKS WAY
N
0 500 1,000 2,000 Feet
Lot Sizes
Spencer, MA
PROJ NO: 13927
DATE: 3/2/2018
FIGURE: 5-5
WRIGHT-PIERCE
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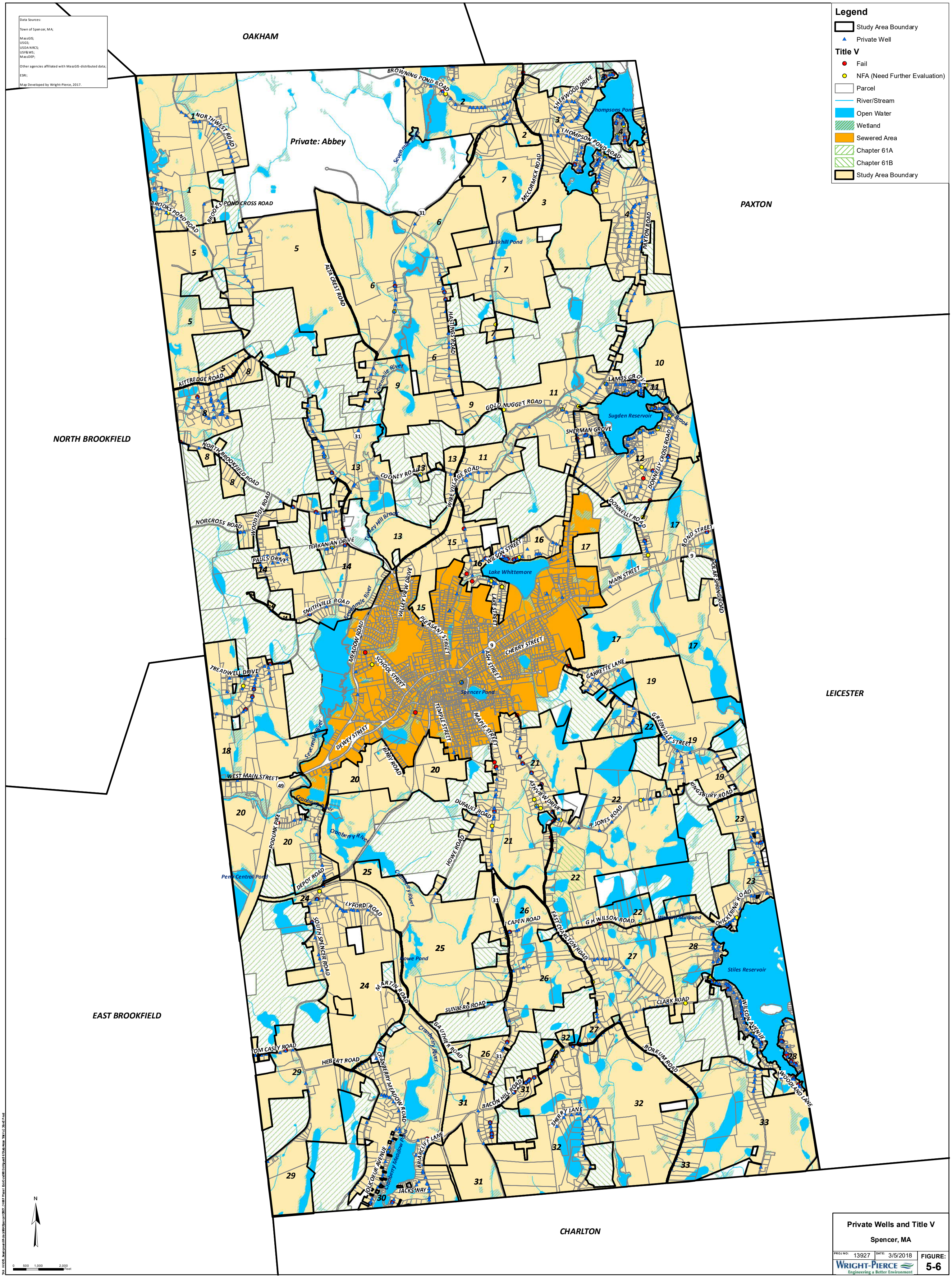

Private Wells and Title V

Spencer, MA

PROJ NO: 13927 DATE: 3/5/2018 FIGURE: 5-6

WRIGHT-PIERCE
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TABLE 5-6

PRIVATE WELL RANKING SYSTEM

Private Wells	Score
Private Well on a Lot Less than 0.5 acre	10
Private Well on a Lot between 0.5 - 1 acre	5
Private Well on a Lot Greater than 1 acre	2
No Private Well	0

5.3.3 Secondary Criteria

The following six secondary evaluative criteria were analyzed as part of the Tier 1 evaluation to determine if the parcel's Title 5 system would remain a viable option for wastewater disposal over the 20-year planning period.

5.3.3.1 Drinking Water Protection

For this secondary criterion, each study area was examined to determine whether it was located within, or partly within, or outside of the Town's Drinking Water Protection District (DWPD). If an area was located within the DWPD, the area was further examined to determine to what extent the area was within the DWPD and it was assigned the appropriate score based on the ranking system presented below in **Table 5-7.** The DWPD includes surface water protection areas (Zone A and B) and groundwater protection areas (Zone I, Zone II, and Interim Wellhead Protection Area (IWPA) zones). **Figure 2-5** shows the Drinking Water Protection zones.

TABLE 5-7

DRINKING WATER PROTECTION DISTRICT RANKING SYSTEM

Drinking Water Protection District	Score
Within DWPD	3
Greater than 50% of Parcel Within DWPD	2
Less than 50% of Parcel Within DWPD	1
Not Within DWPD	0

5.3.3.2 Surface Water Protection - Areas with Regulated Setbacks

The Town of Spencer's freshwater ponds are all impacted, to varying extents, by development within their watersheds. Various EPA/ DEP documents have identified nitrogen, phosphorus, and bacteria as contaminants of principal concern that lead to the degradation of such water bodies. These nutrient sources have been attributed to discharges from WWTP’s, on-site Title 5 septic systems, lawn fertilization, stormwater runoff, atmospheric deposition, and the recycling from bottom sediments.

Surface water impacts were assessed utilizing Massachusetts Title 5 regulated setback requirements. The State requires that the buffer area be 50 feet around all hydrologic features and wetlands, except within the drainage basin for a public surface water supply, where the buffer zones are 100 feet around wetland features, 200 feet around streams and ponds, and 400 feet around public surface water supplies. If the parcel of land was completely located with the Title 5 regulated setback, then it would have had a high score of 5 points for this secondary criterion. The complete ranking systems for State regulated setbacks for water bodies are summarized in **Table 5-8** below.

TABLE 5-8

AREAS WITHIN REGULATED SETBACKS RANKING SYSTEM

Areas Within Regulated Setbacks	Score
Within Title 5 Regulated Setback	5
Greater than 50% of Parcel Within Regulated Setback	3
Less than 50% of Parcel Within Regulated Setback	2
Not Within Regulated Setback	0

5.3.3.3 Floodplains

Location of floodplains was the next secondary criterion that was analyzed. Areas within the 100 or 500-year Federal Emergency Management Agency (FEMA) floodplains were identified utilizing MassGIS data. If an area was located within a 100-year floodplain, it was assessed a score of three (3) as identified in the ranking system shown below in **Table 5-9**. An area located within the 500-year floodplain was assessed a score of (1). **Figure 2-11** shows the floodplains map.

TABLE 5-9

FLOODPLAIN RANKING SYSTEM

Floodplains	Score
Within 100 yr Floodplain	3
Within 500 yr Floodplain	1
Not within floodplain	0

5.3.3.4 Priority/Estimated Habitat Areas & Areas of Critical Environmental Concern (ACEC)

Failing on-site wastewater disposal systems could potentially damage or destroy Priority/Estimated Habitat Areas and/or ACECs, which could cause some species to become endangered or extinct. No ACECs are present in Spencer, however there are many potential vernal pools and areas with existing habitats. The ranking system for protecting priority/estimated habitat areas is included in **Table 5-10**. **Figure 2-10** shows the habitat area map.

TABLE 5-10
PRIORITY/ESTIMATED HABITAT AREAS

Priority/Estimated Habitat Areas	Score
Within Habitat Areas	5
Not within Habitat Areas	0

5.3.3.5 Historic Districts

The Historic District areas within the Town of Spencer where on-site wastewater disposal systems are inconvenient and/or aesthetically displeasing to property owners or neighbors were also evaluated. If a parcel of land was located within a historic district, it was assigned a score of two (2) as shown in the ranking system for in **Table 5-11**. Most of the historic districts in Spencer are in the downtown area with existing sewer infrastructure. There is one section of Study Area 6 that had a historic district, so that is the only area with a score. **Figure 2-6** shows the historic area map.

TABLE 5-11
HISTORIC DISTRICTS

Historic District	Score
Within Historic District	5
Not within Historic District	0

5.3.4 Tier 2

The purpose of the Tier 2 analysis was to evaluate: (1) if a given area showed consistent need; (2) areas where there was a conflict in need (e.g. areas that did not show a need in the first tier, but are known to be problem areas); and (3) areas of no need, where existing on-site septic systems are adequate. The Tier 2 assessment was based on records obtained from MassGIS, the Town's Health Department and the Planning Department. The criteria used as part of the Tier 2 analysis are included in **Table 5-12**. The data for the Title 5 systems were gathered from the best available information from selected records at the Health Department. In general, these records were reviewed to either substantiate or contrast the results of the Tier 1 analysis.

TABLE 5-12

TIER 2 CRITERIA

Title 5 Failures
Zoning restrictions

5.3.4.1 Onsite Septic System Failures

The Town's Health Department requires all septic systems to be in accordance with Title 5 regulations. Properties are required to be inspected for compliance with Title 5 during the process of a real estate transaction or due to public health concerns. Title 5 also requires a reserve area to be located on the property, such that it can be used in case the primary on-site wastewater disposal system fails. Setback requirements are also specified in the Title 5 code, which identifies the minimum horizontal separation required between the onsite septic system and drinking water well, property lines and wetlands. If a property does not comply with the regulations, then it is considered a failed system. The Health Department has been recording Title 5 fail inspection results. The complete results of the failed Title 5 inspections are shown in Appendix D.

5.3.4.2 Zoning

The last Tier 2 evaluation criterion included a review of the Town's zoning districts. For the most part, the Town's downtown, commercial, and industrial areas are already near build-out and have municipal sewer service already available. It is our understanding that the Town generally foresees the desire for industrial development within non-sewered areas near the intersection of Route 9 and 49. Refer to **Figure 2-4** for the zoning map.

5.4 STUDY AREA DESCRIPTIONS AND NEEDS ASSESSMENT

5.4.1 Needs Assessment

5.4.1.1 Tier 1 Needs Assessment

Each of the 33 Study Areas were ranked based on its total score and placed into one of four "needs" categories as shown below:

Needs Category	Total Points
Very Low	0 to 15 total points
Low	15 to 20 total points
Average	20 to 28 total points
High	28 to 75 total points

A complete summary of the Tier 1 evaluation including primary and secondary criteria ranking scores for each of the 33 study areas is shown in **Table 5-13.**

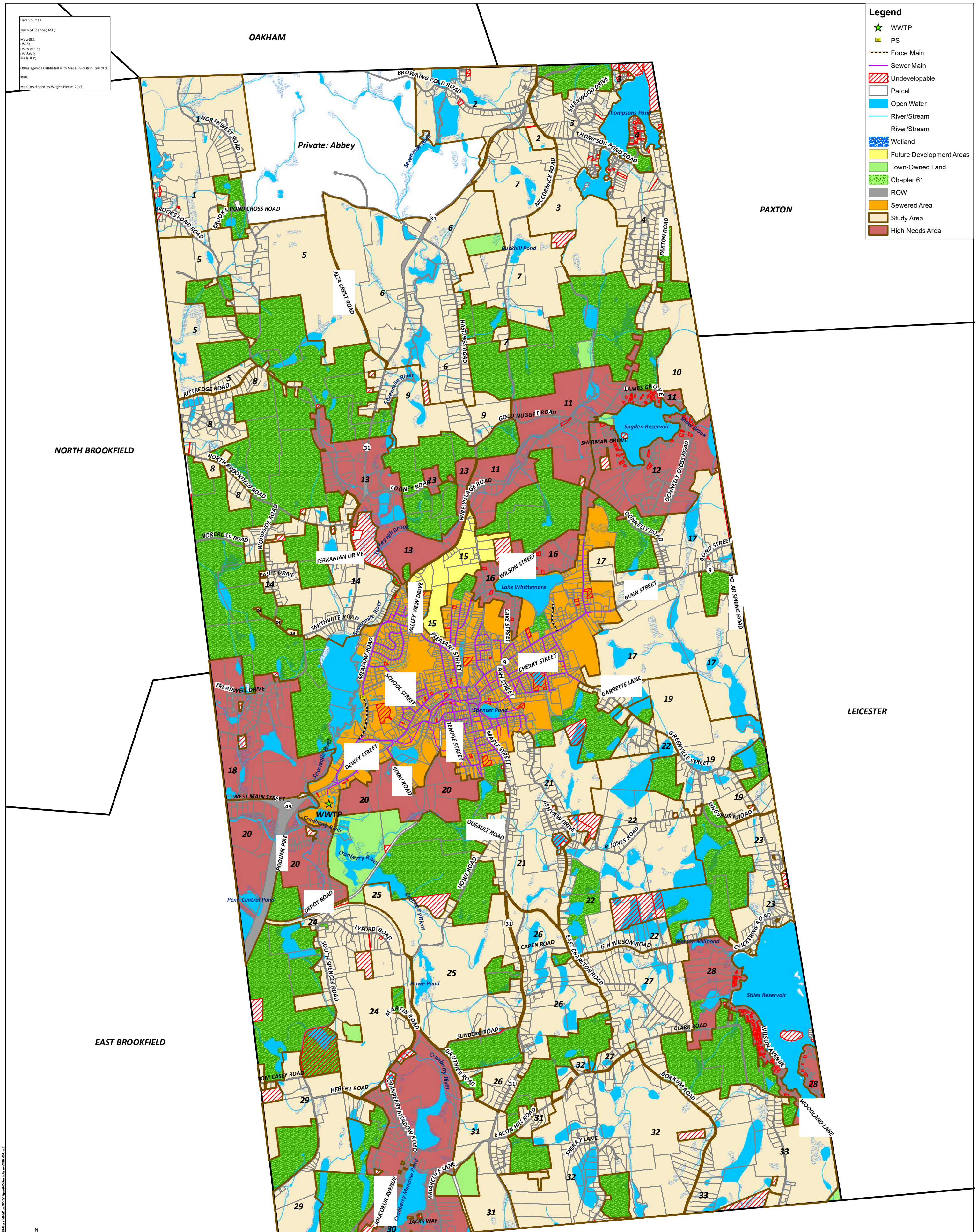
Five out of the 33 Study Areas (15%) scored a total of 15 points or less and were subsequently placed into the Very Low needs category. These Very Low needs category areas had similar physical characteristics, including well-draining soils and lot sizes larger than one acre, which are good candidates for well operating septic systems. The Very Low needs areas, along with the other needs areas are shown in **Figure 5-7**.

Nine out of the 33 Study Areas (27%) had a combined total score in the range of 16 to 20 points and were subsequently placed into the Low needs area category. The Low needs areas had conditions that were still favorable to septic systems.

Ten out of the 33 Study Areas (30%) had a combined total score in the range of 21 to 27 points and were subsequently placed into the Average needs area category. In general, there were some variations in the physical characteristics of each of these Average needs category areas as shown in **Table 5-14**. Specifically, these variations included soil drainage type, lot size, and the depth to high ground water elevation.

Eight out of the 33 Study Areas (24%) had a combined total score of greater than 28 points and were subsequently placed into the High needs area category. These High study areas scored higher in the ranking system primarily due to certain physical characteristics, including poorly drained soils, high groundwater table, and smaller than half acre lots.

One out of the 33 Study Areas (3%) was identified by the Sewer Commission as a potential future development area and was subsequently placed into the Future Development category. This Future Development study area (Study Area 15) was identified as a potentially developable area due to proximity to the existing sewer collection system.



Needs Area Map
Spencer, MA

PROJ NO: 13927 DATE: 3/2/2018 FIGURE: 5-7

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TABLE 5-13
STUDY AREA SCORING

Study Area	Primary Criteria (Ranking from 0 to 10)						Secondary Criteria (Ranking from 0 to 5)						Total Score	Study Area Ranking
	Soils/ Drainage Class	Depth to Water Table	Depth to Bedrock	Lot Sizes	Private Wells	Primary Subtotal	Drinking Water Protection District	Areas with Regulated Setbacks (Title 5)	Flood Plains	Priority/ Estimated Habitat Areas	Historic District	Secondary Subtotal		
1	5	4	0	2	2	**13**	0	1	1	1	0	**3**	**16**	**Low**
2	4	2	0	5	5	**16**	1	2	1	0	0	**4**	**20**	**Average**
3	1	3	0	5	5	**14**	0	2	1	0	0	**3**	**17**	**Low**
4	1	0	0	6	6	**13**	0	2	0	0	0	**2**	**15**	**Low**
5	5	3	0	1	1	**10**	2	0	2	1	0	**5**	**15**	**Low**
6	7	3	4	1	2	**17**	1	1	2	2	0	**6**	**23**	**Average**
7	3	2	2	0	0	**7**	2	0	0	1	0	**3**	**10**	**Very Low**
8	6	4	0	0	0	**10**	0	0	1	0	0	**1**	**11**	**Very Low**
9	8	3	0	1	1	**13**	0	0	2	3	0	**5**	**18**	**Low**
10	2	1	1	2	2	**8**	0	1	0	0	0	**1**	**9**	**Very Low**
11	4	2	0	8	8	**22**	0	3	2	1	0	**6**	**28**	**High**
12	3	3	5	7	7	**25**	0	3	0	0	0	**3**	**28**	**High**
13	8	9	0	3	3	**23**	4	2	3	4	0	**13**	**36**	**High**
14	8	2	0	3	3	**16**	5	2	1	3	0	**11**	**27**	**Average**
15	1	0	0	3	3	**7**	0	1	0	1	0	**2**	**9**	**Future**
16	2	2	4	7	7	**22**	0	3	1	0	2	**6**	**28**	**High**
17	3	3	5	4	4	**19**	1	1	1	3	0	**6**	**25**	**Average**
18	4	4	0	5	5	**18**	3	3	1	3	0	**10**	**28**	**High**
19	4	5	5	3	3	**20**	0	1	0	1	0	**2**	**22**	**Average**
20	8	4	3	4	4	**23**	5	2	1	3	0	**11**	**34**	**High**
21	3	4	6	5	5	**23**	0	2	0	2	0	**4**	**27**	**Average**
22	3	4	5	3	3	**18**	0	1	1	2	0	**4**	**22**	**Average**
23	3	2	2	5	5	**17**	0	2	0	1	0	**3**	**20**	**Average**
24	5	1	1	3	3	**13**	2	1	0	0	0	**3**	**16**	**Low**
25	7	2	4	0	0	**13**	3	1	1	1	0	**6**	**19**	**Low**
26	3	4	4	4	3	**18**	1	1	0	1	0	**3**	**21**	**Average**
27	6	5	1	2	2	**16**	0	2	2	1	0	**5**	**21**	**Average**
28	3	2	6	8	8	**27**	0	5	3	0	0	**8**	**35**	**High**
29	3	2	3	3	3	**14**	0	1	0	2	0	**3**	**17**	**Low**
30	9	5	0	6	6	**26**	0	2	2	1	0	**5**	**31**	**High**
31	3	4	2	2	2	**13**	2	1	0	1	0	**4**	**17**	**Low**
32	4	5	0	1	1	**11**	0	0	1	1	0	**2**	**13**	**Very Low**
33	4	4	0	1	1	**10**	1	0	1	1	0	**3**	**13**	**Very Low**

5.4.1.2 Tier 2 Needs Assessment

As previously described, the Tier 2 evaluation included a review of Health Department records for Title 5 failure results to determine if study areas showed consistent needs; areas with a conflict; or areas of no need where the existing onsite septic system is adequate. In summary, it was concluded that the Tier 2 evaluation did substantiate the results of the Tier 1 investigation.

5.4.1.3 Needs Assessment Summary

The evaluation of the needs assessment concluded with 24 of the 33 study areas (73%) being categorized as having Average, Low or Very Low needs. These 24 study areas will be discontinued from further evaluation as it has been determined that these parcels appear to be acceptable for the continued use of on-site septic systems. The Town and the Health Department will continue its public education efforts regarding the importance of proper maintenance of on-site septic systems in order to prolong the life of these systems. Consideration of a Septage Management Plan will be evaluated for these areas as part of Phase 3 of the CWMP.

The Tier 1 and Tier 2 analyses concluded that the Town has eight needs areas; Study Areas 11, 12, 13, 16, 18, 20, 28, and 30, which scored higher in the evaluation and Study Area 15, which was identified by the Sewer Commission as a future development area, that will move forward for "further study" in Phase 2 and Phase 3. Conventional septic systems may not be sufficient for adequately addressing wastewater treatment in these study areas, both near and longer term. The needs areas and their priority ranking are listed in **Table 5-14.**

TABLE 5-14
AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location	Priority Ranking
11	North and west side of Sugden Reservoir	High
12	South and east side of Sugden Reservoir	
13	Between Route 31 and Wire Village Road, surrounding Cooney Road	High
15	Just north of downtown Spencer and collection system, High Ridge Road	Future Development
16	Area around Lake Whittemore that is not on existing sewer	High
18	Area north of Route 9 and 49 intersection	High
20	Area between Lyford Road and Route 9 and between Town western border and Route 31, excluding Town Owned, sewered, and Chapter 61 lands	High
28	Area on western and southern shore of Stiles Reservoir	High
30	Area surrounding Cranberry Meadow Pond and north up to Cranberry Meadow Road intersection with Gauthier Rd	High

5.4.2 Study Area Descriptions and Needs Assessment

The following sections provide a detailed description of the evaluation for each individual study area and its overall needs assessment.

5.4.2.1 Study Area 1 – Brooks Pond

As shown in **Figure 5-1**, Study Area 1 is located in the northwest corner of Spencer. It is bordered by the Town of Oakham to the north, the Town of North Brookfield to the west, the Abbey to the east, and Study Area 5 to the south. This study area encompasses approximately 486 acres and is comprised of 72 parcels. The area has some poor soils, but some very good soils. Outside of the surface waters, the depth to groundwater is greater than 10 feet. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There are no drinking water protection zones and outside of the Brooks Pond area there are few Title 5 setback requirements. Outside of the surface waters, there is little flooding impacts in the area. There are two potential vernal pool locations but no certified pools or estimated habitat areas. Area 1 also does not contain any historical districts.

Based on our evaluation, Study Area 1 received a total score of 16 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.2 Study Area 2 – Browning Pond Road

Study Area 2 is located in the north central/eastern part of Spencer. It is bordered by the Town of Oakham and Paxton to the north, the Abbey to the west, Study Area 3 to the east, and the Study Area 7 to the south. This study area encompasses approximately 291 acres and is comprised of 66 parcels. The area has some poor soils, but also some very good soils. The depth to groundwater is greater than 10 feet and there is no bedrock impact in this area. The majority of lots are greater than one acre except for a number of small lots along Browning Pond Road. There is a small portion of the Study Area under a drinking water protection zone and outside of the surface water areas there are few Title 5 setback requirements. Outside of the surface waters, there is little flooding impacts in the area. There are few potential vernal pool locations but no certified pools or estimated habitat areas. Area 2 also does not contain any historical districts.

Based on our evaluation, Study Area 2 received a total score of 20 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.3 Study Area 3 – Thompson Pond, west

Study Area 3 is located in the northeastern part of Spencer bordered by the Town of Paxton to the north, Study Areas 2 and 7 to the west, Study Area 4 to the east, and Chapter 61 protected land to the south. This study area encompasses approximately 387 acres and is comprised of 124 parcels. The area has very good soils for Title 5 systems. Outside of the surface waters, the depth to groundwater is greater than 10 feet. There is no bedrock impact in this area. The majority of lots are greater than one acre except for a number of small lots along Thompson Pond. There is no drinking water protection zone in the Area and outside of Thompson Pond there are few Title 5 setback requirements. Outside of the surface waters, there is little flooding impacts in the area. There is one potential vernal pool location but no certified pools or estimated habitat areas. Area 3 also does not contain any historical districts.

Based on our evaluation, Study Area 3 received a total score of 17 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.4 Study Area 4 – Thompson Pond, East

Study Area 4 is located in the northeastern part of Spencer bordered by the Town of Paxton to the north and east, Study Area 3 to the west, and Study Area 10 and Chapter 61 protected land to the south. This study area encompasses approximately 268 acres and is comprised of 230 parcels. The area has very good soils for septic systems. The depth to groundwater is greater than 10 feet and there is no bedrock impact in this area. The majority of lots are greater than one acre except for a number of small lots along Thompson Pond. There is no drinking water protection zone in the Area and outside of Thompson Pond there are few Title 5 setback requirements. Outside of the surface waters, there is little flooding impacts in the area. There are no potential or certified vernal pool locations or estimated habitat areas. Area 4 also does not contain any historical districts.

Based on our evaluation, Study Area 4 received a total score of 15 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.5 Study Area 5 – Alta Crest Road

Study Area 5 is located in the northwest part of Spencer and is bordered by Study Area 1 and the Abbey to the north, the Town of North Brookfield to the west, Study Area 6 to the east, and Study Area 8 and Chapter 61 lands to the south. This study area encompasses approximately 669 acres and is comprised of 49 parcels. The area has a mixture of very poor soils and very good soils. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most areas. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There is one wellhead protection area and community ground water source in the northeast part of the area. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. The surface waters have high flooding chances and cover a significant portion of the area. There are three potential vernal pool locations, but no certified pools or estimated habitat areas. Area 5 also does not contain any historical districts.

Based on our evaluation, Study Area 5 received a total score of 15 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.6 Study Area 6 – Hastings Road

Study Area 6 is in the north central part of Spencer and is bordered by the Abbey to the north, Study Area 5 to the west, Study Area 7 to the east, and Study Area 9 to the south. This study area encompasses approximately 725 acres and is comprised of 64 parcels. The majority of parcels in this area have very poor soils. The depth to groundwater is greater than 10 feet in most areas with high groundwater near surface waters. There is bedrock impact in about 40% of this area and the majority of lots are greater than one acre. There is one Zone II water protection area. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. The surface waters have high flooding chances and cover a significant portion of the area. There are several potential vernal pool locations but no certified pools and there is an estimated habitat area. Area 6 also does not contain any historical districts.

Based on our evaluation, Study Area 6 received a total score of 23 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.7 Study Area 7 – Buckhill Pond

Study Area 7 is in the north central by northeast part of Spencer and is bordered by Study Area 2 and 3 to the north, Study Area 6 to the west, Study Area 3 to the east, and Chapter 61 lands to the south. This study area encompasses approximately 449 acres and is comprised of 26 parcels. The majority of the area has good soils. and low groundwater. There is minor bedrock impact in this area and the majority of lots are greater than one acre. There is one wellhead protection area and non-community ground water source in the northwest part of the area. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. Minimal flooding chances cover a majority of the area. There are a few potential vernal pool locations, but no certified pools or estimated habitat areas. Area 7 also does not contain any historical districts.

Based on our evaluation, Study Area 7 received a total score of 10 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.8 Study Area 8 – Deer Run Road

Study Area 8 is located in the west of Spencer and is bordered by Study Area 5 to the north, the Town of North Brookfield to the west, Chapter 61 lands to the east, and Chapter 61 lands to the south. This study area encompasses approximately 175 acres and is comprised of 76 parcels. The area has portions of very poor soils, mainly surrounding the water bodies, and some very good soils. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most other areas. There is no bedrock impact in this area and majority of the lots are greater than one acre. There are no drinking water protection areas and there are minimal Title 5 setbacks. The surface waters have high flooding chances and cover a small portion of the area. There are no potential or certified vernal pool locations and no estimated habitat areas. Area 8 also does not contain any historical districts.

Based on our evaluation, Study Area 8 received a total score of 11 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.9 Study Area 9 – Gold Nugget Road

Study Area 9 is located in the north central part of Spencer. It is bordered by Study Area 6 and 7 to the north, Chapter 61 lands to the west and south, and Study Area 11 to the east. This study area encompasses approximately 224 acres and is comprised of 25 parcels. The area has predominantly very poor soils as there are a significant number of surface waters and wetlands. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most other areas. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There are no drinking water protection zones in this area. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. The surface waters have high flooding chances and cover a significant portion of the area. There is one potential vernal pool location but no certified pools and there is an estimated habitat area around the river. Area 9 also does not contain any historical districts.

Based on our evaluation, Study Area 9 received a total score of 18 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.10 Study Area 10 – Sugden Reservoir, northeast

Study Area 10 is located in the northeast part of Spencer and is bordered by Study Area 4 and Chapter 61 lands to the north, Study Area 11 and Chapter 61 lands to the west, the Towns of Paxton and Leicester to the east, and Study Area 12 to the south. This study area encompasses approximately 171 acres and is comprised of 7 parcels. The area has predominantly good soils and the depth to groundwater is greater than 10 feet in most areas. There is minimal bedrock impact in this area and the majority of lots are greater than one acre. There are no drinking water protection areas. There are few Title 5 setbacks. There is minimal flooding chances in the area. There are no potential or certified vernal pool locations and no estimated habitat areas. Area 10 also does not contain any historical districts.

Based on our evaluation, Study Area 10 received a total score of 9 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.11 Study Area 11 – Wire Village Road & Sugden Reservoir, North & West

Study Area 11 is located in the northeast central part of Spencer and is bordered by Chapter 61 lands to the north, Study Areas 9 and 13 to the west, Study Areas 10 and 12 to the east, and Chapter 61 lands to the south. This study area encompasses approximately 423 acres and is comprised of 190 parcels. The area has portions of very poor soils, mainly surrounding the water bodies, and some areas with very good soils. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most areas. There is no bedrock impact in this area and the majority of the lots, outside of the Reservoir, are greater than one acre. However, some lots on Wire Village Road are smaller than one acre and many along the water's edge are less than 1/2 acre and densely populated. There are no drinking water protection areas. There are many Title 5 setbacks around Sugden. The surface waters have high flooding chances and cover a medium portion of the area. There are several potential vernal pools but no certified locations and no estimated habitat areas. Area 11 also does not contain any historical districts.

Based on our evaluation, Study Area 11 received a total score of 28 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area be further evaluated.

5.4.2.12 Study Area 12 – Sugden Reservoir, South & East

Study Area 12 is in the central east part of Spencer. It is bordered by Study Area 10 to the north, Study Area 11 to the west, the Town of Leicester to the east, and Chapter 61 lands and Study Area 17 to the south. This study area encompasses approximately 280 acres and is comprised of 250 parcels. The area has predominantly very good soils. The depth to groundwater is greater than 10 feet in most areas. There is bedrock impact in about half of this area. The majority of the lots are less than one acre, especially around the Reservoir, which is densely developed. There are no drinking water protection areas. There are Title 5 setbacks around the reservoir. There are no potential or certified vernal pool locations and no estimated habitat areas. Finally, Area 12 does not contain any historical districts.

Based on our evaluation, Study Area 12 received a total score of 28 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. The area around the Reservoir should be monitored for Title 5 failures and the impact to the water body. It is recommended that this area be further evaluated.

5.4.2.13 Study Area 13 – Cooney Road

Study Area 13 is located in the central part of Spencer, just north of the downtown sewered area. It is bordered by Study Area 9 and Chapter 61 lands to the north, Study Area 14 and Chapter 61 lands to the west, Chapter 61 lands and Study Areas 11 and 15 to the east, and Study Areas 14 and 15 to the south. This study area encompasses approximately 325 acres and is comprised of 73 parcels. The area has predominantly very poor soils and high groundwater. There are many wetlands and surface waters in this area, including Meadow Brook. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There is a large Zone II drinking water protection area and a community groundwater source. There are moderate Title 5 setbacks. The surface waters have high flooding chances and cover a moderate portion of the area. There are two potential vernal pools, but no certified locations and there is a large estimated habitat area. Area 13 also does not contain any historical districts.

Based on our evaluation, Study Area 13 received a total score of 36 points, the highest score of any Study Area, and was categorized as a High needs category area. Conventional septic systems appear not to be a viable long-term wastewater disposal solution for this study area. This area will progress into the next phase as a Needs Area and be studied further for alternative wastewater disposal methods.

5.4.2.14 Study Area 14 – Woodside Road

Study Area 14 is located in the central western part of Spencer, northwest of the downtown sewered area. It is bordered by Study Area 13 and Chapter 61 lands to the north, Chapter 61 lands, bordering the Town of North Brookfield, to the west, Study Area 13 and 15 and the sewered area of downtown to the east, and Chapter 61 lands and the sewered part of downtown to the south. This study area encompasses approximately 366 acres and is comprised of 124 parcels. The area has predominantly very poor soils. High groundwater is only an issue near the surface waters, which does not make up a large portion of this area. There is moderate bedrock in this area and the majority of the lots are greater than one acre except for a number of smaller lots along Route 31 and Woodside Road. There is a large Zone II drinking water protection area and a non-community groundwater source. There are moderate Title 5 setbacks. The surface waters have high flooding chances and cover a small portion of the area. There are two potential vernal pools, but no certified locations and there is a large estimated habitat area. Area 14 also does not contain any historical districts.

Based on our evaluation, Study Area 14 received a total score of 27 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area with the exception to those properties close to Meadow Brook. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.15 Study Area 15 – High Ridge Road (Future Development Area)

Study Area 15 is located in the central part of Spencer close to downtown. It is bordered by Study Area 13 and 11 to the north, Study Area 13 to the west, Study Area 16 to the east, and existing sewered area to the south. This study area encompasses approximately 135 acres and is comprised of 31 parcels. This area has predominantly very good soils and no areas with high groundwater levels. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There are no drinking water protection areas and minimal Title 5 setbacks. There is minimal flood risk in the area. There are few potential and no certified vernal pool locations and no estimated habitat areas. Area 15 also does not contain any historical districts.

Based on our evaluation, Study Area 15 received a total score of 9 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. However, in discussion with the Spencer Sewer Commission, this area was identified as having a high potential of future development and connection to the existing collection system might be beneficial to the Town. Therefore, this area will move forward into Phase 2 for further evaluation.

5.4.2.16 Study Area 16 – Lake Whittemore

Study Area 16 is located in the central part of Spencer, north of the existing sewered area. It is bordered by Study Area 15 and Chapter 61 lands to the north, Study Area 15 and Chapter 61 lands to the west, Study Area 17 to the east, and existing sewered area to the south. This study area encompasses approximately 138 acres and is comprised of 143 parcels. This area has predominantly good soils and the depth to groundwater is greater than 10 feet. There is moderate bedrock impact in this area. The majority of the lots away from Lake Whittemore are greater than one acre except for a number of lots around the lake that are a half acre or smaller and densely populated. There are no drinking water protection areas. There are many Title 5 setbacks around the Lake and minimal flooding chance in the area. There are no potential or certified vernal pool locations and no estimated habitat areas. Area 16 also has the only historical district present in unsewered areas of Spencer.

Based on our evaluation, Study Area 16 received a total score of 28 points and was categorized as a High needs category area. Conventional septic systems appear not to be a viable long-term wastewater disposal solution for this study area, specifically around the Lake. This area will progress into the next phase as a Needs Area and be studied further for alternative wastewater disposal methods.

5.4.2.17 Study Area 17 – East Main Street

Study Area 17 is located in the east central part of Spencer and is bordered by Study Area 12 to the north, the sewered part of downtown Spencer to the west, the Town of Leicester to the east, and Study Area 19 to the south. This study area encompasses approximately 774 acres and is comprised of 71 parcels. The area has large amounts of surface waters and wetlands, which result in portions of very poor soils. However, the majority of the soils are very good soils for septic systems. High groundwater occurs near the surface waters and wetlands, but is not an issue for the overall area. There is bedrock impact in approximately half of this area. The majority of the lots are greater than one acre except for a development along Donnelly Road that has small lot sizes. There is a non-community groundwater source and resulting drinking water protection area on Route 9 on the border with the Town of Leicester. There are minimal Title 5 setbacks. The surface waters have flooding chances and cover a small portion of the area. There are many potential vernal pool location, no certified pools, and an estimated habitat area in the southern part of the area where the surface waters drain to Burncoat Pond. Area 17 also does not contain any historical districts.

Based on our evaluation, Study Area 17 received a total score of 25 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. If Route 9 gets developed further, the surface waters should be monitored for environmental impacts to Burncoat Pond. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.18 Study Area 18 – Route 9 and 49, North

Study Area 18 is located in the west central part of Spencer and is bordered by Chapter 61 Lands to the north, the Town of East Brookfield to the west, Chapter 61 Lands and the existing sewered area to the east, and Study Area 20 to the south. This study area encompasses approximately 362 acres and is comprised of 74 parcels. The area has portions of very poor soils and very good soils.

The poor soils are contained to the areas near the surface waters, including the Seven Mile River. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most areas. There is no bedrock impact in this area. The majority of the lots are greater than one acre, but along Smithville Lane there is development with half acre to one acre lots. There is one wellhead protection area and non-community ground water source in the northeast part of the area and a DEP approved Zone II area in the southeast. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks, but with the Zone II area this Study Area has many setback requirements. The surface waters have high flooding chances and cover a significant portion of the area. There is one potential vernal pool location, but no certified pools, and there is an estimated habitat area along the Seven Mile River. Area 18 also does not contain any historical districts.

Based on our evaluation, Study Area 18 received a total score of 28 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. This area will progress to the next phase as a needs area and alternative wastewater disposal methods will be analyzed.

5.4.2.19 Study Area 19 – Greenville Street

Study Area 19 is located in the west central part of Spencer and is bordered by Study Area 17 to the north, Chapter 61 Lands and downtown Spencer to the west, the Town of Leicester to the east, and Study Area 22 and 23 to the south. This study area encompasses approximately 432 acres and is comprised of 85 parcels. The area has portions of very poor soils, mostly around surface waters, and very good soils. Approximately half of the area, near wetlands and surface waters, has high groundwater. Approximately half of the area also has bedrock impacts. The majority of the lots are greater than one acre, with a few half acre lots along Greenville Street. There are no drinking water protection zones. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks and low flooding chances. There is one potential vernal pool location, but no certified pools, and there is an estimated habitat area on the eastern border with Leicester (Burncoat Pond). Area 19 also does not contain any historical districts.

Based on our evaluation, Study Area 19 received a total score of 22 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.20 Study Area 20 – Route 49

Study Area 20 is located in the west central part of Spencer and is bordered by Study Area 18 and downtown Spencer to the north, Town of East Brookfield to the west, Chapter 61 lands to the east, and Chapter 61 lands and Study Areas 24 and 25 to the south. This study area encompasses approximately 480 acres and is comprised of 85 parcels. The area has very poor soils, as it is predominantly surface waters and wetlands, including the Seven Mile River and its tributaries. Approximately half of the area, near wetlands and surface waters, has high groundwater. Approximately a third of the area has bedrock impacts. The majority of the lots are greater than one acre, except for a few half acre lots and smaller located along Condor Drive. There is a large Zone II drinking water protection zone. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. The surface waters have low flooding chances. There is one potential vernal pool location, but no certified pools, and there is a large estimated habitat area along the Seven Mile River. Area 20 also does not contain any historical districts.

Based on our evaluation, Study Area 20 received a total score of 34 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. Because of the protected waters and habitats and the possible future development along Route 49, it is recommended that this area be moved forward into the next phase to study alternative wastewater disposal methods.

5.4.2.21 Study Area 21 – Ash Street

Study Area 21 is located in the central part of Spencer and it is bordered by downtown Spencer to the north, Chapter 61 Lands and downtown Spencer to the west, Study Area 22 to the east, and Study Area 22 and 26 to the south. This study area encompasses approximately 451 acres and is comprised of 121 parcels. The area has predominantly very good soils except for some poor soils located mostly around surface waters. . Approximately half of the area, near wetlands and surface waters have high groundwater. Approximately half of the area has bedrock impacts. The area is evenly split between large and small lots. The small lots are primarily located on Route 31 and Ash Street. There are no drinking water protection zones. Outside of the surface waters, there are no Title 5 setbacks. The surface waters have flooding potential and cover approximately half the area. There are more than 10 potential vernal pool locations, but no certified pools or estimated habitat areas. Area 21 also does not contain any historical districts.

Based on our evaluation, Study Area 21 received a total score of 27 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.22 Study Area 22 – R Jones Road

Study Area 22 is located in the central part of Spencer and is bordered by downtown Spencer to the north, Chapter 61 Lands and downtown Spencer to the west, Study Area 22 to the east, and Study Area 22 and 26 to the south. This study area encompasses approximately 649 acres and is comprised of 80 parcels. The area has predominantly very good soils except for some poor soils located mostly around surface waters. Approximately half of the area, near wetlands and surface waters, have high groundwater. Approximately half of the area has bedrock impacts. The area has a majority of 1 acre lots or greater, with smaller lots along Ash Street and R Jones Road. There are no drinking water protection zones. Outside of the surface waters, there are no Title 5 setbacks. The surface waters have flooding potential and cover a small part of the area. There are 7 potential vernal pool locations and one certified pool. There are no estimated habitat areas. Area 22 also does not contain any historical districts.

Based on our evaluation, Study Area 22 received a total score of 22 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.23 Study Area 23 – Stiles Reservoir, North

Study Area 23 is located in the southeast part of Spencer and is bordered by Study Area 19 to the north, Chapter 61 Lands to the west, the Town of Leicester to the east, and Study Area 28 to the south. This study area encompasses approximately 180 acres and is comprised of 73 parcels. The area has predominantly very good soils except for some poor soils located mostly around surface waters. A small portion of the area, near wetlands and surface waters, have high groundwater. A small part of the area, in the center, has bedrock impacts. The area is split approximately even between large and small lots. The small lots are located around Fairview Drive and the Reservoir. There are no drinking water protection zones. There are Title 5 setbacks around the Reservoir and confluence waters. The surface waters do not have flooding potential. There are 2 potential vernal pool locations, but no certified pools or estimated habitat areas. Finally, Area 23 does not contain any historical districts.

Based on our evaluation, Study Area 23 received a total score of 20 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.24 Study Area 24 – Lyford Road

Study Area 24 is located in the southwest part of Spencer and is bordered by Study Area 20 to the north, Chapter 61 Lands to the west, Study Area 25 to the east, and Study Area 30 to the south. This study area encompasses approximately 473 acres and is comprised of 76 parcels. Approximately half of the area has very poor soils, along the northeast part of the area, and the rest of the area has very good soils. Most of the area does not have high groundwater. A small part of the area has bedrock impacts. The area has some small lots, on Lyford Road and South Spencer Road. However, the area largely includes lots greater than 1 acre. There is a large Zone II drinking water protection zone along the northern part of the area. There are Title 5 setbacks around the Zone II area, but not outside it. The surface waters do not have flooding potential. There are 2 potential vernal pool locations, but no certified pools or estimated habitat areas. Area 24 also does not contain any historical districts.

Based on our evaluation, Study Area 24 received a total score of 16 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.25 Study Area 25 – Howe Pond

Study Area 25 is located in the southeast part of Spencer and is bordered by Chapter 61 Lands to the north, Study Area 24 to the west, Study Area 26 to the east, and Study Area 30 and Chapter 61 Lands to the south. This study area encompasses approximately 471 acres and is comprised of 27 parcels. The area has predominantly very poor soils. The area has many surface waters, but predominantly low groundwater. A section in the eastern part of the area has bedrock impacts that covers about 40 percent of the area. The area has lots that are all greater than one acre. There is a Zone II drinking water protection zone in the northwest part of the area and a non-community groundwater source with wellhead protection zone. There are Title 5 setbacks around the drinking water protection zones. The surface waters have minimal flooding potential. There are 3 potential vernal pool locations, but no certified pools and a small portion of an estimated habitat area in the northwest. Area 25 also does not contain any historical districts.

Based on our evaluation, Study Area 25 received a total score of 19 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.26 Study Area 26 – Charlton Road (Route 31)

Study Area 26 is located in the south central part of Spencer and is bounded by Charlton and East Charlton Road. It is bordered by Study Area 21 to the north, Chapter 61 Lands and Study Area 25 to the west, Study Areas 22 and 27 to the east, and Study Areas 31 and 32 and Chapter 61 Lands to the south. This study area encompasses approximately 311 acres and is comprised of 72 parcels. The area has predominantly very good soils, except for some poor soils located mostly around surface waters. Nearly half of the area, near wetlands and surface waters, has high groundwater.

About half of the area, in the north and center, has bedrock impacts. The area has approximately 40 percent small lots under one acre. The small lots are predominantly along Route 31. There is a non-community groundwater source with wellhead protection zone in the southern tip of the area. There are Title 5 setbacks around the drinking water zone and surface waters. The surface waters do not have flooding potential. There are 7 potential vernal pool locations, but no certified pools or estimated habitat areas. Area 26 also does not contain any historical districts.

Based on our evaluation, Study Area 26 received a total score of 21 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.27 Study Area 27 – Marble Road

Study Area 27 is located in the southeast part of Spencer and is bordered by Study Area 22 to the north, Chapter 61 Lands and Study Area 26 to the west, Study area 28 to the east, and Study Area 32 to the south. This study area encompasses approximately 326 acres and is comprised of 91 parcels. The area has a large portion of very poor soils, around surface waters, with the remaining areas having very good soils. The same areas around the surface waters have high groundwater. A small part of the area, in the northwest, has bedrock impacts. The area has mostly lots with sizing greater than one acre, with a few small lots along G H Wilson Road. There are no drinking water protection zones. There are Title 5 setbacks around the surface waters. The surface waters have flooding potential. There are 2 potential vernal pool locations, but no certified pools or estimated habitat areas Area 27 also does not contain any historical districts.

Based on our evaluation, Study Area 27 received a total score of 21 points and was categorized as an Average needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.28 Study Area 28 – Stiles Reservoir, West

Study Area 28 is located in the southeast part of Spencer and is bordered by Study Area 23 to the north, Study Area 27 and Chapter 61 Lands to the west, the Town of Leicester to the east, and Study Area 33 to the south. This study area encompasses approximately 217 acres and is comprised of 375 parcels. The area has predominantly very good soils. A small portion of the area has high groundwater but mostly has a depth over ten feet to groundwater. A large part of the areahas bedrock impacts. The area is split approximately 50/50 between large and small lots. The small lots are around the Reservoir, are less than a half-acre and very densely populated. There are no drinking water protection zones. There are Title 5 setbacks around the Reservoir. The Reservoir has flooding issues and impacts many of the small surrounding lots. There is one potential vernal pool location, but no certified pools or estimated habitat areas. Area 28 also does not contain any historical districts.

Based on our evaluation, Study Area 28 received a total score of 35 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. Because of the densely populated small lots around the Reservoir, it is recommended that this area be moved forward into the next phase to study alternative wastewater disposal methods.

5.4.2.29 Study Area 29 – South Spencer Road

Study Area 29 is located in the southwest part of Spencer and is bordered by Chapter 61 Lands to the north, the town of East Brookfield to the west, Study Area 30 and Chapter 61 Lands to the east, and the Town of Charlton to the south. This study area encompasses approximately 341 acres and is comprised of 28 parcels. The area has predominantly very good soils except for some poor soils located mostly around surface waters. The area has some surface waters, but predominantly low depth to groundwater. A section in the southwestern part of the area has bedrock impacts that covers about 30 percent of the area. The area has predominantly large lots greater than one acre. And there are no drinking water protection zones. There are Title 5 setbacks around the surface waters. The surface waters have minimal flooding potential. There is one potential vernal pool location, but no certified pools and a small portion of an estimated habitat area in the southwest. Area 29 also does not contain any historical districts.

Based on our evaluation, Study Area 29 received a total score of 17 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.30 Study Area 30 – Cranberry Meadow Pond

Study Area 30 is located in the southwest part of Spencer and is bordered by Study Area 24 and 25 to the north, Study Area 29 and Chapter 61 Lands to the west, Study Area 31 to the east, and the Town of Charlton to the south. This study area encompasses approximately 485 acres and is comprised of 173 parcels. The area is approximately evenly split between poor and very good soils, with the poor soils surrounding the surface waters. About half of the area has high groundwater concerns and there are no bedrock impacts. The area is approximately 60 percent small lots with less than one acre. The small lots are around the Pond and some are on Jolicoeur Road. There are no drinking water protection zones. There are Title 5 setbacks around the Pond. The Pond has flooding issues and impacts many of the small surrounding lots. There are five potential vernal pool locations, but no certified pools or estimated habitat areas. Area 30 also does not contain any historical districts.

Based on our evaluation, Study Area 30 received a total score of 31 points and was categorized as a High needs category area. Conventional septic systems do not appear to be a viable long-term wastewater disposal solution for this study area. Because of the densely populated small lots around the Pond, it is recommended that this area be moved forward into the next phase to study alternative wastewater disposal methods.

5.4.2.31 Study Area 31 – Bacon Hill Road

Study Area 31 is located in the south-central part of Spencer and is bordered by Study Area 26 to the north, Study Area 30 to the west, Study Area 32 to the east, and the Town of Charlton to the south. This study area encompasses approximately 273 acres and is comprised of 41 parcels. The area has predominantly very good soils with a section in the southern part with poor soils. The area has predominantly low groundwater except for a few surface waters where there is high groundwater. A small section in the southern part of the area has bedrock impacts. The area also has a section with lots between a half-acre and one acre located. on Blueberry Hill Drive. There are two non-community groundwater sources with wellhead protection zones. There are Title 5 setbacks around the drinking water protection zones. The surface waters have minimal flooding potential. There are 3 potential vernal pool locations, but no certified pools and a small portion of an estimated habitat area in the northwest. Area 31 also does not contain any historical districts.

Based on our evaluation, Study Area 31 received a total score of 17 points and was categorized as a Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.32 Study Area 32 – East Charlton Road

Study Area 32 is located in the south-central part of Spencer and is bordered by Chapter 61 Lands and Study Area 27 to the north, Study Area 31 to the west, Study Area 33 to the east, and the Town of Charlton to the south. This study area encompasses approximately 736 acres and is comprised of 93 parcels. The area has many surface waters and very poor soils surround them, taking up about 50 percent of the area. There are no bedrock impacts and all lots are greater than one acre. There are no drinking water protection zones. There are no Title 5 setbacks outside of the surface waters. The surface waters have minimal flooding potential. There are 2 potential vernal pool locations, but no certified pools or estimated habitat areas. Area 32 also does not contain any historical districts.

Based on our evaluation, Study Area 32 received a total score of 13 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.4.2.33 Study Area 33 – Buteau Road

Study Area 33 is located in the southeast part of Spencer and is bordered by Chapter 61 Lands and Study Area 28 to the north, Study Area 32 to the west, the Town of Leicester to the east, and the Town of Charlton to the south. This study area encompasses approximately 459 acres and is comprised of 60 parcels. The area has many surface waters and very poor soils surround them, taking up about 50 percent of the area. The surface waters also have high groundwater. There are no bedrock impacts and all lots are greater than one acre. There is a non-community groundwater source and wellhead protection zone. There are Title 5 setbacks around the wellhead protection zone and the surface waters. The surface waters have minimal flooding potential. There are 3 potential vernal pool locations, but no certified pools or estimated habitat areas. Area 33 also does not contain any historical districts.

Based on our evaluation, Study Area 33 received a total score of 13 points and was categorized as a Very Low needs category area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. It is recommended that this area continue to be maintained in accordance with the Town's Health Department regulations.

5.5 ALTERNATIVES IDENTIFICATION AND SCREENING

The CWMP Phase 2 - Alternatives Identification and Screening will present recommendations for wastewater management alternatives in the identified needs areas of Spencer (Study Areas 11, 12, 13, 16, 18, 20, 28, and 30) and future development area (Study Area 15). Specific recommendations by needs area will take into account the appropriateness of utilizing septage management plans, nutrient management plans, alternative collection systems, I/A systems, communal systems, local and/or regional wastewater collection, treatment and disposal facilities, and residuals treatment and disposal. Phase 2 will evaluate the environmental impacts and design criteria associated with each alternative and recommend a short list of alternatives for detailed evaluation in Phase 3 of the CWMP.

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SECTION 6

PUBLIC PARTICIPATION

6.1 INTRODUCTION

Public outreach strategies and activities included meetings with municipal officials and representatives of regulatory agencies, and other appropriate stakeholders. All relevant Town Boards and Departments were interviewed to identify:

- The current wastewater management status with the Town;
- The short and long-term goals regarding the Town's wastewater management systems;
- The issues, concerns and inputs specific to the CWMP;

The public outreach efforts are also utilized to gauge the level of knowledge and interest about the wastewater issues within the Town.

This process gives interested parties in the Town of Spencer a chance to understand the issues, the CWMP process, and the opportunity to "have a voice" in the decision-making process. Communication between Town officials, interested stakeholders, and state agencies is important and will continue through the CWMP process and beyond.

Implementation of an effective public participation process results in a plan that can be "approved" by Town officials and the citizens of the community.

6.2 SUMMARY OF PUBLIC PARTICIPATION

Wright-Pierce has worked closely with the Town's Sewer Department, Board of Health, Planning Department, Assessor's Department, Water Department, and relevant state agencies to develop the Phase 1 CWMP. The intent of the CWMP is to ultimately build consensus for the recommended wastewater management plan.

The Town will establish a depository for project information to be viewed by the public. This depository is to be located at Town Hall. This depository site is for displaying information generated during the CWMP process and may include:

- Draft and final versions of CWMP reports;
- Project progress reports;
- Any advertisements and press releases published;
- Newspaper articles;
- Any relevant project meeting schedules

One public meeting will be held for gathering and reporting information for the residents of Spencer. The public meeting will be held at a location in Spencer to present the overall approach, goals and progress to date.

The draft CWMP will be made available to the Town, DEP, and the public via the depositories for review prior to the public meeting. After the public meeting, Wright-Pierce will summarize the comments, the questions, and the answers presented at the public meeting.

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TOWN OF SPENCER, MASSACHUSETTS
COMPREHENSIVE WASTEWATER MANAGEMENT PLAN (CWMP)
SCOPE OF SERVICES (SOS)/PLAN OF STUDY (POS)

PROJECT MANAGEMENT, REGULATORY COORDINATION, MEETINGS

1. Prepare and submit a detailed Scope of Services(SOS)/Plan of Study (POS) to MassDEP for review and approval at the project outset. Goal is to have the Scope of Services that is included in the Agreement be the same document that is submitted to MassDEP for review and approval. Any changes to the Scope of Services by MassDEP that are not included in the Agreement Scope of Services between the Town and Engineer will be subject to an associated amendment to the fee for the project and may impact the project completion schedule.

2. The Town of Spencer, MA has chosen Wright-Pierce to prepare a Comprehensive Wastewater Management Plan (CWMP) to be use in the development of wastewater collection and WWTP upgrades and improvements. The CWMP process is divided into three Tasks/Phases. Task No.1/Phase I includes an assessment of existing conditions, projection of future wastewater disposal requirements, and a needs assessment for the entire Town study area. In Task No.2/Phase II, alternative means of handling the wastewater are developed to address the needs identified in Task No.1/Phase I. Task No. 3/Phase III involves a detailed evaluation of the alternatives identified, and a recommendation of a specific wastewater management plan. The culmination of the CWMP process is in Phase III, where a draft and a final CWMP report are prepared, submitted and reviewed for approval by the Town and MassDEP.

3. The CWMP study area covers the entire Town of Spencer. The Planning Period will extend 20 years beyond the date when all the planned facilities are scheduled to become operational.

4. Prepare and submit monthly invoices include a one page monthly progress report with each invoice. (Included in Scope under Task Nos. 1, 2 and 3.)

5. Attend two project progress meetings and one Public Hearing with the Town. Project meetings to be held at specific project milestone dates after completion of CWMP Phase I and CWMP Phase II. Public Hearing to be held at completion of the CWMP Phase III - Draft CWMP. (Meetings included in Scope under Task Nos. 1, 2 and 3.)

6. **Regulatory Coordination:** Wright-Pierce will contact MassDEP/MEPA at project outset to review if MEPA involvement is necessary. It is currently anticipated that a MEPA Environmental Notification Form (ENF) will <u>not</u> be required for the CWMP. Hence, preparation of an ENF is <u>not</u> included in the Scope of Services. A MEPA EIR is also <u>not</u> included in this Scope of Services. If a MEPA ENF and/or EIR are ultimately required, this will be an addition to the Scope of Services and will affect the project completion schedule.

7. **Project Meetings**: Attend a total of two project meetings with the Town and stakeholders to review and receive comments on initial Draft CWMP Phase I and initial Draft CWMP Phase II prior to submitting Drafts to MassDEP for review. Conduct a joint review meeting with the Town and MassDEP after completion and submission of the revised Draft Phase I Comprehensive Wastewater Management Plan (CWMP) report. Conduct a joint review meeting with the Town and MassDEP after completion and submission of the revised Draft Phase II Comprehensive Wastewater Management Plan (CWMP). Conduct a joint review meeting with the Town and MassDEP after completion and submission of the revised unified

Draft Comprehensive Wastewater Management Plan (CWMP) (Meetings included in Scope under Task Nos. 1, 2 and 3.)

8. **Schedule Management and Coordination:** The schedule for obtaining an approved CWMP in 8 months is aggressive. In order for this project schedule to be met, Engineer has assumed that no MEPA ENF or EIR is required. In addition, the schedule does not allow time to wait for MassDEP and/or other agency review and feedback on the Final CWMP Report project deliverable.

PUBLIC PARTICIPATION

1. Development of and coordination with a Project Advisory Committee (PAC) or Citizen's Advisory Committee (CAC) is not planned and not included in the scope of services. *(Due to the comprehensive nature of the CWMP, Spencer will involve a variety of stakeholders, as appropriate. Stakeholders may include members from: Spencer Board of Selectmen, Board of Health, Finance Committee, Conservation Commission, and Planning Board; Citizens of Spencer; Department of Fish and Wildlife (DFW) Natural Heritage Program, Water Resources Commission (WRC), and the MEPA Unit. All stakeholders, including governmental agencies, will have representation on the PAC, and members will be responsible for conveying information to and from their constituents. The PAC will offer technical input and general advice in the planning process.)*

2. The Town, at its own discretion, can make certain project progress meetings open to the public. The Town will post on Town web site planning and process documents and project progress meeting dates and times

3. As this CWMP will take a streamlined approach and be completed on a fast-track schedule, a formal public participation program will not be implemented. Rather, one Public Hearing will be held as part of the project. The Public Hearing will be held near the completion of the Project. The intent is to have a draft of the recommended CWMP available for review in advance of the public hearing.

TASK NO.1/PHASE I – EXISTING CONDITIONS, FUTURE REQUIREMENTS AND PROBLEM IDENTIFICATION AND NEEDS ASSESSMENT

1. Assemble and review all relevant prior studies of Spencer wastewater collection and treatment facilities and master planning and incorporate relevant and current information as part of the CWMP. It is assumed that Town staff will assemble and provide the necessary prior studies and relevant information to Engineer. The fundamental studies that will be used as the primary basis for the CWMP include:

   - *1977 EPA Funded Facilities Planning Study to Evaluate Sewer System I/I and WWTP Upgrade by Engineer*
   - *1981 EPA Funded SSES by Cullinan Engineering Co, Inc.*
   - *1987 EPA Funded WWTP Facility Process Upgrade by Engineer*
   - *1987 EPA Funded Sewer System Rehabilitation by Engineer*
   - *1989 EPA Funded WWTP Modifications & Dechlorination Facility by Engineer*
   - *1990 MassDEP Step 1 Grant Infiltration/Inflow Study by Engineer*
   - *1996 WWTP Aeration System Upgrade by Dufresne-Henry, Inc.*

- *2002 Design and Construction of the Roy Drive Grinder Pump Station and Low Pressure Sewer System*
- *2006 WWTP UV Disinfection by Engineer*
- *2010 WWTP Headworks & Wet Weather Pump Station Upgrade by Engineer*
- *2014 Meadow Rd. Pump Station, WWTP Blowers & Final Clarifier Replacement by Engineer*
- *2016 WWTP Final Clarifier Rebuild by Engineer*

The intent in this section is to reuse all relevant and accurate information from the above noted studies and update the available relevant information via critical evaluation of the data used and the interpretation of such, and collect, evaluate and properly interpret all relevant new data available specific to existing wastewater management systems.

2. Identify the General Environmental Conditions in and around the Town of Spencer (Town staff to assist in this task). This will include:

   a. Description of Basin-Wide Initiatives and Other Facilities Plans for Town's Watershed Basin:

      - Compile a bibliography of existing reports, plans and initiatives that impact the land use and conditions of Spencer and the watershed basin. CMRPC, MassDEP, EPA, and other entities may have plans for inclusion in the bibliography.
      - Identify important components of other plans that may impact Spencer's wastewater management plans.
      - Compile information from the Chicopee River Watershed Action Plan and for the Spencer Seven Mile River Watershed.

   b. Description of the Town's built/human environment (desktop study). Based on current, relevant information to be provided by Town staff:

      - Review and integrate relevant information presented in the Town's Master Plan, census data and zoning regulations to describe the current population and land uses within the Town.
      - Meet with the Spencer Conservation Commission and Planning Department staff to describe recent and anticipated development trends, both residential and commercial, and to describe any conservation or open space efforts, including wetlands conservation bylaws.
      - Based on availability, develop a base map using data layers from MassGIS and/or Spencer's GIS.
      - Indicate locations of existing conservation land on the base map.

   c. Description of the natural environmental systems based on reviewing and summarizing information compiled in previous studies:

      - Identify locations and issues of critical environmental concern. Coordinate, as applicable with MRPC and Spencer Conservation Commission.
      - Describe the regional climate conditions using available NOAA data.
      - Describe the soils in Spencer using NRCS soil conditions reports and maps as informational sources. Coordinate, if applicable with Board of Health (BOH) staff on soils, perc rates and groundwater information. The BOH staff will be interviewed to gather specific field observations and experiences regarding Spencer soils information

and locations. Locate areas containing soils poorly suited to onsite disposal on the base map.

- Describe the regional and localized hydrologic conditions using available published information from USGS, DEM or other agency sources.
- Describe the regional and localized hydrogeologic conditions using available published information from USGS, DEM or other agencies sources.
- Describe the regional and localized water quality conditions using available reports from the BOH summer water quality testing for specific water bodies within the Town and other available published information from USGS, MassDEP, EPA, CMRPC or other agency sources. Location any historically troubled surface water bodies on the base map.
- Describe wetlands or species habitats in Spencer using available published information by the Conservation Commission, Natural Heritage, CMRPC or other agency sources. Locations on the base map.
- Describe flood plain locations in Spencer using available FEMA maps. Locations on the base map.
- Describe regional air quality and noise conditions using available MassDEP, EPA and other available sources.

d. Compile the summary information from this task into a draft of Chapter 1 of the CWMP Phase I report submittal.

3. Describe the Town of Spencer Existing Water System and Supply Sources.

The Spencer Water Department is responsible for managing the Town's surface and groundwater supplies. Engineer will summarize a description of the existing water system into Chapter 2 of the CWMP Phase I report submittal, emphasizing the following items:

- A brief description of the Town's existing potable water supply, source/raw water treatment and Hi/Lo pressure distribution systems based on available relevant information (Annual Statistical Report, Annual Water Quality Report, Water Management Permit, Water Withdraw Permit, past water system assessments, etc.) provided by the Town Water Department.
- Discuss private well zoning issues, compliance with MassDEP Zone I wellhead protection areas and any recent water system assessments with Town Water Department.
- A summary of water use trends and future water demands.
- A review of recent and ongoing water conservation efforts and potential for further demand reduction. (If the Town has not addressed, as an Additional Service Wright-Pierce will conduct a desktop study.)
- A description of Spencer's source water protection measures and any goals for enhancing protection in the future.

4. Describe the current Sewered Wastewater Collection and Treatment Systems and Non-Sewered Wastewater Management Systems, and Determine Wastewater Management Needs. This will include:

a. A Desk Top Study by Wright-Pierce will be conducted to develop a description of the Town's Existing Wastewater Systems. This effort will include:

- Description of the Town's existing wastewater facilities including the collection, treatment and effluent disposal systems.

- Review, evaluate and summarize the existing and future wastewater flows and loads.
- Review and summarize the current status of the wastewater treatment facilities, including:
  - Current and future permit conditions (NPDES permit limits, compliance schedule and other conditions).
  - Physical and operational conditions of facilities.
  - Historical modifications and upgrades to the facilities.
  - Planned upgrades and modifications to treatment facilities including: headworks; influent pump station; aeration system; final clarifiers; septage receiving; sludge handling/dewatering/removal; WAS & RAS pumping systems; nutrient, nitrogen & copper removal; emergency generator; SCADA; outfall relocation; etc.
  - The basis for this section will primarily be the preliminary needs discussion with WWTP staff, pending NPDES permit limits, EPA Order of Compliance for Copper and the physical/operational condition of the existing WWTP.
- Review and summarize the current status of the wastewater collection system, including:
  - Current and future permit conditions (NPDES conditions for infiltration/inflow work and reporting).
  - Physical conditions of collection system.
  - Recent modifications and upgrades to the collection system.
  - Review and summary of I/I investigations and SSES work completed in the last decade (the basis for this section will primarily be the 1990 I/I report and the proposed 2017 I/I and SSES).
  - Planned I/I rehabilitation projects/tasks (rehabilitation tasks/projects remaining).
- Describe the Town's current septage receiving and pretreatment program, including the quantity of septage pumped from Spencer's septic systems. Discuss any grease trap and odor issues from businesses with WWTP personnel.
- Meet with the Board of Health staff to collect available relevant information, and develop summary description of the current situation of Town's onsite subsurface wastewater disposal systems. Discuss any grease trap and odor issues from businesses with BOH health agent.
- Describe the Board of Health septic system regulations and procedures. Septage disposal, pumping records, new system installation, and repair procedures will be reviewed and explained.

b. Develop Sewered and Non-Sewered Areas within Study Area:

- The Town in the early 1980's divided up the sanitary sewer system into 10 sewered sewer system subreaches (A thru H, J and K). Past I/I and SSES studies, sewer system manhole inspections, sewer system rehabilitation work and televising of sewer system by WWTP staff reference locations using these subreach designations.
- Non-sewered areas within the Study Area will be "synced" with these subreaches as sewering of existing areas or future growth/expansion areas will come from either within these subreaches or their periphery.
- Distinctive Non-Sewered Areas for which wastewater management needs can be assessed and solutions analyzed will be created. The size of the individual non-sewered areas will be small enough so customized solutions can be developed. Should significantly different natural conditions be found within existing neighborhoods, non-sewered areas may be subdivided to reflect specific characteristics and solutions.

Distinctive Non-Sewered Areas will also include open land that has been targeted for development in the Town Master Plan.

- A table will be prepared listing the existing sewer system subreaches and the Distinctive Non-Sewered Areas and additional information stated in Item c. below.
- A base map figure will be developed initially showing the existing sewer subreaches and the initial Distinctive Non-Sewered Areas for use as stated in Item c. below.

c. Summarize existing conditions of Non-Sewered Areas within Study Area and identify and evaluate problems for each within the Study Area including:

- Develop a streamline "Needs Assessment" for the project based on the results of the previous studies. This will include categorization of each Non-Sewered Area "needs" into broad groupings. Examples of these "needs" groupings could be: Public Health; Water Supply Protection; Protection of Surface Waters (from nutrient enrichment); and enabling smart growth/other desired/required development (Chapter 40B or 40R projects for example).
- Develop a short-list of the Distinctive Non-Sewered Areas down to a strategic number so that the analysis can be focused and cost-effective (i.e, exclude conservation restricted land and other non-developable land areas). In general, Distinctive Non-Sewered Areas will not include the areas of the Town that are already sewered. Exception, those Non-Sewered Areas adjacent to a sewer line or subsurface disposal systems that if converted to pumped systems could access sewer.
- Review water quality data collected in previous studies, if applicable and update as appropriate (specifically looking for areas near bacteria impacted ponds or receiving waters); query available GIS system information (specifically looking for areas with high unit water use); and review BOH variances collected in previous studies, if applicable and update as appropriate.
- Perform brief visual ("windshield") survey to determine overall characteristics of each Distinctive Non-Sewered Areas. Survey will: identify natural characteristics surrounding the Area, such as the presence of woodlands, water bodies, floodplain or wetlands; comment on the development characteristics of the neighborhood such as density of development; note the presence or absence of trees or ledge outcroppings; describe the overall topography of the Area, including the severity and direction of street grades, and if houses are significantly higher or lower than street elevations; identify signs of failed on-site systems; and identify, characterize and list by street address any commercial properties. This survey will be "drive-by with appropriate stops" in nature, as opposed to a detailed lot-by-lot review.
- Compile available Board of Health records for the Distinctive Non-Sewered Areas, including: septage pumping records; sites that have failed Title 5 inspections; sites that have been issued system repair or replacement permits; and properties that have applied for financial assistance for system repairs. Update base map to locate system problems.
- Identify current lot sizes and zoning regulations within each Distinctive Non-Sewered Area. Consult assessor's maps and zoning regulations, and discuss known variances from the regulations with the Board of Health and Planning Board staff. It is assumed that the Assessors information necessary for these tasks will be available electronically from the Town.
- Identify the potential for subdivision of land and further development within each Distinctive Non-Sewered Area. Review the Town's Master Plan and zoning regulations, and consult with the Planning Board Staff. Identify and evaluate planned and potential Chapter 40B and 40R housing projects in Spencer within the Distinctive

Non-Sewered Areas. Update base map to indicate these potential Distinctive Non-Sewered Areas developments.

- Identify the development potential of land adjacent to each Distinctive Non-Sewered Areas. Review the Town's Master Plan and zoning regulations, and consult with the Planning Board staff. Update base map to indicate potential development.
- Combine information on current zoning and planned growth to estimate current and future wastewater flows from each Distinctive Non-Sewered Areas. Develop a flow calculation spreadsheet based on the assessor's information. Spreadsheet to include information necessary to summarize current flow and projected future flow estimates. It is assumed that the Assessors information necessary for these tasks will be available electronically from the Town.
- Perform a soils evaluation to determine the characteristics of soils in each Distinctive Non-Sewered Areas. The evaluation will focus on assessing the feasibility of using on-site systems or groundwater discharge systems. This evaluation will consist of a review of previous studies along with available BOH records and soils data. No field investigations will be conducted as part of this Scope.
- Compile and analyze existing groundwater quality data if available from past studies and the Town. Available BOH groundwater quality data will be obtained from staff and evaluated. No field investigations will be conducted as part of this Scope.

d. Rank Distinctive Non-Sewered Areas within Study Area by need for wastewater management:

- Apply a rating formula to each Distinctive Non-Sewered Areas within the Study Area (including undeveloped lands) and present the rating criteria and Distinctive Non-Sewered Areas conditions in a decision matrix to illustrate how each Distinctive Non-Sewered Area's rating was determined.
- Rank the Distinctive Non-Sewered Areas according to their respective wastewater needs as determined by the calculated rating.
- Update table for matrix and ranking information.
- Update base map to present Distinctive Non-Sewered Areas rating information.

e. Based on high rankings, recommend Distinctive Non-Sewered Areas within Study Area that require off-site solutions and therefore, further investigation in the CWMP:

- Summarize the Distinctive Non-Sewered Areas into groupings that will range from the favorable scenario (capable of handling current and expanded use with on-site systems) to least favorable scenario (not adequate for onsite disposal and requiring off-site solution). The final grouping of Needs Distinctive Non-Sewered Areas will establish the baseline for specific Distinctive Non-Sewered Areas to be considered in Phase II.
- Assess the suitability of continued reliance on subsurface disposal systems for Distinctive Non-Sewered Areas Study that received low rankings and determine if those areas should be studied further in the CWMP.

f. Evaluate alternatives for legal and/or zoning regulations which control the number of tie-ins to existing and future sewers.

g. Evaluate the Town's current Sewer Regulations/Ordinance and recommend revisions (if necessary) to provide minimum design criteria for private sewer connections in anticipation of the transfer of authority for such issues from MassDEP to the local level.

5. CWMP Phase I Report:

   a. Compile the conclusions of all tasks and prepare and produce an initial Draft CWMP Phase I Report.

   b. Engineer will make a total of five (5) hard copies, and have Town post a pdf copy to their web site of an initial Draft CWMP Phase I Report and submit to the Town for review and comment.

   c. One (1) project meeting scheduled for the middle of July 2018 is included in this task for review and discussion of the initial Draft CWMP Phase I Report with the Town and applicable stakeholders.

   d. Comments received from Town and during the public review process will be finalized by discussion and addressed prior to submitting a revised Draft CWMP Phase I Report to MassDEP for review.

6. Massachusetts Department of Environmental Protection Review

a. Engineer shall submit one copy of the revised Draft CWMP Phase I Report to MassDEP for review. One (1) joint meeting scheduled for end of July 2018 is included in this task for review and discussion of revised Draft CWMP Phase I Report with MassDEP and the Town.

b. Engineer will meet with MassDEP officials and Town to discuss revised Draft CWMP Phase I Report. Written comments will be received, finalized by discussion as necessary and addressed prior to submitting a Final CWMP Phase I Report to MassDEP for approval.

c. Engineer will finalize Report, make and submit one copy of the Final CWMP Phase I Report to MassDEP for approval in the middle of August 2018. Three (3) additional copies will be made for distribution to the Town.

TASK NO.2/PHASE II – MANAGEMENT TECHNIQUES AND ALTERNATIVES IDENTIFICATION AND SCREENING

1. **IF NECESSARY** - Determine potential locations for off-site collection and treatment facilities. *(Note, the level of effort for this task depends on the number of off-site locations and the number of treatment facilities under consideration. For purposes of this Agreement Wright-Pierce has assume a total of **28** manhours)*. This effort will include:

   a. Review required siting criteria and update as appropriate.

   b. Compile a list of potential sites for construction of decentralized wastewater treatment facilities and groundwater discharge:

      - Using assessor's information, identify undeveloped parcels with sufficient acreage, proximity to need areas, and distance from environmentally sensitive areas to develop a list of potential sites.
      - Perform a visual inspection of each site to describe topography and ground cover.
      - Perform a literature search to determine the general soils and groundwater conditions of each site.

- Using the selection criteria and information in the above tasks, screen the identified sites to form a short-list of potential sites.
- Perform a desktop hydrogeologic evaluation of identified potential sites to determine the feasibility of constructing an effluent disposal system on site(s).
- Rank the potential sites according to the desktop hydrogeologic evaluation and the evaluation criteria.
- Update the base map to reflect the locations of the potential sites.

2. Prepare a technical memorandum describing the selection criteria and the list of potential off-site treatment sites. Distribute to the Town and MassDEP for review, and incorporate any suggested revisions into Chapter 1 of the CWMP Phase II submittal.

3. Develop overview of wastewater management techniques and technologies. This will include:

   a. Review technical, operational and permitting considerations of potential **on-site solutions** as appropriate:

   - Technical considerations:

     - Identify ideal, adequate and prohibitive soil types.
     - Identify preferred and prohibitive groundwater separations, per applicable regulation.
     - Identify spatial constraints such as lot size, proximate to property lines and proximity to wells, etc.
     - Identify other facilities, such as septic tanks, leaching fields and/or electricity power sources that must be present for any proposed technology to be feasible.
     - Describe other conditions that are required for proposed system to work or other conditions that prohibit the system's use.

   - Operational considerations:

     - Describe the maintenance required to sustain a proposed system's operation.
     - Describe conditions that may cause the system to operate ineffectively.
     - Identify the residuals produced by the process.

   - Describe the overall advantages and disadvantages of potential on-site solutions with regard to:

     - Disposal of wastewater.
     - Continued limitations on growth.
     - Capital and O & M costs.
     - Pollution potential from failing or improperly maintained systems.
     - Odors.
     - Reliability.
     - Redundancy.
     - Phasing considerations.
     - Environmental impacts.

   - Group the technologies into similar categories, and assess the general permitting and regulatory requirements for the on-site systems.

b. Review technical, operational and permitting considerations of potential **decentralized treatment solutions** as appropriate:

- Technical considerations:
    - Describe the wastewater loading rates and characteristics that are well suited and poorly suited for the technology.
    - Describe site conditions, including climate, soils, and groundwater elevation, that promote efficient treatment.
    - Describe the conditions that hinder operations.
    - Identify other treatment trains that must be paired with the technology to gain regulatory approval or adequate effluent quality.
    - Estimate the required land area for a decentralized treatment facility.

- Operational considerations:
    - Describe the staffing and training requirements to operate the facility.
    - Identify the materials/chemicals required to operate the system.
    - Identify the residuals produced by the process, and the requirements for residuals disposal.
    - Describe required maintenance schedules and procedures.

- Describe the advantages and disadvantages of decentralized treatment solutions with regard to:
    - The non-centralized disposal of wastewater.
    - The limitation of growth.
    - Location of treatment facilities.
    - Odor control.
    - The technologies reliability.
    - The technologies performance.
    - Any significant environmental impacts.
    - Potentially higher capital and operations costs.

- Assess the general permitting/regulatory requirements of each decentralized treatment solution, including:
    - Board of Health approval.
    - Conservation Commission approval.
    - Possible Army Corps of Engineers 404 permit.
    - Possible MassDEP 401 Water Quality Certification.
    - MassDEP groundwater discharge permits.
    - MassDEP approval for some I/A technologies.
    - Other applicable permitting and regulatory requirements.

c. Review technical, operational and permitting considerations of potential additions (sewer extensions) to the existing **centralized/regional** wastewater collection system:

- Review previously described technical considerations associated with the different wastewater collection system alternatives available:
    - Conventional sewers (gravity sewers, pump stations and force mains).

- Low pressure sewers.
- Small diameter gravity sewers.
- STEP and vacuum systems will not be considered.

- Describe the operational considerations associated with different collection system components, such as:
  - Odor control.
  - Lower O&M on conventional gravity sewers.
  - Higher O&M on low pressure and pump stations.

- Describe the overall advantages and disadvantages of a centralized/regional wastewater solution, including:
  - Management/control of facilities.
  - Capital and O&M costs.
  - WWTF effluent monitoring and control.

- Describe the overall general permit/regulatory requirements for the construction of wastewater collection systems, including:
  - Possible Conservation Commission approval.
  - MassDEP sewer extension permit.
  - Easements and/or property takings.

d. Review previously detailed watershed-based (wastewater and non-wastewater) management techniques and update as appropriate: Review local and regional conservation initiatives, and briefly describe conservation issues.

e. Prepare a technical memorandum summarizing the information generated for Item 2c on potential technologies. To the maximum extent possible, present the information in a format that facilitates the evaluation of potential technologies using the general screening criteria. This will become Chapter 2 of the CWMP Phase II report.

4. Screening of the Potential Techniques/Technologies. *(For purposes of this Agreement Wright-Pierce has assume a total of 32 manhours)*:

   a. Develop a technology evaluation form based on the screening criteria (if/as necessary).

   b. Complete a technology evaluation form for each potential technology (if/as necessary).

   c. If necessary, develop a decision matrix summarizing the information on the technology evaluation forms. The matrix would consist of criteria on one axis, technologies on the other, and numerical ratings in the array.

   d. Prepare a technical memorandum summarizing the screening process and recommendation of candidate technologies for further examination in Phase III. This will become Chapter 3 of the CWMP Phase II Report.

5. CWMP Phase II Report:

   a. Compile the conclusions of all tasks and prepare and produce an initial Draft CWMP Phase II Report.

   b. Engineer will make a total of five (5) hard copies, and have Town post a pdf copy to their web site of an initial Draft CWMP Phase II Report and submit to the Town for review and comment.

   c. One (1) project meeting scheduled for the middle of October 2018 is included in this task for review and discussion of the initial Draft CWMP Phase II Report with the Town and applicable stakeholders.

   d. Comments received from Town and during the public review process will be finalized by discussion and addressed prior to submitting a revised Draft CWMP Phase II Report to MassDEP for review.

6. Massachusetts Department of Environmental Protection Review

   a. Engineer shall submit one copy of the revised Draft CWMP Phase II Report to MassDEP for review. One (1) joint meeting scheduled for end of October 2018 is included in this task for review and discussion of Draft CWMP Phase II Report with MassDEP and the Town.

   b. Engineer will meet with MassDEP officials and Town to discuss revised Draft CWMP Phase II Report. Written comments will be received, finalized by discussion as necessary and addressed prior to submitting a Final CWMP Phase II Report to MassDEP for approval.

   c. Engineer will finalize Report, make and submit one copy of the Final CWMP Phase II Report to MassDEP for approval in the middle of November 2018. Three (3) additional copies will be made for distribution to the Town.

<u>TASK NO.3/PHASE III</u> - DETAILED EVALUATION OF ALTERNATIVES, DEVELOPMENT OF RECOMMENDED WASTEWATER MANAGEMENT PLAN AND DRAFT AND FINAL COMPREHENSIVE WASTEWATER MANAGEMENT PLAN REPORT

1. Pair candidate technologies with Needs Areas to create viable alternatives:

   a. Describe conditions present in each Study Area, including a summary of conditions described in the Phase III report:

      - For each Study Area:
         - Identify <u>on-site</u> techniques that are <u>not feasible</u> because area conditions (e.g. soils, lot size, and groundwater) are prohibitive for the technology.
         - Identify <u>on-site</u> technologies that are <u>not preferred</u> because area conditions are not ideal for the technology.
         - Identify <u>on-site</u> technologies that are <u>technically feasible</u> because area conditions align with conditions that are conducive for implementation of the technology.
         - Create a short-list of viable <u>on-site</u> technologies for each Area.

b. Pair needs Areas with nearby potential sites for decentralized treatment facilities and describe the collection/conveyance system from the Study Area to the site:

- Describe the conditions present at each potential site and create a short-list of viable decentralized technologies for each site.
- Describe the viable centralized alternatives.
- Compile the viable alternatives into solutions for each Area and combination of Areas and potential sites, as necessary.

2. Prepare general conceptual designs of each viable alternative *(Note, the level of effort for this task depends on the number of Study Areas and the number of candidate technologies under consideration. For purposes of this Agreement Wright-Pierce has assume a total of **44** manhours)*. In the case of on-site solutions, conceptual designs will consist of selecting representative lots and representing the I/A technology (if necessary) on those lots. For decentralized solutions, a collection system schematic in the Study Area and a preliminary facility layout on the Site will be developed. For the centralized solutions, a schematic wastewater collection system layout indicating the destination of the wastewater will be presented.

a. For each viable alternative, identify the associated general environmental impacts:

- Water quality and quantity including the amount of groundwater recharge vs. surface water discharge.
- Solid/hazardous waste generation (including septage or residuals disposal).
- Odors, air and noise.
- Visual, historical, open space and recreation impacts.
- Wetlands, habitat and flood plain impacts.
- Growth and development consideration.
- Aesthetic compatibility of the system with the surrounding environment.

b. For each viable alternative, prepare a preliminary present-worth cost analysis for construction and operation of systems in each Area or site:

- Establish budgetary costs for components of potential wastewater management systems.
- Estimate quantities for each viable technology in each Area or potential site.
- Calculate a budgetary capital cost of each viable option for each Area or potential site, including ancillary costs to develop the solution.
- Estimate the operation and maintenance cost of each viable alternative for each Area, including any unique costs.

c. Compile the conceptual designs for each Area and combinations of Areas and sites. This will include schematic layouts, evaluation matrices for environmental impacts, and a present-worth calculation to estimate the preliminary costs

3. Apply the selection methodology to each of the viable alternative conceptual designs:

a. Develop a viable alternative evaluation form based on the selection methodology set forth. The impetus behind the form and format of the form will be similar to the one developed for the technology screening process.

b. Complete an evaluation form for each viable alternative.
c. Generate a decision matrix summarizing the information on the evaluation forms.
d. Develop a recommended preferred technology for each Area or combination of Areas and sites. This will become a chapter of the Phase III report.

4. Final Wastewater Management Plan Refinement.

a. Develop a conceptual summary of the recommended wastewater management systems which may include, on-site, decentralized and centralized systems

- Prepare schematic design presenting wastewater collection system routes and connection to existing system.
- Locate proposed pumping stations.
- Indicate present and future design flows.
- If applicable, provide a general summary of decentralized treatment facilities to accommodate current and future flows.
- Identify potentially impacted wetlands and estimate any required replication.
- Outline water conservation programs.

b. Review and evaluate existing Inter-Municipal Agreements (IMAs) with the other Towns. **The Town of Spencer has no existing IMAs.**

c. Identify and generally summarize the environmental impact of the preferred alternative:

- Assess the aesthetics impacts of decentralized facilities, if applicable.
- Assess the alternative impacts to groundwater quality, particularly in any Zone II's, if applicable.
- Estimate the quantities of residuals produced by the treatment facilities and indicate the potential disposal methods.
- Indicate the potential for odor generation or air pollution.
- Assess the reduced risk to human health by discontinuing use of septic systems for areas that this was determined to be the best solution.
- Identify any general impacts to wetlands or species habitat and indicate any mitigation measures (no wetlands delineation is included in the Scope of Services).
- Estimate average power consumption by the operation of the proposed facilities.
- Indicate the materials and chemicals required to operate the facilities.
- Assess how the proposed alternatives might impact projected growth patterns.
- Prepare a complete flow table for both the existing and proposed sewers for each proposed alternative.

d. Identify the regulatory considerations and permit requirements of the preferred alternatives.

e. Prepare a planning level present-worth cost analysis for the recommended plan, including both capital and O & M costs.

5. Compile the separate selected components of the overall plan into a single Recommended Wastewater Management Plan:

- Combine the selected preliminary solutions into a single recommended plan.
- Assess the cumulative environmental impacts of the recommended plan.
- Develop a final cost estimate for the recommended plan.

- Assess the "cost-per-household" of the recommended plan by comparing the final cost estimate to the number of households served by the recommended plan.

6. Develop an Implementation Plan:

   - Prepare a brief project implementation plan.
   - Identify a plan for financing the project including possible sources of funding.
   - Outline a proposed project schedule, including sequencing of construction contracts, permits and project compliance.

7. Compile all of the Phase I, II and III efforts into a unified Draft CWMP Report. This report will serve as the **draft** version of the Comprehensive Wastewater Management Plan:

   a. Engineer will make a total of five (5) hard copies, and have Town post a pdf copy to their web site of a unified Draft CWMP Report and submit to the Town for review and comment.

   b. Engineer shall submit one copy of the unified Draft CWMP Report to MassDEP for review. One (1) joint meeting scheduled for the end of November 2018 is included in this task for review and discussion of Draft CWMP Report with MassDEP and the Town.

   c. One (1) Public Meeting scheduled for the middle of December 2018 is included in this task for review and discussion of the unified Draft CWMP Report with the Town, applicable stakeholders and Public Meeting/Hearing attendees (see Item 8 below).

8. Facilitate public review process:

   a. Facilitate the CWMP public review process.

   b. Prepare materials, including summary sheets, maps and graphics for a Public Hearing.

   c. Attend one Public Meeting/Hearing with Town and MassDEP.

   d. Compile a summary of comments received from the Public hearing/review process.

9. Revise the unified Draft CWMP Report into the Final CWMP report based on feedback from the Public Meeting/Hearing and review and feedback from MassDEP and other stakeholders:

   a. Upon the completion of this phase, Engineer in conjunction with the Town and MassDEP officials will agree upon which comments received during the public review process to address, and how to best address them. The responses to these comments will be incorporated into the Final CWMP submittal. The content of the report will be revised to reflect comments from regulatory agencies and the public. An executive summary including the conclusions and recommendations will be added to the report.

   b. The input resulting from the unified Draft CWMP will be incorporated into the Final CWMP for approval by MassDEP and ratification by the Town.

   c. Engineer will make a total of five (5) hard copies, and have Town post a pdf copy to their web site of the Final CWMP Report.

   d. Engineer will make and submit one hard copy and one digital of the Final CWMP Report to MassDEP for approval in the end of December 2018.

B

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act as amended (33 U.S.C. §§1251 et eq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap. 21, §§26-53),

Town of Spencer
Sewer Commission

is authorized to discharge from a facility located at

Spencer Wastewater Treatment Plant
Route 9
Spencer, MA

to receiving waters named

Cranberry Brook

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit will become effective on the first day of the month following 60 days after signature.

This permit and the authorization to discharge expire at midnight, five (5) years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on February 4, 2003 and expired on April 5, 2006.

This permit consists of 12 pages in Part I including effluent limitations, monitoring requirements, and state permit conditions; 25 pages in Part II, Standard Conditions; Attachment A - Freshwater Chronic Toxicity Test Procedure and Protocol, and Attachment B - Sludge Compliance Guidance.

Signed this 27th day of September, 2007.

/S/ SIGNATURE ON FILE

Stephen S. Perkins, Director	Glenn Haas, Director
Office of Ecosystem Protection	Division of Watershed Management
Environmental Protection Agency	Department of Environmental Protection
Boston, MA	Commonwealth of Massachusetts
	Boston, MA

PART I

A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning with the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall number 001. Such discharge shall be limited and monitored as specified below:

Effluent Characteristic	Units	Discharge Limitation			Monitoring Requirement	
		Average Monthly	**Average Weekly**	**Maximum Daily**	**Measurement Frequency**	**Sample Type**
Influent Flow – Annual Average[1]	MGD	1.08	----	-----	Continuous	Recorder
Influent Flow[1]	MGD	Report	----	Report	Continuous	Recorder
Effluent Flow – Annual Average[1]	MGD	Report	----	-----	Continuous	Recorder
Effluent Flow[1]	MGD	Report	----	Report	Continuous	Recorder
BOD *(May 1- October 31)* *(November 1 - April 30)*	mg/l lbs/day mg/l lbs/day	5.6 50 30 270	7.5 68 45 405	Report Report Report Report	1/Week[2]	24-Hour Composite[3]
TSS *(May 1- October 31)* *(November 1- April 30)*	mg/l lbs/day mg/l lbs/day	5.6 50 30 270	7.5 68 45 405	Report Report Report Report	1/Week[2]	24-Hour Composite[3]
PH	S.U.	(See Condition I.A.1.a on page 6)			1/Day	Grab
Fecal Coliform Bacteria[4,5]	cfu/100 ml	200	----	400	1/Week	Grab
Escherichia Coli Bacteria [4,5]	cfu/100ml	126	----	669	1/Week[5]	Grab

Effluent Characteristic	**Units**	**Discharge Limitation**			**Monitoring Requirement**	
		Average Monthly	**Average Weekly**	**Maximum Daily**	**Measurement Frequency** Page	**Sample Type**
Ammonia-Nitrogen						
(May 1- October 31)	mg/l	0.56	0.84	Report	1/week	24-Hour Composite[3]
	lbs/day	5.0	7.5	Report		
(December 1- April 30)	mg/l	15.2	----	----	2/Month	
	lbs/day	136	----	----		
(November 1-30)	mg/l	8.5	----	----	1/week	
	lbs/day	76	----	----		
Total Nitrogen[6]	mg/l	Report	-----	-----	4/year	24-Hour Composite[3]
	lbs/day	Report				
Total Phosphorus						
(May 1-October 31)[7]	mg/l	0.2	--------	Report	3/week	24-Hour Composite[3]
	lbs/day	Report	--------	Report		
	lbs/day	0.79[7]	--------	--------	1/year	
(November 1- April 30)[8]	mg/l	0.3	1.0	Report	1/week	24-Hour Composite[3]
	lbs/day	Report	--------	Report		
	lbs/day	1.19[8]	--------	--------	1/year	
Copper[9]	µg/l	10.3	-----	15.3	1/Month	24-Hour Composite[3]
LC_{50}[10, 11, 13]	%	100%			2/year	24-Hour Composite[3]
Chronic NOEC[10, 12, 13]	%	92%			2/Year	24-Hour Composite[3]
Dissolved Oxygen	mg/l	>6.0	>6.0	-----	1/week	Grab

(May 1- October 31)

Footnotes:

1. Report annual average, monthly average, and the maximum daily influent and effluent flow. The 1.08 MGD flow limit is an annual average of the influent flow, which shall be reported as a rolling average. The value will be calculated as the arithmetic mean of the monthly average influent flow for the reporting month and the monthly average flows of the previous eleven months. For the purpose of calculating the mass of pollutants in the discharge, effluent flow shall be used.

2. Sampling required for influent and effluent.

3. 24-hour composite samples will consist of at least twenty four (24) grab samples taken during one consecutive 24 hour period, either collected at equal intervals and combined proportional to flow or continuously collected proportionally to flow.

4. This is a state certification requirement.

5. The fecal coliform monitoring and limits will be in effect for the period April 1 - October 31. Fecal coliform discharges shall not exceed a monthly geometric mean of 200 colony forming units (cfu) per 100 ml, nor shall exceed 400 cfu per 100 ml as a daily maximum. The fecal coliform limits and monitoring requirement will end one year from the effective date of the permit.

   The Escherichia Coli (E. coli) limits will become effective one year from the effective date of the permit and will be in effect for the period from April 1 - October 31. E. coli discharges shall not exceed a monthly geometric mean of 126 cfu100 ml, nor shall exceed 669 cfu as a daily maximum. E.coli monitoring frequency will increase to 1/week when the limits become effective. During the first year of the permit, when both fecal coliform and E.coli sampling are required, E. coli samples shall be taken at the same time as a fecal coliform sample.

6. Total Nitrogen shall be determined by performing the "Total Kjeldahl Nitrogen (as N)" test and the "Nitrate-Nitrite (as N)" test and adding the two test results together to produce a value for mg/l of Total Nitrogen.

7. The 0.79 lbs/day total phosphorus limit is a seasonal average limit for the period *May 1 – October 31*. The seasonal mass total phosphorus load shall be calculated as the arithmetic mean of the six monthly average total phosphorus loads for the months of *May 1 – October 31*, and shall be reported in November of each year.

8. The 1.19 lbs/day total phosphorus limit is a seasonal average limit for the period *November 1 – April 30*. The seasonal mass total phosphorus load shall be calculated as the arithmetic mean of the six monthly average total phosphorus load for the months of *November 1 – April 30*, and shall be reported in May of each year.

9. The minimum level (ML) for copper is defined as 3.0 µg/l. This value is the minimum level for copper using the furnace atomic absorption analytical method. Sample results of 3 µg/l or less shall be reported as zero on the discharge monitoring report.

10. The permittee shall conduct chronic (and modified acute) toxicity tests two times per year. The chronic test may be used to calculate the acute LC_{50} at the 48 hour exposure interval. The permittee shall test the daphnid, Ceriodaphnia dubia, only. Toxicity test samples shall be collected during the second week of the months of February and August. The test results shall be submitted by the last day of the month following the completion of the test. The results are due March 31 and September 30, respectively. The tests must be performed in accordance with test procedures and protocols specified in **Attachment A** of this permit. If the results of any acute or chronic test fail to comply with the LC_{50} and Chronic NOEC limits, the permittee must perform an additional test on an effluent sample collected within fourteen days of the date on which failed test sample was collected.

Test Dates	**Submit Results By:**	**Test Species**	**Acute Limit LC_{50}**	**Chronic Limit C-NOEC**
February August	March 31 September 30	Ceriodaphnia dubia (daphnid) See Attachment A	≥ 100%	≥ 92%

11. The LC_{50} is the concentration of effluent which causes mortality to 50% of the test organisms. Therefore, a 100% limits means that a sample of 100 % effluent (no dilution) shall cause no more that a 50% mortality rate.

12. C-NOEC (chronic-no observed effect concentration) is defined as the highest concentration of toxicant or effluent to which organisms are exposed in a life cycle or partial life cycle test which causes no adverse effect on growth, survival, or reproduction at a specific time of observation as determined from hypothesis testing where the test results exhibit a linear dose-response relationship. However, where the test results do not exhibit a linear dose-response relationship, the permittee must report the lowest concentration where there is no observable effect. The "92% or greater" is defined as a sample which is composed of 92% (or greater) effluent, the remainder being dilution water.

13. If toxicity test(s) using receiving water as diluent show the receiving water to be toxic or unreliable, the permittee shall follow procedures outlined in **Attachment A Section IV.,**

DILUTION WATER in order to obtain an individual approval for use of an alternate dilution water. In lieu of an individual approval for alternate dilution water required **in Attachment A**, EPA-New England has developed a Self-Implementing Alternative Dilution Water Guidance document (called "Guidance Document") which may be used to obtain automatic approval of an alternate dilution water, including the appropriate species for use with that water. If this Guidance document is revoked, the permittee shall revert to obtaining approval as outlined in **Attachment A**. The "Guidance Document" has been sent to all permittees with their annual set of DMRs and Revised Updated Instructions for Completing EPA's Pre-Printed NPDES Discharge Monitoring Report (DMR) Form 3320-1 and is not intended as a direct attachment to this permit. Any modification or revocation to this "Guidance Document" will be transmitted to the permittees as part of the annual DMR instruction package. However, at any time, the permittee may choose to contact EPA-New England directly using the approach outlined in **Attachment A**.

Part I.A.1. (Continued)

a. The discharge shall not cause a violation of the water quality standards of the receiving waters.

b. The pH of the effluent shall not be less than 6.5 or greater than 8.3 at any time.

c. The discharge shall not cause objectionable discoloration of the receiving waters.

d. The effluent shall not contain a visible oil sheen, foam, or floating solids at any time.

e. The permittee's treatment facility shall maintain a minimum of 85 percent removal of both total suspended solids and biochemical oxygen demand. The percent removal shall be based on monthly average values.

f. If the average annual influent flow in any calendar year exceeds 80% of the facilities design flow, **the permittee shall submit a report to MassDEP by March 31** of the following calendar year describing its plans for further flow increases and describing how it will maintain compliance with the flow limit and all other effluent limitations and conditions.

g. The results of sampling for any parameter above its required frequency must also be reported.

2. All POTWs must provide adequate notice to the Director of the following:

a. Any new introduction of pollutants into that POTW from an indirect discharger in a primary industry category discharging process water; and

b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

c. For purposes of this paragraph, adequate notice shall include information on:

(1) The quantity and quality of effluent introduced into the POTW; and

(2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

3. Prohibitions Concerning Interference and Pass Through:

a. Pollutants introduced into POTW's by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

4. Toxics Control

a. The permittee shall not discharge any pollutant or combination of pollutants in toxic amounts.

b. Any toxic components of the effluent shall not result in any demonstrable harm to aquatic life or violate any state or federal water quality standard which has been or may be promulgated. Upon promulgation of any such standard, this permit may be revised or amended in accordance with such standards.

5. Numerical Effluent Limitations for Toxicants

EPA or MassDEP may use the results of the toxicity tests and chemical analyses conducted pursuant to this permit, as well as national water quality criteria developed pursuant to Section 304(a)(1) of the Clean Water Act (CWA), state water quality criteria, and any other appropriate information or data, to develop numerical effluent limitations for any pollutants, including but not limited to those pollutants listed in Appendix D of 40 CFR Part 122.

B. UNAUTHORIZED DISCHARGES

The permittee is authorized to discharge only in accordance with the terms and conditions of this permit and only from the outfall listed in Part I A.1.of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs) are not authorized by this permit and shall be reported in accordance with Section D.1.e. (1) of the General Requirements of this permit (Twenty-four hour reporting). [Note: SSO Reporting Form (which includes MassDEP Regional Office telephone numbers) for submittal of written report to MassDEP is available on-line at http://www/mass/.gov/dep/water/approvals/surffms.htm#sso.]

Flow in excess of the plant's treatment capacity which does not receive full secondary treatment is not a permittable bypass under 40 CFR §122.41(m) and is not authorized by this permit.

C. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

Operation and maintenance of the sewer system shall be in compliance with the General Requirements of Part II and the following terms and conditions:

1. Maintenance Staff

   The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit.

2. Preventative Maintenance Program

   The permittee shall maintain an ongoing preventative maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure. The program shall include an inspection program designed to identify all potential and actual unauthorized discharges.

3. Infiltration/Inflow Control Plan:

   The permittee shall develop and implement a plan to control infiltration and inflow (I/I) to the separate sewer system. The plan shall be submitted to EPA and MassDEP **within six months of the effective date of this permit** (see page 1 of this permit for the effective date) and shall describe the permittee's program for preventing infiltration/inflow related effluent limit violations, and all unauthorized discharges of wastewater, including overflows and by-passes due to excessive infiltration/inflow.

   The plan shall include:

   - An ongoing program to identify and remove sources of infiltration and inflow. The program shall include the necessary funding level and the source(s) of funding.

   - An inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts. Priority should be given to removal of public and private inflow sources that are upstream from, and potentially contribute to, known areas of sewer system backups and/or overflows.

   - Identification and prioritization of areas that will provide increased aquifer recharge as the result of reduction/elimination of infiltration and inflow to the system.

- An educational public outreach program for all aspects of I/I control, particularly private inflow.

Reporting Requirements:

A summary report of all actions taken to minimize I/I during the previous calendar year shall be submitted to EPA and MassDEP annually, **by March 31**. The summary report shall, at a minimum, include:

- A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year.
- Expenditures for any infiltration/inflow related maintenance activities and corrective actions taken during the previous year
- A map with areas identified for I/I-related investigation/action in the coming year.
- A calculation of the annual average I/I and the maximum month I/I for the reporting year.
- A report of any infiltration/inflow related corrective actions taken as a result of unauthorized discharges reported pursuant to 314 CMR 3.19(20) and reported pursuant to the Unauthorized Discharges section of this permit.

4. Alternate Power Source

In order to maintain compliance with the terms and conditions of this permit, the permittee shall continue to provide an alternative power source with which to sufficiently operate its treatment works (as defined at 40 CFR §122.2).

D. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices and with the CWA Section 405(d) technical standards.

2. The permittee shall comply with the more stringent of either the state or federal (40 CFR part 503), requirements.

3. The requirements and technical standards of 40 CFR part 503 apply to facilities which perform one or more of the following use or disposal practices.

a. Land application - the use of sewage sludge to condition or fertilize the soil

b. Surface disposal - the placement of sewage sludge in a sludge only landfill

c. Sewage sludge incineration in a sludge only incinerator

4. The 40 CFR part 503 conditions do not apply to facilities which place sludge within a municipal solid waste landfill. These conditions also do not apply to facilities which do not dispose of sewage sludge during the life of the permit but rather treat the sludge (lagoons- reed beds), or are otherwise excluded under 40 CFR 503.6.

5. The permittee shall use and comply with the attached compliance guidance document to determine appropriate conditions. Appropriate conditions contain the following elements.

- General requirements
- Pollutant limitations
- Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
- Management practices
- Record keeping
- Monitoring
- Reporting

Depending upon the quality of material produced by a facility, all conditions may not apply to the facility.

6. The permittee shall monitor the pollutant concentrations, pathogen reduction and vector attraction reduction at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year:

less than 290	1/ year
290 to less than1500	1 /quarter
1500 to less than 15000	6 /year
15000 +	1 /month

7. The permittee shall sample the sewage sludge using the procedures detailed in 40 CFR 503.8.

8. The permittee shall submit an annual report containing the information specified in the guidance by **February 19**. Reports shall be submitted to the address contained in the reporting section of the permit. Sludge monitoring is not required by the permittee when the permittee is not responsible for the ultimate sludge disposal. The permittee must be

assured that any third party contractor is in compliance with appropriate regulatory requirements. In such case, the permittee is required only to submit an annual report by **February 19** containing the following information:

- Name and address of contractor responsible for sludge disposal
- Quantity of sludge in dry metric tons removed from the facility by the sludge contractor

E. MONITORING AND REPORTING

1. Reporting

Monitoring results obtained during each calendar month shall be summarized and reported on Discharge Monitoring Report Form(s) postmarked no later than the 15th day of the following month.

Signed and dated originals of these, and all other reports required herein, shall be submitted to the Director and the State at the following addresses:

Environmental Protection Agency
Water Technical Unit (SEW)
P.O. Box 8127
Boston, Massachusetts 02114

The State Agency is:

Massachusetts Department of Environmental Protection
Central Regional Office - Bureau of Resource Protection
627 Main Street
Worcester, MA 01608

Signed and dated Discharge Monitoring Report Forms and toxicity test reports required by this permit shall also be submitted to the State at:

Massachusetts Department of Environmental Protection
Division of Watershed Management
Surface Water Discharge Permit Program
627 Main Street, 2nd Floor
Worcester, Massachusetts 01608

G. STATE PERMIT CONDITIONS

This Discharge Permit is issued jointly by the U. S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) under Federal and State law, respectively. As such, all the terms and conditions of this permit are hereby incorporated into and constitute a discharge permit issued by the Commissioner of the MassDEP pursuant to M.G.L. Chap.21, §43.

Each Agency shall have the independent right to enforce the terms and conditions of this Permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the Agency taking such action, and shall not affect the validity or status of this permit as issued by the other Agency, unless and until each Agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this Permit is declared, invalid, illegal or otherwise issued in violation of State law such permit shall remain in full force and effect under Federal law as an NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this Permit is declared invalid, illegal or otherwise issued in violation of Federal law, this Permit shall remain in full force and effect under State law as a Permit issued by the Commonwealth of Massachusetts.

NPDES PART II STANDARD CONDITIONS
(January, 2007)

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PART II. A. GENERAL REQUIREMENTS

1. Duty to Comply

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

a. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirements.

b. The CWA provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any of such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Section 402 (a)(3) or 402 (b)(8) of the CWA is subject to a civil penalty not to exceed $25,000 per day for each violation. Any person who negligently violates such requirements is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both. Any person who knowingly violates such requirements is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the CWA, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the CWA. Administrative penalties for Class I violations are not to exceed $10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed $25,000. Penalties for Class II violations are not to exceed $10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed $125,000.

Note: See 40 CFR §122.41(a)(2) for complete “Duty to Comply” regulations.

2. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or notifications of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

The permittee shall furnish to the Regional Administrator, within a reasonable time, any information which the Regional Administrator may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Regional Administrator, upon request, copies of records required to be kept by this permit.

4. Reopener Clause

The Regional Administrator reserves the right to make appropriate revisions to this permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the CWA in order to bring all discharges into compliance with the CWA.

For any permit issued to a treatment works treating domestic sewage (including "sludge-only facilities"), the Regional Administrator or Director shall include a reopener clause to incorporate any applicable standard for sewage sludge use or disposal promulgated under Section 405 (d) of the CWA. The Regional Administrator or Director may promptly modify or revoke and reissue any permit containing the reopener clause required by this paragraph if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or contains a pollutant or practice not limited in the permit.

Federal regulations pertaining to permit modification, revocation and reissuance, and termination are found at 40 CFR §122.62, 122.63, 122.64, and 124.5.

5. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from responsibilities, liabilities or penalties to which the permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

6. Property Rights

The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges.

7. Confidentiality of Information

   a. In accordance with 40 CFR Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 CFR Part 2 (Public Information).

   b. Claims of confidentiality for the following information will be denied:

      (1) The name and address of any permit applicant or permittee;
      (2) Permit applications, permits, and effluent data as defined in 40 CFR §2.302(a)(2).

   c. Information required by NPDES application forms provided by the Regional Administrator under 40 CFR §122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

8. Duty to Reapply

If the permittee wishes to continue an activity regulated by this permit after its expiration date, the permittee must apply for and obtain a new permit. The permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Regional Administrator. (The Regional Administrator shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

9. State Authorities

Nothing in Part 122, 123, or 124 precludes more stringent State regulation of any activity covered by these regulations, whether or not under an approved State program.

10. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, nor does it relieve the permittee of its obligation to comply with any other applicable Federal, State, or local laws and regulations.

PART II. B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit and with the requirements of storm water pollution prevention plans. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

(1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can be reasonably expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypass not exceeding limitations

The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provision of Paragraphs B.4.c. and 4.d. of this section.

c. Notice

(1) Anticipated bypass. If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
(2) Unanticipated bypass. The permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (Twenty-four hour reporting).

d. Prohibition of bypass

Bypass is prohibited, and the Regional Administrator may take enforcement action against a permittee for bypass, unless:

(1) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
(2) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and
(3) i) The permittee submitted notices as required under Paragraph 4.c. of this section.
ii) The Regional Administrator may approve an anticipated bypass, after considering its adverse effects, if the Regional Administrator determines that it will meet the three conditions listed above in paragraph 4.d. of this section.

5. <u>Upset</u>

a. Definition. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of paragraph B.5.c. of this section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. Conditions necessary for a demonstration of upset. A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated;
(3) The permittee submitted notice of the upset as required in paragraphs D.1.a. and 1.e. (Twenty-four hour notice); and
(4) The permittee complied with any remedial measures required under B.3. above.

d. Burden of proof. In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

PART II. C. MONITORING REQUIREMENTS

1. Monitoring and Records

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records for monitoring information required by this permit related to the permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by 40 CFR Part 503), the permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application except for the information concerning storm water discharges which must be retained for a total of 6 years. This retention period may be extended by request of the Regional Administrator at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

d. Monitoring results must be conducted according to test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, unless other test procedures have been specified in the permit.

e. The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

2. Inspection and Entry

The permittee shall allow the Regional Administrator or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the CWA, any substances or parameters at any location.

PART II. D. REPORTING REQUIREMENTS

1. Reporting Requirements

a. Planned Changes. The permittee shall give notice to the Regional Administrator as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is only required when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR§122.29(b); or
(2) The alteration or addition could significantly change the nature or increase the quantities of the pollutants discharged. This notification applies to pollutants which are subject neither to the effluent limitations in the permit, nor to the notification requirements at 40 CFR§122.42(a)(1).
(3) The alteration or addition results in a significant change in the permittee's sludge use or disposal practices, and such alteration, addition or change may justify the application of permit conditions different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. Anticipated noncompliance. The permittee shall give advance notice to the Regional Administrator of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. Transfers. This permit is not transferable to any person except after notice to the Regional Administrator. The Regional Administrator may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the CWA. (See 40 CFR Part 122.61; in some cases, modification or revocation and reissuance is mandatory.)

d. Monitoring reports. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

  (1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices.

  (2) If the permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 CFR Part 136 or, in the case of sludge use or disposal, approved under 40 CFR Part 136 unless otherwise specified in 40 CFR Part 503, or as specified in the permit, the results of the monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

  (3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. Twenty-four hour reporting.

  (1) The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances.

  A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

  (2) The following shall be included as information which must be reported within 24 hours under this paragraph.

    (a) Any unanticipated bypass which exceeds any effluent limitation in the permit. (See 40 CFR §122.41(g).)
    (b) Any upset which exceeds any effluent limitation in the permit.
    (c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Regional Administrator in the permit to be reported within 24 hours. (See 40 CFR §122.44(g).)

  (3) The Regional Administrator may waive the written report on a case-by-case basis for reports under Paragraph D.1.e. if the oral report has been received within 24 hours.

f. Compliance Schedules. Reports of compliance or noncompliance with, any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

g. Other noncompliance. The permittee shall report all instances of noncompliance not reported under Paragraphs D.1.d., D.1.e., and D.1.f. of this section, at the time monitoring reports are submitted. The reports shall contain the information listed in Paragraph D.1.e. of this section.

h. Other information. Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Administrator, it shall promptly submit such facts or information.

2. <u>Signatory Requirement</u>

a. All applications, reports, or information submitted to the Regional Administrator shall be signed and certified. (See 40 CFR §122.22)

b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 2 years per violation, or by both.

3. <u>Availability of Reports</u>.

Except for data determined to be confidential under Paragraph A.8. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Regional Administrator. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

PART II. E. DEFINITIONS AND ABBREVIATIONS

1. <u>Definitions for Individual NPDES Permits including Storm Water Requirements</u>

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all, State, interstate, and Federal standards and limitations to which a "discharge", a "sewage sludge use or disposal practice", or a related activity is subject to, including "effluent limitations", water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices", pretreatment standards, and "standards for sewage sludge use and disposal" under Sections 301, 302, 303, 304, 306, 307, 308, 403, and 405 of the CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in "approved States", including any approved modifications or revisions.

Average means the arithmetic mean of values taken at the frequency required for each parameter over the specified period. For total and/or fecal coliforms and Escherichia coli, the average shall be the geometric mean.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" measured during the calendar week divided by the number of "daily discharges" measured during the week.

Best Management Practices (BMPs) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Best Professional Judgment (BPJ) means a case-by-case determination of Best Practicable Treatment (BPT), Best Available Treatment (BAT), or other appropriate technology-based standard based on an evaluation of the available technology to achieve a particular pollutant reduction and other factors set forth in 40 CFR §125.3 (d).

Coal Pile Runoff means the rainfall runoff from or through any coal storage pile.

Composite Sample means a sample consisting of a minimum of eight grab samples of equal volume collected at equal intervals during a 24-hour period (or lesser period as specified in the section on Monitoring and Reporting) and combined proportional to flow, or a sample consisting of the same number of grab samples, or greater, collected proportionally to flow over that same time period.

Construction Activities - The following definitions apply to construction activities:

(a) Commencement of Construction is the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

(b) Dedicated portable asphalt plant is a portable asphalt plant located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to. The term dedicated portable asphalt plant does not include facilities that are subject to the asphalt emulsion effluent limitation guideline at 40 CFR Part 443.

(c) Dedicated portable concrete plant is a portable concrete plant located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

(d) Final Stabilization means that all soil disturbing activities at the site have been complete, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

(e) Runoff coefficient means the fraction of total rainfall that will appear at the conveyance as runoff.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility except for infrequent shutdowns for maintenance, process changes, or similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended by Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, and Pub. L. 97-117; 33 USC §§1251 et seq.

Daily Discharge means the discharge of a pollutant measured during the calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Director normally means the person authorized to sign NPDES permits by EPA or the State or an authorized representative. Conversely, it also could mean the Regional Administrator or the State Director as the context requires.

Discharge Monitoring Report Form (DMR) means the EPA standard national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source", or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation (See "Point Source" definition).

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances leading into privately owned treatment works.

This term does not include an addition of pollutants by any "indirect discharger."

Effluent limitation means any restriction imposed by the Regional Administrator on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States", the waters of the "contiguous zone", or the ocean.

Effluent limitation guidelines means a regulation published by the Administrator under Section 304(b) of CWA to adopt or revise "effluent limitations".

EPA means the United States "Environmental Protection Agency".

Flow-weighted composite sample means a composite sample consisting of a mixture of aliquots where the volume of each aliquot is proportional to the flow rate of the discharge.

Grab Sample – An individual sample collected in a period of less than 15 minutes.

Hazardous Substance means any substance designated under 40 CFR Part 116 pursuant to Section 311 of the CWA.

Indirect Discharger means a non-domestic discharger introducing pollutants to a publicly owned treatment works.

Interference means a discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

(a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(b) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act (CWA), the Solid Waste Disposal Act (SWDA) (including Title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection Research and Sanctuaries Act.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and which is not a land application unit, surface impoundment, injection well, or waste pile.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for treatment or disposal.

Large and Medium municipal separate storm sewer system means all municipal separate storm sewers that are either: (i) located in an incorporated place (city) with a population of 100,000 or more as determined by the latest Decennial Census by the Bureau of Census (these cities are listed in Appendices F and 40 CFR Part 122); or (ii) located in the counties with unincorporated urbanized populations of 100,000 or more, except municipal separate storm sewers that are located in the incorporated places, townships, or towns within such counties (these counties are listed in Appendices H and I of 40 CFR 122); or (iii) owned or operated by a municipality other than those described in Paragraph (i) or (ii) and that are designated by the Regional Administrator as part of the large or medium municipal separate storm sewer system.

Maximum daily discharge limitation means the highest allowable "daily discharge" concentration that occurs only during a normal day (24-hour duration).

Maximum daily discharge limitation (as defined for the Steam Electric Power Plants only) when applied to Total Residual Chlorine (TRC) or Total Residual Oxidant (TRO) is defined as "maximum concentration" or "Instantaneous Maximum Concentration" during the two hours of a chlorination cycle (or fraction thereof) prescribed in the Steam Electric Guidelines, 40 CFR Part 423. These three synonymous terms all mean "a value that shall not be exceeded" during the two-hour chlorination cycle. This interpretation differs from the specified NPDES Permit requirement, 40 CFR § 122.2, where the two terms of "Maximum Daily Discharge" and "Average Daily Discharge" concentrations are specifically limited to the daily (24-hour duration) values.

Municipality means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribe organization, or a designated and approved management agency under Section 208 of the CWA.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".

New Discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants";

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source"; and

(d) Which has never received a finally effective NPDES permit for discharges at that "site".

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore rig or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Regional Administrator in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Regional Administrator shall consider the factors specified in 40 CFR §§125.122 (a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a "new discharger" only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a "discharge of pollutants", the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

NPDES means "National Pollutant Discharge Elimination System".

Owner or operator means the owner or operator of any "facility or activity" subject to regulation under the NPDES programs.

Pass through means a Discharge which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation).

Permit means an authorization, license, or equivalent control document issued by EPA or an "approved" State.

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 CFR §122.2).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. §§2011 et seq.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Primary industry category means any industry category listed in the NRDC settlement agreement (Natural Resources Defense Council et al. v. Train, 8 E.R.C. 2120 (D.D.C. 1976), modified 12 E.R.C. 1833 (D. D.C. 1979)); also listed in Appendix A of 40 CFR Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operation is not the operator of the treatment works or (b) not a "POTW".

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly Owned Treatment Works (POTW) means any facility or system used in the treatment (including recycling and reclamation) of municipal sewage or industrial wastes of a liquid nature which is owned by a "State" or "municipality".

This definition includes sewers, pipes, or other conveyances only if they convey wastewater to a POTW providing treatment.

Regional Administrator means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

Secondary Industry Category means any industry which is not a "primary industry category".

Section 313 water priority chemical means a chemical or chemical category which:

(1) is listed at 40 CFR §372.65 pursuant to Section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) (also known as Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986);

(2) is present at or above threshold levels at a facility subject to EPCRA Section 313 reporting requirements; and

(3) satisfies at least one of the following criteria:

   (i) are listed in Appendix D of 40 CFR Part 122 on either Table II (organic priority pollutants), Table III (certain metals, cyanides, and phenols), or Table V (certain toxic pollutants and hazardous substances);
   (ii) are listed as a hazardous substance pursuant to Section 311(b)(2)(A) of the CWA at 40 CFR §116.4; or
   (iii) are pollutants for which EPA has published acute or chronic water quality criteria.

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge means any solid, semisolid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced wastewater treatment, scum, septage, portable toilet pumpings, Type III Marine Sanitation Device pumpings (33 CFR Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Significant materials includes, but is not limited to: raw materials, fuels, materials such as solvents, detergents, and plastic pellets, raw materials used in food processing or production, hazardous substance designated under section 101(14) of CERCLA, any chemical the facility is required to report pursuant to EPCRA Section 313, fertilizers, pesticides, and waste products such as ashes, slag, and sludge that have the potential to be released with storm water discharges.

Significant spills includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 CFR §110.10 and §117.21) or Section 102 of CERCLA (see 40 CFR § 302.4).

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to Section 405(d) of the CWA, and is required to obtain a permit under 40 CFR §122.1(b)(3).

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Trust Territory of the Pacific Islands.

Storm Water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm water discharge associated with industrial activity means the discharge from any conveyance which is used for collecting and conveying storm water and which is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant. (See 40 CFR §122.26 (b)(14) for specifics of this definition.

Time-weighted composite means a composite sample consisting of a mixture of equal volume aliquots collected at a constant time interval.

Toxic pollutants means any pollutant listed as toxic under Section 307 (a)(1) or, in the case of "sludge use or disposal practices" any pollutant identified in regulations implementing Section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or wastewater treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, "domestic sewage" includes waste and wastewater from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Regional Administrator may designate any person subject to the standards for sewage sludge use and disposal in 40 CFR Part 503 as a "treatment works treating domestic sewage", where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 CFR Part 503.

Waste Pile means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of tide;

(b) All interstate waters, including interstate "wetlands";

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands", sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

(1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;

(2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

(3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in Paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in Paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 CFR §423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole Effluent Toxicity (WET) means the aggregate toxic effect of an effluent measured directly by a toxicity test. (See Abbreviations Section, following, for additional information.)

2. Definitions for NPDES Permit Sludge Use and Disposal Requirements.

Active sewage sludge unit is a sewage sludge unit that has not closed.

Aerobic Digestion is the biochemical decomposition of organic matter in sewage sludge into carbon dioxide and water by microorganisms in the presence of air.

Agricultural Land is land on which a food crop, a feed crop, or a fiber crop is grown. This includes range land and land used as pasture.

Agronomic rate is the whole sludge application rate (dry weight basis) designed:

(1) To provide the amount of nitrogen needed by the food crop, feed crop, fiber crop, cover crop, or vegetation grown on the land; and

(2) To minimize the amount of nitrogen in the sewage sludge that passes below the root zone of the crop or vegetation grown on the land to the ground water.

Air pollution control device is one or more processes used to treat the exit gas from a sewage sludge incinerator stack.

Anaerobic digestion is the biochemical decomposition of organic matter in sewage sludge into methane gas and carbon dioxide by microorganisms in the absence of air.

Annual pollutant loading rate is the maximum amount of a pollutant that can be applied to a unit area of land during a 365 day period.

Annual whole sludge application rate is the maximum amount of sewage sludge (dry weight basis) that can be applied to a unit area of land during a 365 day period.

Apply sewage sludge or sewage sludge applied to the land means land application of sewage sludge.

Aquifer is a geologic formation, group of geologic formations, or a portion of a geologic formation capable of yielding ground water to wells or springs.

Auxiliary fuel is fuel used to augment the fuel value of sewage sludge. This includes, but is not limited to, natural gas, fuel oil, coal, gas generated during anaerobic digestion of sewage sludge, and municipal solid waste (not to exceed 30 percent of the dry weight of the sewage sludge and auxiliary fuel together). Hazardous wastes are not auxiliary fuel.

Base flood is a flood that has a one percent chance of occurring in any given year (i.e. a flood with a magnitude equaled once in 100 years).

Bulk sewage sludge is sewage sludge that is not sold or given away in a bag or other container for application to the land.

Contaminate an aquifer means to introduce a substance that causes the maximum contaminant level for nitrate in 40 CFR §141.11 to be exceeded in ground water or that causes the existing concentration of nitrate in the ground water to increase when the existing concentration of nitrate in the ground water exceeds the maximum contaminant level for nitrate in 40 CFR §141.11.

Class I sludge management facility is any publicly owned treatment works (POTW), as defined in 40 CFR §501.2, required to have an approved pretreatment program under 40 CFR §403.8 (a) (including any POTW located in a state that has elected to assume local program responsibilities pursuant to 40 CFR §403.10 (e) and any treatment works treating domestic sewage, as defined in 40 CFR § 122.2, classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved state programs, the Regional Administrator in conjunction with the State Director, because of the potential for sewage sludge use or disposal practice to affect public health and the environment adversely.

Control efficiency is the mass of a pollutant in the sewage sludge fed to an incinerator minus the mass of that pollutant in the exit gas from the incinerator stack divided by the mass of the pollutant in the sewage sludge fed to the incinerator.

Cover is soil or other material used to cover sewage sludge placed on an active sewage sludge unit.

Cover crop is a small grain crop, such as oats, wheat, or barley, not grown for harvest.

Cumulative pollutant loading rate is the maximum amount of inorganic pollutant that can be applied to an area of land.

Density of microorganisms is the number of microorganisms per unit mass of total solids (dry weight) in the sewage sludge.

Dispersion factor is the ratio of the increase in the ground level ambient air concentration for a pollutant at or beyond the property line of the site where the sewage sludge incinerator is located to the mass emission rate for the pollutant from the incinerator stack.

Displacement is the relative movement of any two sides of a fault measured in any direction.

Domestic septage is either liquid or solid material removed from a septic tank, cesspool, portable toilet, Type III marine sanitation device, or similar treatment works that receives only domestic sewage. Domestic septage does not include liquid or solid material removed from a septic tank, cesspool, or similar treatment works that receives either commercial wastewater or industrial wastewater and does not include grease removed from a grease trap at a restaurant.

Domestic sewage is waste and wastewater from humans or household operations that is discharged to or otherwise enters a treatment works.

Dry weight basis means calculated on the basis of having been dried at 105 degrees Celsius (°C) until reaching a constant mass (i.e. essentially 100 percent solids content).

Fault is a fracture or zone of fractures in any materials along which strata on one side are displaced with respect to the strata on the other side.

Feed crops are crops produced primarily for consumption by animals.

Fiber crops are crops such as flax and cotton.

Final cover is the last layer of soil or other material placed on a sewage sludge unit at closure.

Fluidized bed incinerator is an enclosed device in which organic matter and inorganic matter in sewage sludge are combusted in a bed of particles suspended in the combustion chamber gas.

Food crops are crops consumed by humans. These include, but are not limited to, fruits, vegetables, and tobacco.

Forest is a tract of land thick with trees and underbrush.

Ground water is water below the land surface in the saturated zone.

Holocene time is the most recent epoch of the Quaternary period, extending from the end of the Pleistocene epoch to the present.

Hourly average is the arithmetic mean of all the measurements taken during an hour. At least two measurements must be taken during the hour.

Incineration is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

Industrial wastewater is wastewater generated in a commercial or industrial process.

Land application is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

Land with a high potential for public exposure is land that the public uses frequently. This includes, but is not limited to, a public contact site and reclamation site located in a populated area (e.g., a construction site located in a city).

Land with low potential for public exposure is land that the public uses infrequently. This includes, but is not limited to, agricultural land, forest and a reclamation site located in an unpopulated area (e.g., a strip mine located in a rural area).

Leachate collection system is a system or device installed immediately above a liner that is designed, constructed, maintained, and operated to collect and remove leachate from a sewage sludge unit.

Liner is soil or synthetic material that has a hydraulic conductivity of 1×10^{-7} centimeters per second or less.

Lower explosive limit for methane gas is the lowest percentage of methane gas in air, by volume, that propagates a flame at 25 degrees Celsius and atmospheric pressure.

Monthly average (Incineration) is the arithmetic mean of the hourly averages for the hours a sewage sludge incinerator operates during the month.

Monthly average (Land Application) is the arithmetic mean of all measurements taken during the month.

Municipality means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management agency under section 208 of the CWA, as amended. The definition includes a special district created under state law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

Other container is either an open or closed receptacle. This includes, but is not limited to, a bucket, a box, a carton, and a vehicle or trailer with a load capacity of one metric ton or less.

Pasture is land on which animals feed directly on feed crops such as legumes, grasses, grain stubble, or stover.

Pathogenic organisms are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

Permitting authority is either EPA or a State with an EPA-approved sludge management program.

Person is an individual, association, partnership, corporation, municipality, State or Federal Agency, or an agent or employee thereof.

Person who prepares sewage sludge is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

pH means the logarithm of the reciprocal of the hydrogen ion concentration; a measure of the acidity or alkalinity of a liquid or solid material.

Place sewage sludge or sewage sludge placed means disposal of sewage sludge on a surface disposal site.

Pollutant (as defined in sludge disposal requirements) is an organic substance, an inorganic substance, a combination or organic and inorganic substances, or pathogenic organism that, after discharge and upon exposure, ingestion, inhalation, or assimilation into an organism either directly from the environment or indirectly by ingestion through the food chain, could on the basis on information available to the Administrator of EPA, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions (including malfunction in reproduction) or physical deformations in either organisms or offspring of the organisms.

Pollutant limit (for sludge disposal requirements) is a numerical value that describes the amount of a pollutant allowed per unit amount of sewage sludge (e.g., milligrams per kilogram of total solids); the amount of pollutant that can be applied to a unit of land (e.g., kilograms per hectare); or the volume of the material that can be applied to the land (e.g., gallons per acre).

Public contact site is a land with a high potential for contact by the public. This includes, but is not limited to, public parks, ball fields, cemeteries, plant nurseries, turf farms, and golf courses.

Qualified ground water scientist is an individual with a baccalaureate or post-graduate degree in the natural sciences or engineering who has sufficient training and experience in ground water hydrology and related fields, as may be demonstrated by State registration, professional certification, or completion of accredited university programs, to make sound professional judgments regarding ground water monitoring, pollutant fate and transport, and corrective action.

Range land is open land with indigenous vegetation.

Reclamation site is drastically disturbed land that is reclaimed using sewage sludge. This includes, but is not limited to, strip mines and construction sites.

Risk specific concentration is the allowable increase in the average daily ground level ambient air concentration for a pollutant from the incineration of sewage sludge at or beyond the property line of a site where the sewage sludge incinerator is located.

Runoff is rainwater, leachate, or other liquid that drains overland on any part of a land surface and runs off the land surface.

Seismic impact zone is an area that has 10 percent or greater probability that the horizontal ground level acceleration to the rock in the area exceeds 0.10 gravity once in 250 years.

Sewage sludge is a solid, semi-solid, or liquid residue generated during the treatment of domestic sewage in a treatment works. Sewage sludge includes, but is not limited to:, domestic septage; scum or solids removed in primary, secondary, or advanced wastewater treatment processes; and a material derived from sewage sludge. Sewage sludge does not include ash generated during the firing of sewage sludge in a sewage sludge incinerator or grit and screening generated during preliminary treatment of domestic sewage in treatment works.

Sewage sludge feed rate is either the average daily amount of sewage sludge fired in all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located for the number of days in a 365 day period that each sewage sludge incinerator operates, or the average daily design capacity for all sewage sludge incinerators within the property line of the site where the sewage sludge incinerators are located.

Sewage sludge incinerator is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

Sewage sludge unit is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 CFR §122.2.

Sewage sludge unit boundary is the outermost perimeter of an active sewage sludge unit.

Specific oxygen uptake rate (SOUR) is the mass of oxygen consumed per unit time per unit mass of total solids (dry weight basis) in sewage sludge.

Stack height is the difference between the elevation of the top of a sewage sludge incinerator stack and the elevation of the ground at the base of the stack when the difference is equal to or less than 65 meters. When the difference is greater than 65 meters, stack height is the creditable stack height determined in accordance with 40 CFR §51.100 (ii).

State is one of the United States of America, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Trust Territory of the Pacific Islands, the Commonwealth of the Northern Mariana Islands, and an Indian tribe eligible for treatment as a State pursuant to regulations promulgated under the authority of section 518(e) of the CWA.

Store or storage of sewage sludge is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

Surface disposal site is an area of land that contains one or more active sewage sludge units.

Total hydrocarbons means the organic compounds in the exit gas from a sewage sludge incinerator stack measured using a flame ionization detection instrument referenced to propane.

Total solids are the materials in sewage sludge that remain as residue when the sewage sludge is dried at 103 to 105 degrees Celsius.

Treat or treatment of sewage sludge is the preparation of sewage sludge for final use or disposal. This includes, but is not limited to, thickening, stabilization, and dewatering of sewage sludge. This does not include storage of sewage sludge.

Treatment works is either a federally owned, publicly owned, or privately owned device or system used to treat (including recycle and reclaim) either domestic sewage or a combination of domestic sewage and industrial waste of a liquid nature.

Unstable area is land subject to natural or human-induced forces that may damage the structural components of an active sewage sludge unit. This includes, but is not limited to, land on which the soils are subject to mass movement.

Unstabilized solids are organic materials in sewage sludge that have not been treated in either an aerobic or anaerobic treatment process.

Vector attraction is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

Volatile solids is the amount of the total solids in sewage sludge lost when the sewage sludge is combusted at 550 degrees Celsius in the presence of excess air.

Wet electrostatic precipitator is an air pollution control device that uses both electrical forces and water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

Wet scrubber is an air pollution control device that uses water to remove pollutants in the exit gas from a sewage sludge incinerator stack.

3. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)

TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont. (Continuous)	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M^3/day	Cubic meters per day
DO	Dissolved oxygen
kg/day	Kilograms per day
lbs/day	Pounds per day
mg/l	Milligram(s) per liter
ml/l	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
pH	A measure of the hydrogen ion concentration. A measure of the acidity or alkalinity of a liquid or material
Surfactant	Surface-active agent

Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
ug/l	Microgram(s) per liter
WET	"Whole effluent toxicity" is the total effect of an effluent measured directly with a toxicity test.
C-NOEC	"Chronic (Long-term Exposure Test) – No Observed Effect Concentration". The highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.
A-NOEC	"Acute (Short-term Exposure Test) – No Observed Effect Concentration" (see C-NOEC definition).
LC_{50}	LC_{50} is the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 100% is defined as a sample of undiluted effluent.
ZID	Zone of Initial Dilution means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports.

FRESHWATER CHRONIC
TOXICITY TEST PROCEDURE AND PROTOCOL
USEPA Region 1

I. GENERAL REQUIREMENTS

The permittee shall be responsible for the conduct of acceptable chronic toxicity tests using three fresh samples collected during each test period. The following tests shall be performed as prescribed in Part 1 of the NPDES discharge permit in accordance with the appropriate test protocols described below. (Note: the permittee and testing laboratory should review the applicable permit to determine whether testing of one or both species is required).

- **Daphnid (Ceriodaphnia dubia) Survival and Reproduction Test.**
- **Fathead Minnow (Pimephales promelas) Larval Growth and Survival Test.**

Chronic toxicity data shall be reported as outlined in Section VIII.

II. METHODS

Methods to follow are those recommended by EPA in: Short Term Methods For Estimating The Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition. October 2002. United States Environmental Protection Agency. Office of Water, Washington, D.C., EPA 821-R-02-013. The methods are available on-line at http://www.epa.gov/waterscience/WET/ . Exceptions and clarification are stated herein.

III. SAMPLE COLLECTION AND USE

A total of three fresh samples of effluent and receiving water are required for initiation and subsequent renewals of a freshwater, chronic, toxicity test. The receiving water control sample must be collected immediately upstream of the permitted discharge's zone of influence. Fresh samples are recommended for use on test days 1, 3, and 5. However, provided a total of three samples are used for testing over the test period, an alternate sampling schedule is acceptable. The acceptable holding times until initial use of a sample are 24 and 36 hours for on-site and off-site testing, respectively. A written waiver is required from the regulating authority for any hold time extension. All test samples collected may be used for 24, 48 and 72 hour renewals after initial use. All samples held for use beyond the day of sampling shall be refrigerated and maintained at a temperature range of 0-6^{o} C.

All samples submitted for chemical and physical analyses will be analyzed according to Section VI of this protocol.

Sampling guidance dictates that, where appropriate, aliquots for the analysis required in this protocol shall be split from the samples, containerized and immediately preserved, or analyzed as per 40 CFR Part 136. EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection. Testing for the presence of total residual chlorine (TRC) must be analyzed immediately or as soon as possible, for all effluent samples, prior to WET testing. TRC analysis may be performed on-site or by the toxicity testing laboratory and the samples must be dechlorinated, as necessary, using sodium thiosulfate prior to sample use for toxicity testing.

If any of the renewal samples are of sufficient potency to cause lethality to 50 percent or more of the test organisms in any of the test treatments for either species or, if the test fails to meet its permit limits, then chemical analysis for total metals (originally required for the initial sample only in Section VI) will be required on the renewal sample(s) as well.

IV. DILUTION WATER

Samples of receiving water must be collected from a location in the receiving water body immediately upstream of the permitted discharge’s zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. EPA strongly urges that screening for toxicity be performed prior to the set up of a full, definitive toxicity test any time there is a question about the test dilution water's ability to achieve test acceptability criteria (TAC) as indicated in Section V of this protocol. The test dilution water control response will be used in the statistical analysis of the toxicity test data. All other control(s) required to be run in the test will be reported as specified in the Discharge Monitoring Report (DMR) Instructions, Attachment F, page 2,Test Results & Permit Limits.

The test dilution water must be used to determine whether the test met the applicable TAC. When receiving water is used for test dilution, an additional control made up of standard laboratory water (0% effluent) is required. This control will be used to verify the health of the test organisms and evaluate to what extent, if any, the receiving water itself is responsible for any toxic response observed.

If dechlorination of a sample by the toxicity testing laboratory is necessary a “sodium thiosulfate” control, representing the concentration of sodium thiosulfate used to adequately dechlorinate the sample prior to toxicity testing, must be included in the test.

If the use of an alternate dilution water (ADW) is authorized, in addition to the ADW test control, the testing laboratory must, for the purpose of monitoring the receiving water, also run a receiving water control.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable an ADW of known quality with hardness similar to that of the receiving water may be substituted. Substitution is species specific meaning that the decision to use ADW is made for each species and is based on the toxic response of that particular species. Substitution to an ADW is authorized in two cases. The first is the case where repeating a test due to toxicity in the site dilution water requires an **immediate decision** for ADW use be made by the permittee and toxicity testing laboratory. The second is in the case where two of the most recent documented incidents of unacceptable site dilution water toxicity requires ADW use in future WET testing.

For the second case, written notification from the permittee requesting ADW use **and** written authorization from the permit issuing agency(s) is required **prior to** switching to a long-term use of ADW for the duration of the permit.

Written requests for use of ADW must be mailed with supporting documentation to the following addresses:

Director
Office of Ecosystem Protection (CAA)
U.S. Environmental Protection Agency, Region 1
Five Post Office Square, Suite 100
Mail Code OEP06-5
Boston, MA 02109-3912

and

Manager
Water Technical Unit (SEW)
U.S. Environmental Protection Agency
Five Post Office Square, Suite 100
Mail Code OES04-4
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

See the most current annual DMR instructions which can be found on the EPA Region 1 website at http://www.epa.gov/region1/enforcementandassistance/dmr.html for further important details on alternate dilution water substitution requests.

V. TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA

Method specific test conditions and TAC are to be followed and adhered to as specified in the method guidance document, EPA 821-R-02-013. If a test does not meet TAC the test must be repeated with fresh samples within 30 days of the initial test completion date.

V.1. Use of Reference Toxicity Testing

Reference toxicity test results and applicable control charts must be included in the toxicity testing report.

If reference toxicity test results fall outside the control limits established by the laboratory for a specific test endpoint, a reason or reasons for this excursion must be evaluated, correction made and reference toxicity tests rerun as necessary.

If a test endpoint value exceeds the control limits at a frequency of more than one out of twenty then causes for the reference toxicity test failure must be examined and if problems are identified corrective action taken. The reference toxicity test must be repeated during the same month in which the exceedance occurred.

If two consecutive reference toxicity tests fall outside control limits, the possible cause(s) for the exceedance must be examined, corrective actions taken and a repeat of the reference toxicity test must take place immediately. Actions taken to resolve the problem must be reported.

V.1.a. Use of Concurrent Reference Toxicity Testing

In the case where concurrent reference toxicity testing is required due to a low frequency of testing with a particular method, if the reference toxicity test results fall slightly outside of laboratory established control limits, but the primary test met the TAC, the results of the primary test will be considered acceptable. However, if the results of the concurrent test fall well outside the established **upper** control limits i.e. ≥3 standard deviations for IC25 values and ≥ two concentration intervals for NOECs, and even though the primary test meets TAC, the primary test will be considered unacceptable and must be repeated.

V.2. For the *C. dubia* test, the determination of TAC and formal statistical analyses must be performed using only the first three broods produced.

V.3. Test treatments must include 5 effluent concentrations and a dilution water control. An additional test treatment, at the permitted effluent concentration (% effluent), is required if it is not included in the dilution series.

VI. CHEMICAL ANALYSIS

As part of each toxicity test's daily renewal procedure, pH, specific conductance, dissolved oxygen (DO) and temperature must be measured at the beginning and end of each 24-hour period in each test treatment and the control(s).

The additional analysis that must be performed under this protocol is as specified and noted in the table below.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1, 4]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3, 4]	x		0.02
Alkalinity[4]	x	x	2.0
pH[4]	x	x	--
Specific Conductance[4]	x	x	--
Total Solids [6]	x		--
Total Dissolved Solids [6]	x		--
Ammonia[4]	x	x	0.1
Total Organic Carbon [6]	x	x	0.5
Total Metals [5]			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

Notes:

1. Hardness may be determined by:

- APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
  - -Method 2340B (hardness by calculation)
  - -Method 2340C (titration)

2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.

- APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
  - -Method 4500-CL E Low Level Amperometric Titration
  - -Method 4500-CL G DPD Colorimetric Method
- USEPA 1983. Manual of Methods Analysis of Water and Wastes
  - -Method 330.5

3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing
4. Analysis is to be performed on samples and/or receiving water, as designated in the table above, from all three sampling events.
5. Analysis is to be performed on the initial sample(s) only unless the situation arises as stated in Section III, paragraph 4
6. Analysis to be performed on initial samples only

VII. TOXICITY TEST DATA ANALYSIS AND REVIEW

A. Test Review

1. Concentration / Response Relationship

A concentration/response relationship evaluation is required for test endpoint determinations from both Hypothesis Testing and Point Estimate techniques. The test report is to include documentation of this evaluation in support of the endpoint values reported. The dose-response review must be performed as required in Section 10.2.6 of EPA-821-R-02-013. Guidance for this review can be found at http://water.epa.gov/scitech/methods/cwa/ . In most cases, the review will result in one of the following three conclusions: (1) Results are reliable and reportable; (2) Results are anomalous and require explanation; or (3) Results are inconclusive and a retest with fresh samples is required.

2. Test Variability (Test Sensitivity)

This review step is separate from the determination of whether a test meets or does not meet TAC. Within test variability is to be examined for the purpose of evaluating test sensitivity. This evaluation is to be performed for the sub-lethal hypothesis testing endpoints reproduction and growth as required by the permit. The test report is to include documentation of this evaluation to support that the endpoint values reported resulted from a toxicity test of adequate sensitivity. This evaluation must be performed as required in Section 10.2.8 of EPA-821-R-02-013.

To determine the adequacy of test sensitivity, USEPA requires the calculation of test percent minimum significant difference (PMSD) values. In cases where NOEC determinations are made based on a non-parametric technique, calculation of a test PMSD value**,** for the sole purpose of assessing test sensitivity, shall be calculated using a comparable parametric statistical analysis technique. The calculated test PMSD is then compared to the upper and lower PMSD bounds shown for freshwater tests in Section 10.2.8.3, p. 52, Table 6 of EPA-821-R-02-013. The comparison will yield one of the following determinations.

- The test PMSD exceeds the PMSD upper bound test variability criterion in Table 6, the test results are considered highly variable and the test may not be sensitive enough to determine the presence of toxicity at the permit limit concentration (PLC). If the test results indicate that the discharge is not toxic at the PLC, then the test is considered insufficiently sensitive and must be repeated within 30 days of the initial test completion using fresh samples. If the test results indicate that the discharge is toxic at the PLC, the test is considered acceptable and does not have to be repeated.

- The test PMSD falls below the PMSD lower bound test variability criterion in Table 6, the test is determined to be very sensitive. In order to determine which treatment(s) are statistically significant and which are not, for the purpose of reporting a NOEC, the relative percent difference (RPD) between the control and each treatment must be calculated and compared to the lower PMSD boundary. See *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program*, EPA 833-R-00-003, June 2002, Section 6.4.2. The following link: Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program can be used to locate the USEPA website containing this document. If the RPD for a treatment falls below the PMSD lower bound, the difference is considered statistically insignificant. If the RPD for a treatment is greater that the PMSD lower bound, then the treatment is considered statistically significant.

- The test PMSD falls within the PMSD upper and lower bounds in Table 6, the sub-lethal test endpoint values shall be reported as is.

B. Statistical Analysis

1. General - Recommended Statistical Analysis Method

Refer to general data analysis flowchart, EPA 821-R-02-013, page 43

For discussion on Hypothesis Testing, refer to EPA 821-R-02-013, Section 9.6

For discussion on Point Estimation Techniques, refer to EPA 821-R-02-013, Section 9.7

2. *Pimephales promelas*

Refer to survival hypothesis testing analysis flowchart, EPA 821-R-02-013, page 79

Refer to survival point estimate techniques flowchart, EPA 821-R-02-013, page 80

Refer to growth data statistical analysis flowchart, EPA 821-R-02-013, page 92

3. *Ceriodaphnia dubia*

Refer to survival data testing flowchart, EPA 821-R-02-013, page 168

Refer to reproduction data testing flowchart, EPA 821-R-02-013, page 173

VIII. TOXICITY TEST REPORTING

A report of results must include the following:

- Test summary sheets (2007 DMR Attachment F) which includes:
  - Facility name
  - NPDES permit number
  - Outfall number
  - Sample type
  - Sampling method
  - Effluent TRC concentration
  - Dilution water used
  - Receiving water name and sampling location
  - Test type and species
  - Test start date
  - Effluent concentrations tested (%) and permit limit concentration
  - Applicable reference toxicity test date and whether acceptable or not
  - Age, age range and source of test organisms used for testing
  - Results of TAC review for all applicable controls
  - Test sensitivity evaluation results (test PMSD for growth and reproduction)
  - Permit limit and toxicity test results
  - Summary of test sensitivity and concentration response evaluation

In addition to the summary sheets the report must include:

- A brief description of sample collection procedures
- Chain of custody documentation including names of individuals collecting samples, times and dates of sample collection, sample locations, requested analysis and lab receipt with time and date received, lab receipt personnel and condition of samples upon receipt at the lab(s)
- Reference toxicity test control charts
- All sample chemical/physical data generated, including minimum limits (MLs) and analytical methods used
- All toxicity test raw data including daily ambient test conditions, toxicity test chemistry, sample dechlorination details as necessary, bench sheets and statistical analysis
- A discussion of any deviations from test conditions
- Any further discussion of reported test results, statistical analysis and concentration-response relationship and test sensitivity review per species per endpoint

EPA REGION I

NPDES PERMIT
SLUDGE COMPLIANCE GUIDANCE

04 NOVEMBER 1999

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1. LAND APPLICATION

This section applies to sewage sludge from the permittee's facility which is applied to the land for the purpose of enriching the soil. The permittee should answer the following questions. The answers to these questions need to be evaluated to determine which permitting scenario for sewage sludge land application applies. After the permitting scenario is determined, the permittee must comply with the directives contained in the chosen scenario.

1.1 Question Algorithm

The permittee should review and answer the following questions. The information gathered from answering these questions will aid the permittee to determine the appropriate land application scenario which applies to the sludge generated at the permittee's waste water treatment facility. The scenario selected will detail which specific Use or Disposal of Sewage Sludge, Part 503, regulations must be complied with for the land application method used by the permittee.

1. What type of land is the sewage sludge being applied to?

   If the sewage sludge/material is to be sold or given away, or applied to a lawn or home garden, the sewage sludge MUST meet Class A pathogen reduction requirements.

2. Is all the sludge generated at the facility used in the same manner?

   If all the sludge is not used the same way, the permittee needs to determine what amounts are used in what manner. Different scenarios may apply to the different portions.

3. Is the sewage sludge in bulk or is it a bagged material?

   Scenario No.1 and No.6 can be applied to bagged materials. All other scenarios apply to bulk sewage sludge only. Bulk material is an amount of sewage sludge greater than one metric ton (2200 lbs).

4. What is the metals content in the sewage sludge for the following metals: arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc?

   If any of the concentrations in Table 1 of 40 CFR §503.13 (b) (1) are exceeded on a dry weight basis, the sewage sludge cannot be land applied. Table 1 is summarized below:

§503.13 Table 1

Maximum Pollutant Concentrations

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

5. Does the sludge qualify for "exceptional quality" criteria in accordance with Table 3, 40 CFR §503.13(b)(3)on a dry weight basis? Table 3 is summarized:

§503.13 Table 3

Exceptional Quality Pollutant Concentrations

Arsenic	41 mg/kg
Cadmium	39 mg/kg
Copper	1500 mg/kg
Lead	300 mg/kg
Mercury	17 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	2800 mg/kg

In addition, Class A pathogen reduction (see Section 4), and achievement of one of the vector attraction reduction alternatives 1 through 8 (see Section 5) must be attained.

NOTHING ELSE QUALIFIES AS EXCEPTIONAL QUALITY

6. What is the level of pathogen reduction achieved, Class A or Class B?

Refer to Section 4, Pathogen Reduction, to select the appropriate method that is used to reduce the pathogens in the sewage sludge produced at the facility.

7. What is the method for vector attraction reduction?

Refer to Section 5, Vector Attraction Reduction, to select the appropriate method that is used to reduce the pathogens in the sewage sludge produced at the facility.

8. What is the amount of sewage sludge used in dry metric tons/365 day period?

This determines the frequency of monitoring (see Section 6) for the pollutants, pathogens and vectors. Use the table below to make the determination:

Sampling Frequency Table

SEWAGE SLUDGE PRODUCED (metric tons per 365 day period)	**SAMPLING FREQUENCY**
0<Sludge (tons) <290	Once Per year
290≤Sludge (tons) <1500	Once Per Quarter (four times per year)
1500≤Sludge (tons) <15000	Once Per 60 days (six times per year)
Sludge (tons) ≤15000	Once Per Month (12 times per year)

1.2 Scenario Determination

After the information is gathered and evaluated from the questions in the preceding section, the permittee can select the appropriate land application scenario from the table on page 1.4.

Land Application Scenario Selection Table

SCENARIO	LAND TYPE	BULK/ BAGGED	POLLUTANT LIMITS[2]	PATHOGENS[3]	VECTORS[3]
No .1	ANY TYPE	BOTH (EQ)	TABLE 3	CLASS A	1-8 ONLY
No .2	SEE BELOW[1]	BULK	TABLE 3	CLASS A	9 OR 10
No .3	SEE BELOW[1]	BULK	TABLE 3	CLASS B	1-10
No .4	SEE BELOW[1]	BULK	TABLE 2	CLASS A	1-10
No .5	SEE BELOW[1]	BULK	TABLE 2	CLASS B	1-10
No .6	ANY TYPE	BAGGED	TABLE 4	CLASS A	1-8 ONLY

1. Land types: Agricultural land, forest, reclamation site or public contact site
2. Refer to 40 CFR §503.13 Table 2, Table 3 and Table 4
3. The Pathogen Reduction Section (Section 4)and Vector Attraction Reduction Section (Section 5) are located after the Scenario section.

1.3. Scenarios

This section contains the sewage sludge land application scenarios. One of these scenarios has been selected by the permittee, based on reading and answering the questions in Section 1.2, to regulate their treatment facility’s sewage sludge land application.

1.3.1. Scenario No. 1

This applies to bulk or bagged sewage sludge and materials derived from sewage sludge meeting the pollutant concentrations at §503.13(b)(3); one of the Class A pathogen reduction alternatives at §503.32(a); one of the vector attraction reduction requirements at §503.33(b)(1) through (b)(8). Materials meeting these characteristics are considered “Exceptional Quality” materials and are exempt from the general requirements at §503.12 and the management practices at §503.14. Sludges of this quality may be applied to any type of land.

SLUDGE CONDITIONS

1. Pollutant Limitations

a. The maximum concentrations of metals in the sewage sludge that is applied to the land shell not exceed the following (dry weight basis:

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

b. The sewage sludge shall not be applied to the land if any of the pollutant concentrations in Paragraph 1a. are exceeded.

c. The monthly average concentration of metals in the sewage sludge shall not exceed the following (dry weight basis):

Arsenic	41 mg/kg
Cadmium	39 mg/kg
Copper	1500 mg/kg
Lead	300 mg/kg
Mercury	17 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	2800 mg/kg

2. The permittee shall meet Class A pathogen requirements utilizing one of the methods specified in 40 CFR §503.32.

3. The permittee shall meet one of the vector attraction reduction requirements specified in 40CFR §503.33. The permittee may only utilize alternatives 1 through 8. If the permittee meets one of the vector attraction reduction alternatives 1 through 5, the Class A pathogen requirements must be met either prior to or at the same time as the vector attraction reduction requirement.

4. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 1a, the pathogen density and the vector attraction reduction requirements at the frequency specified in sludge condition 6 of the permit.

5. The permittee shall develop and retain the following information for five years:

   a. The concentration of each pollutant listed in Paragraph 1a..

   b. The following certification statement:

   "I certify, under penalty of law, that the information that will be used to determine compliance with the Class A pathogen requirements in §503.32(a) and the vector attraction reduction requirements in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through (b)(8)] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

   c. A description of how the Class A pathogen requirements are met.

   d. A description of how the vector attraction reduction requirements are met.

6. The permittee shall report the information in Paragraphs 5a, b, c, and d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of this permit.

7. All sewage sludge sampling and analysis procedures shall be in accordance with the procedures detailed in 40 CFR §503.8.

1.3.2. Scenario No.2

This scenario applies to bulk sewage sludge or materials derived from bulk sewage sludge meeting the following criteria: the pollutant concentrations in §503.13(b)(3); Class A pathogen requirements in §503.32(a); and vector attraction §503.33(b)(9) or (b)(10). Sludge of this quality may be applied to agricultural land, forest land, public contact site or reclamation site. This scenario has specific requirements for the preparer and the applier.

SLUDGE CONDITIONS

1. The permittee and the applier of the bulk sewage sludge shall comply with the following general requirements:

    a. Bulk sewage sludge shall not be applied the land except in accordance with 40 CFR Part 50J, Subpart B.

    b. The permittee shall provide the person who applies the bulk sewage sludge written notification of the concentration of total nitrogen (as N on a dry weight basis) in the bulk sewage sludge.

    c. The person who applies the bulk sewage sludge shall obtain notice and necessary information from the permittee to comply with the requirements of 40 CFR Part 503, Subpart B.

    d. When the permittee provides the bulk sewage sludge to a person who applies the bulk sewage sludge, the permittee shall provide the person who applies the bulk sewage sludge notice and necessary information to comply with 40 CFR part 503, Subpart B.

    e. When the permittee provides the bulk sewage sludge to a person who prepares the bulk sewage sludge the permittee shall provide the preparer notice and necessary information to comply with 40 CFR Part 503, Subpart B.

    f. The person who applies the bulk sewage sludge shall provide the owner or lease holder of the land on which the bulk sewage sludge is applied notice and necessary information to comply with 40 CFR Part 503, Subpart B.

    g. When bulk sewage sludge is applied in another state, the person who prepares the sewage sludge shall provide notice to the permitting authority for the state in which the sewage sludge will be applied. Notice shall be given prior to the initial application and shall contain the following information:

        i. The location of each site by either street address or latitude and longitude.

        ii. The approximate period of time the bulk sewage sludge will be applied to each site.

iii. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if applicable) for the person who prepares the bulk sewage sludge.

iv. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if applicable) for the person who applies the bulk sewage sludge.

2. Pollutant Limitations

a. The maximum concentration of metals in the sewage sludge that is applied to the land shall not exceed the following (dry weight basis):

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

b. The sewage sludge shall not be applied to the land if any of the pollutant concentrations in Paragraphs 2a are exceeded.

c. The monthly average concentration of metals in the sewage sludge shall not exceed the following (dry wight basis):

Arsenic	41 mg/kg
Cadmium	39 mg/kg
Copper	1500 mg/kg
Lead	300 mg/kg
Mercury	17 mg/kg

Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	2800 mg/kg

3. The permittee shall meet Class A pathogen requirements utilizing one of the methods specified in 40 CFR §503.32

4. The person who applies the bulk sewage sludge shall meet either vector attraction reduction requirement 9 or 10 as specified in 40 CFR §503.33.

5. The bulk sewage sludge shall be injected below the surface of the land, or incorporated into the soil within 8 hours after discharge from the pathogen treatment process.

6. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2a and the pathogen density requirements at the frequency specified in sludge condition 6 of the permit.

7. The person who applies the bulk sewage sludge to the land shall comply with the following management practices:

   a. The bulk sewage sludge shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated habitat.

   b. The bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site or a land reclamation site that is frozen, snow-covered or flooded so that the bulk sewage sludge enters a wetland or other water of the United States as defined in 40 CFR §122.2, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act.

   c. Bulk sewage sludge shall not be applied to agricultural land, forest land, and public contact site, or land reclamation site that is less than 10 meters (33 feet) from waters of the United States, as defined in 40 CFR §122.2.

   d. The whole sludge application rate shall be applied at an agronomic rate designed to (i) provide the amount of nitrogen needed by the crop or vegetation grown on the land; and (ii) minimize the amount of nitrogen that passes below the root zone for the crop or vegetation grown of the land into the groundwater.

8. The permittee shall develop and retain the following information for five years:

   a. The pollutant concentration for each pollutant listed in Paragraph 2a. of this section.

   b. The following certification statement:

"I certify, under penalty of law, that the information that will ve used to determine compliance with the Class A pathogen requirements in §503.32 (a) was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility for fine and imprisonment."

   c. A description of how the pathogen requirements are met.

9. The person who applies the bulk sewage sludge shall develop and retain the following information for five years:

   a. The following certification requirement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.14 and the vector attraction reduction requirement in <u>[insert either §503.33 (b)(9) or (b)(10)]</u> was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including fine and imprisonment."

   b. A description of how the management practices in §503.14 are met for each site on which the bulk sewage sludge is applied.

   c. A description of how the vector attraction reduction requirements are met for each site on which bulk sewage sludge is applied, including a description of how the requirement in Paragraph 5 is met.

10. The permittee shall report the information in paragraphs 8a, b and c annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of this permit.

11. All sludge sampling and analysis shall be in accordance with the procedures detailed in 40 CFR §503.8.

12. The permittee shall supply the following information/requirements to the person who applies the bulk sewage sludge:

    a. Information in Paragraph 1b.
    b. Requirements in Paragraphs 1f and 5.
    c. Management Practices in Paragraphs 7a through d.
    d. Record keeping requirements in Paragraphs 9a through c.

13. If the permittee intends to apply sludge to land application sites not identified at the time of permit issuance, the permittee shall submit a land application plan 180 days prior to initial application at the new site. The plan shall:

    a. Describe the geographic area covered by the plan;
    b. Identify site selection criteria;
    c. Describe how sites will be managed; and
    d. Provide for advance public notice as required by state and local laws, and notice to landowners and occupants adjacent to or abutting the proposed land application site.

1.3.3. Scenario No. 3

This scenario applies to bulk sewage sludge meeting the following criteria: pollutant concentrations at §503.13(b); Class B pathogens at §503.32(b); and one of the vector attraction reduction requirements found at §503.33(b). Bulk sewage sludge of this quality may be applied to agricultural land, forest land, public contact site or a reclamation site. There are specific requirements for the preparer and applier.

SLUDGE CONDITIONS

1. The permittee and the applier of the bulk sewage sludge shall comply with the following general requirements:

    a. Bulk sewage sludge shall not the applied to the land except in accordance with 40 CFR Part 503 Subpart B.

    b. The permittee shall provide the person who applies the bulk sewage sludge written notification of the concentration of total nitrogen (as N on a dry weight basis) in the bulk sewage sludge.

    c. The person who applies the bulk sewage sludge shall obtain notice and necessary information from the permittee to comply with the requirements of 40 CFR Part 503 Subpart B.

d. When the permittee provides the bulk sewage sludge to a person who applies the bulk sewage sludge, the permittee shall provide the person who applies the bulk sewage notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

e. When the permittee provides the bulk sewage sludge to a person who prepares the bulk sewage sludge, the permittee shall provide the person who prepares the bulk sewage sludge notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

f. The person who applies the bulk sewage sludge shall provide the owner or lease holder of the land on which the bulk sewage sludge is applied notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

g. When bulk sewage sludge is applied in another state, the person who prepares the sewage sludge shall provide notice to the permitting authority for the state in which the sewage sludge will be applied. Notice shall be given prior to the initial application and shall contain the following information:

i. The location of each site by either street address or latitude and longitude.

ii. The approximate period of time the bulk sewage sludge will be applied to each site.

iii. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if applicable) for the person who prepares the bulk sewage sludge.

iv. The name, address, telephone number, and national Pollutant Discharge Elimination System permit number (if applicable) for the person who applies the bulk sewage sludge.

2. Pollutant Limitations

a. The maximum concentration of metals in the sewage sludge that is applied to the land shall not exceed the following (dry weight basis):

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg

Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

b. The sewage sludge shall not be applied to the land if any of the pollutant concentrations in Paragraph 2a are exceeded

c. The monthly average concentration of metals in the sewage sludge shall not exceed the following (dry weight basis):

Arsenic	41 mg/kg
Cadmium	39 mg/kg
Copper	1500 mg/kg
Lead	300 mg/kg
Mercury	17 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	2800 mg/kg

3. The permittee shall meet Class B pathogen requirements utilizing one of the methods specified in 40CFR §503.32

4. The permittee shall meet one of vector attraction reduction requirements specified in 40CFR §503.33

5. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2a, the pathogen density requirements and the vector attraction reduction requirements at the frequency specified in sludge condition 6 of the permit.

6. The person who applies the bulk sewage sludge to the land shall comply with the following management practices:

a. The bulk sewage sludge shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated habitat.

b. The bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site or a land reclamation site that is frozen, snow-covered or flooded so that the bulk sewage sludge enters a wetland or other water of the United States as defined in 40 CFR 122.2, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act.

c. Bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site or a land reclamation site that is less than 10 meters (33 feet) from waters of the United States, as defined in 40 CFR §122.2.

d. The whole sludge application rate shall be applied at an agronomic rate designed to (i) provide the amount of nitrogen needed by the crop or vegetation grown on the land; and (ii) minimize the amount of nitrogen that passes below the root zone for the crop or vegetation grown of the land into the groundwater.

7. The person who applies the bulk sewage sludge shall insure that the following site restrictions are met for each site on which the bulk sewage sludge is applied:

   a. Food crops with harvested parts that touch the sewage sludge/soil mixture and are not totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

   b. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for four months or longer prior to incorporation into the soil.

   c. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than four months prior to incorporation into soil.

   d. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

   e. Animals shall not be grazed on the land for 30 days after application of sewage sludge.

f. Turf grown on land where sewage sludge is applied shall not be harvested for one year after application of the sewage sludge when the harvested turf is placed on either land with high potential for public exposure or a lawn.

g. Public access to land with a high potential for public exposure shall be restricted for one year after application of sewage sludge.

h. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

8. The permittee shall develop and retain the following information for five years:

a. The concentration of each pollutant listed in Paragraph 2a of this section.

b. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirement in §503.32(b) and the vector attraction reduction requirement in [insert one of the vector attraction reduction requirements in §503.33 (b)(1) through (b)(8), if one of those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information I am aware that there are significant penalties for false certification including the possibility of fine or imprisonment."

c. A description of how the Class B pathogen requirements are met.

d. When the permittee is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirements are met.

9. The person who applies the bulk sewage sludge shall develop and maintain the following information for five years:

a. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.14, the site restrictions in §503.32(b)(5), and the vector attraction reduction requirements in [insert either §503.33(b)(9) or (b)(10), if one of those requirements is met] was prepared for each site on which sewage sludge is applied under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

b. A description of how the management practices in Paragraphs 6a through d are met for each site.

c. A description of how the site restrictions in Paragraphs 7a through h are met for each site.

d. When the applier is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirements in either §503.33(b)(9) or (b)(10) is met.

10. The permittee shall report the information in Paragraph 8a, b, c and d annually on February 19. Reports shall be submitted to the address in the Monitoring and Reporting section of this permit.

11. All sludge sampling and analysis shall be in accordance with the procedures detailed in 40CFR §503.8

12. The permittee shall notify the person who applies the bulk sewage sludge of the following information/requirements:

a. Information in Paragraph 1b.
b. Requirement in Paragraph 1f.
c. Management practices in Paragraph 6a through d.
d. Site Restrictions in Paragraph 7a through h.
e. Record keeping requirements in Paragraphs 9a through d.

13. If the permittee intends to apply sludge to land application sites not identified at the time of permit issuance, the permittee shall submit a land application plan 180 days prior to initial application at the mew site. The plan shall:

a. Describe the geographic area covered by the plan;
b. Identify site selection criteria;
c. Describe how sites will be managed; and
d. Provide for advance public notice as required by state and local laws, and notice to landowners and occupants adjacent to or abutting the proposed land application site.

1.3.4. Scenario No. 4

This scenario applies to bulk sewage sludge meeting the following criteria: pollutant concentrations at §503.13(b)(2); Class A pathogen requirements at §503.32(a); and one of the vector attraction reduction requirement found at §503.33(b). Bulk sewage sludge of this quality may be applied to agricultural land, forest land, public contact site or a reclamation site. There are specific requirements for the preparer and the applier.

SLUDGE CONDITIONS

1. The permittee and the applier of the bulk sewage sludge shall comply with the following general requirements:

   a. Bulk sewage sludge shall not be applied to the land except in accordance with 40 CFR Part 503 Subpart B.

   b. Bulk sewage sludge shall not be applied if any of the cumulative pollutant loading rates in Paragraph 2c have been reached on the site.

   c. The permittee shall provide the person who supplies the bulk sewage sludge written notification of the concentration of total nitrogen (as N on a dry weight basis) in the bulk sewage sludge.

   d. The person who applies the bulk sewage sludge shall obtain notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart b.

   e. The person who applies the bulk sewage sludge shall obtain the following information:

      i. Prior to the application of bulk sewage sludge, the person who proposes to apply the bulk sewage shall contact the permitting authority for the state in which the bulk sewage sludge will be applied to determine whether bulk sewage sludge subject to the cumulative pollutant loading rates in §503.13(b)(2) has been applied to the site since July 20, 1993.

      ii. If bulk sewage sludge subject to the cumulative pollutant loading rates has not been applied to the site, the cumulative amount for each pollutant listed in Paragraph 2c may be applied.

      iii. If bulk sewage sludge subject to the cumulative pollutant loading rates has been applied to the site since July 20, 1993, and the cumulative amount of each pollutant applied to the site since that date is known, the cumulative amount of each pollutant applied to the site shall be used to determine the additional amount of each pollutant that can be applied to the site such that the loading rates in Paragraph 2c are not exceeded.

      iv. If bulk sewage sludge subject to the cumulative pollutant loading rates has been applied to the site since July 20, 1993, and the cumulative amount of each pollutant applied to the site since that date is not known, an additional amount of any pollutant may not be applied to the site.

f. When the permittee provides the bulk sewage sludge to a person who applies the bulk sewage sludge, the permittee shall provide the person who applies the bulk sewage notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

g. When the permittee provides the bulk sewage sludge to a person who prepares the bulk sewage sludge, the permittee shall provide the person who prepares the bulk sewage sludge notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

h. The person who applies the bulk sewage sludge shall provide the owner or lease holder of the land on which the bulk sewage sludge is applied notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

i. When the bulk sewage sludge is applied in another state, the person who prepares the sewage sludge shall provide notice to the permitting authority for the state in which the sewage sludge will be applied. Notice shall be given prior to the initial application and shall contain the following information:

    i. The location of each site by either street address or latitude and longitude.

    ii. The approximate period of time the bulk sewage sludge will be applied to each site.

    iii. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if applicable) for the person who prepares the bulk sewage sludge.

    iv. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if applicable) for the person who applies the bulk sewage sludge.

j. The person who applies the bulk sewage sludge shall provide written notice, prior to the initial application of the bulk sewage sludge, to the permitting authority for the State in which the bulk sewage sludge will be applied. The notice shall include:

    i. The location, by either street address or latitude and longitude, of the land application site.

ii. The name, address, telephone number, and National Pollutant Discharge Elimination System permit number (if appropriate) of the person who will apply the bulk sewage sludge.

2. Pollutant limitations

a. The maximum concentration of metal in the sewage sludge that is applied to the land shall not exceed the following (dry weight basis):

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg
Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

b. The sewage sludge shall not be applied to the land if any of the pollutant concentrations in Paragraph 2a are exceeded.

c. The cumulative pollutant loading rates for each site shall not exceed the following (kilograms per hectare):

Arsenic	41 kilograms/hectare
Cadmium	39 kilograms/hectare
Copper	1500 kilograms/hectare
Lead	300 kilograms/hectare
Mercury	17 kilograms/hectare
Nickel	420 kilograms/hectare
Selenium	100 kilograms/hectare
Zinc	2800 kilograms/hectare

d. Bulk sewage sludge shall not be applied to a site on which any of the cumulative pollutant loading rates have been reached.

3. The permittee shall meet Class A pathogen requirements utilizing one of the methods specified in 40CFR §503.32

4. The permittee shall meet one of the vector attraction reduction requirements specified in 40CFR §503.33. The permittee may only utilize alternatives 1 through 8. If the permittee meets one of the vector attraction reduction alternatives 1 through 5, the Class A pathogen requirements must be met either prior to or at the same time as the vector attraction reduction requirement.

5. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2a, the pathogen density requirements and the vector attraction reduction requirements at the frequency specified in sludge condition 6 of the permit.

6. The person who applies the bulk sewage sludge to the land shall comply with the following management practices:

    a. The bulk sewage sludge shall not be applied to the land if it is likely to adversely affect threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated habitat.

    b. The bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site or a land reclamation site that is frozen, snow-covered or flooded so that the bulk sewage sludge enters a wetland or other water of the United States as defined in 40 CFR §122.2, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act.

    c. Bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site, or a land reclamation site that is less than 10 meters (33 feet) from waters of the United States, as defined in 40 CFR §122.2.

    d. The whole sludge application rate shall be applied at an agronomic rate designed to (i) provide the amount of nitrogen needed by the crop or vegetation grown on the land and (ii) minimize the amount of nitrogen that passed below the root zone for the crop or vegetation grown on the land into the groundwater.

    e. The permittee shall develop and maintain the following information for five years:

    f. The concentration of each pollutant listed in paragraph 2a in the bulk sewage sludge.

g. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class A pathogen requirement in §503.32(a) and the vector attraction reduction requirement in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through (b)(8), if one of the those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine or imprisonment."

h. A description of how the Class A pathogen requirements are met.

i. When the permittee is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirements are met.

7. The person who applies the bulk sewage sludge shall develop and retain the following information indefinitely:

a. The location, by either street address of latitude and longitude, of each site on which bulk sewage sludge is applied.

b. The number of hectares in each site on which bulk sewage sludge is applied.

c. The date bulk sewage sludge is applied to each site.

d. The cumulative amount of each pollutant listed in Paragraph 2a in the bulk sewage sludge applied to each site, including the amount in Paragraph 1e(iii) of this section (in kilograms).

e. The amount of sewage sludge applied to each site (in metric tons).

f. The following certification statement:

"I certify, under penalty fo law, that the information that will be used to determine compliance with the requirements to obtain information in §503.12(e)(2){Paragraphs 1e (i through iv) of this permit) was prepared for each site on which sewage sludge was applied under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including fine and imprisonment."

g. A description of how the requirements to obtain the information in Paragraph 1e (i through iv) are met.

8. The person who applies the bulk sewage sludge shall develop and maintain the following information for five years:

   a. The following certification statement:

   "I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.14 was prepared for each site on which sewage sludge was applied my direction and supervision in accordance with the system designed to ensured that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

   b. A description of how the management practices in Paragraphs 6a through d are met for each site.

   c. When the applier is responsible for meeting the vector attraction reduction requirements, the following certification statement:

   "I certify, under penalty of law, that the information that will be used to determine compliance with the vector attraction reduction requirement in [insert either §503.33(b)(9) or (b)(10)§] was prepared under my direction and supervision in accordance with the system designed to endure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

   d. When the applier is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirement in either §503.33(b)(9) or (b)(10) is met.

   e. The permittee shall report the information in Paragraphs 7a, b, c and d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of this permit.

9. When 90 percent or more of any of the cumulative pollutant loading rates are reached, the person who applies the bulk sewage sludge shall report the information in Paragraphs 10a through d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of this permit.

10. All sludge sampling and analysis shall be in accordance with the procedures detailed in 40CFR §503.8.

11. The permittee shall notify the applier of the following information/requirements:

   a. Requirements in paragraphs 1b, 1d, 1e, 1j, 2c and 2d.
   b. Information in Paragraph 1c.
   c. The management practices in Paragraphs 6a through d.
   d. Record keeping requirements in Paragraph 8a through g and Paragraphs 9a through d.
   e. Reporting requirements in Paragraph 11.

12. If the permittee intends to apply sludge to land application sites not identified at the time of permit issuance, the permittee shall submit a land application plan 180 days prior to initial application at the new site. The plan shall:

   a. Describe the geographic area covered by the plan;
   b. Identify site selection criteria;
   c. Describe how sited will be managed; and
   d. Provide for advance public notice as required by state and local laws, and notice to landowners and occupants adjacent to or abutting the proposed land application site.

1.3.5 Scenario No.5

This scenario applies to bulk sewage sludge meeting the following criteria: pollutant concentrations at §503.13(b)(2); Class B pathogen requirements at §503.32(b); and one of the vector attraction reduction requirements found at §503.33(b). Bulk sewage sludge of this quality may be applied to agricultural land, forest land, public contact site or a reclamation site. There are specific requirements for the preparer and the applier.

SLUDGE CONDITIONS

1. The permittee and the applier of the bulk sewage sludge shall comply with the following general requirements:

   a. Bulk sewage sludge shall not be applied to the land except in accordance with 40 CFR Part 503 Subpart B.

   b. Bulk sewage sludge shall not be applied if any of the cumulative pollutant loading rates in Paragraph 2c have been reached on the site.

   c. The permittee shall provide the person who applies the bulk sewage sludge written notification of the concentration of total nitrogen (as N on a dry weight basis) in the bulk sewage sludge.
   d. The person who applies the bulk sewage sludge shall obtain notice and necessary

information to comply with the requirements of 40 CFR Part 503 Subpart B.

e. The person who applies the bulk sewage sludge shall obtain the following information:

   i. Prior to application of bulk sewage sludge, the person who propose to apply the bulk sewage shall contact the permitting authority for the state in which the bulk sewage sludge will be applied to determine whether bulk sewage sludge subject to the cumulative pollutant loading rates in §503.13(b)(2) has been applied to the site since July 20, 1993.

   ii. If bulk sewage sludge subject to the cumulative pollutant loading rates has not been applied to the site, the cumulative amount for each pollutant listed in Paragraph 2c may be applied.

   iii. If bulk sewage sludge subject to the cumulative pollutant loading rates has been applied to the site since July 20, 1993, and the cumulative amount of each pollutant applied to the site since that date is known, the cumulative amount of each pollutant applied to the site shall be used to determine the additional amount of each pollutant that can be applied to the site such that the loading rates in Paragraph 2c are not exceeded.

   iv. If bulk sewage sludge subject to the cumulative pollutant loading rates has been applied to the site since July 20, 1993, and the cumulative amount of each pollutant applied to the site since that date is not known, an additional amount of any pollutant may not be applied to the site.

f. When the permittee provides the bulk sewage sludge to a person who applies the bulk sewage sludge, the permittee shall provide the person who applies the bulk sewage notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

g. When the permittee provides the bulk sewage sludge to a person who prepares the bulk sewage sludge, the permittee shall provide the person who prepares the bulk sewage sludge notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

h. The person who applies the bulk sewage sludge shall provide the owner or lease holder of the land on which the bulk sewage sludge is applied notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

i. When bulk sewage sludge is applied in another state, the person who prepares the sewage sludge shall provide notice to the permitting authority for the state in which the sewage sludge will be applied. Notice shall be given prior to the initial application and shall contain the following information:

i. The location of each site by either street address or latitude and longitude.

ii. The approximate period of time the bulk sewage sludge will be applied to each site.

iii. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if applicable) for the person who prepares the bulk sewage sludge.

iv. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if applicable) for the person who applies the bulk sewage sludge.

j. The person who applies the bulk sewage sludge shall provide written notice, prior to the initial application of the bulk sewage sludge, to the permitting authority for the State in which the bulk sewage sludge will be applied. The notice shall include:

i. The location, by either street address or latitude and longitude, of the land application site.

ii. The name, address, telephone number and National Pollutant Discharge Elimination System permit number (if appropriate) of the person who will apply the bulk sewage sludge.

2. Pollutant limitations

a. The maximum concentration of metals in the sewage sludge that is applied to the land shall not exceed the following (dry weight basis):

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg

Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

c. The sewage sludge shall not be applied to the land if any of the pollutant concentration in Paragraph 2a are exceeded.

d. The cumulative pollutant loading rates for each site shall not exceed the following (kilograms per hectare):

Arsenic	41 kilograms/hectare
Cadmium	39 kilograms/hectare
Copper	1500 kilograms/hectare
Lead	300 kilograms/hectare
Mercury	17 kilograms/hectare
Nickel	420 kilograms/hectare
Selenium	100 kilograms/hectare
Zinc	2800 kilograms/hectare

d. Bulk sewage sludge shall not be applied to a site on which any of the cumulative pollutant loading rates have been reached.

3. The permittee shall meet Class B pathogen requirements utilizing one of the methods specified in 40 CFR §503.32

4. The permittee shall meet one of vector attraction reduction requirements specified in 40 CFR §503.33

5. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2a, the pathogen density requirements and the vector attraction reduction requirements at the frequency specified in sludge condition 6 of the permit.

6. The person who applies the bulk sewage sludge shall insure that the following site restrictions are met for each site on which the bulk sewage sludge is applied:

a. Food crops with harvested parts that touch the sewage sludge/soil mixture and are not totally above the land surface shall not be harvested for 14 months after application of sewage sludge.

b. Food crops with harvested parts below the surface of the land shall not be harvested for 20 months after application of sewage sludge when the sewage sludge remains on the land surface for four months or longer prior to incorporation into the soil.

c. Food crops with harvested parts below the surface of the land shall not be harvested for 38 months after application of sewage sludge when the sewage sludge remains on the land surface for less than four months prior to incorporation into the soil.

d. Food crops, feed crops, and fiber crops shall not be harvested for 30 days after application of sewage sludge.

e. Animals shall not be grazed on the land for 30 days after application fo sewage sludge.

f. Turf grown on land where sewage sludge is applied shall not be harvested for one year after application of the sewage sludge when the harvested turf is placed on either land with a high potential for public exposure or a lawn.

g. Public access to land with a high potential for public exposure shall be restricted for one year after application of sewage sludge.

h. Public access to land with a low potential for public exposure shall be restricted for 30 days after application of sewage sludge.

7. The person who applies the bulk sewage sludge to the land shall comply with the following management practices:

a. The bulk sewage sludge shall not be applied to the land if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated habitat.

b. The bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site or a land reclamation site that is frozen, snow-covered or flooded so that the bulk sewage sludge enters a wetland or other water of the United States as defined in 40 CFR §122.2, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act.

c. Bulk sewage sludge shall not be applied to agricultural land, forest land, a public contact site, or a land reclamation site that is less than 10 meters (33 feet) from waters of the United States, as defined in 40 CFR §122.2.

d. The whole sludge application rate shall be applied at an agronomic rate designated to (i) provide the amount of nitrogen needed by the crop or vegetation grown on that land; and (ii) minimize the amount of nitrogen that passes below the root zone for the crop or vegetation grown of the land into the groundwater.

8. The permittee shall develop and maintain the following information for five years:

a. The concentration of each pollutant listed in Paragraph 2a in the bulk sewage sludge.

b. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the Class B pathogen requirement in §503.32(b) and the vector attraction reduction requirement in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through (b)(8), if one of those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility fo fine or imprisonment."

c. A description of how the Class B pathogen requirements are met.

d. When the permittee is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirements are met.

9. The person who applies the bulk sewage sludge shall develop and retain the following information indefinitely:

a. The location, by either street address of latitude and longitude, of each site on which bulk sewage sludge is applied.

b. The number of hectares in each site on which bulk sewage sludge is applied.

c. The date bulk sewage sludge is applied to each site.

d. The cumulative amount of each pollutant listed in Paragraph 2a in the bulk sewage sludge applied to each site, including the amount in Paragraph 1e(iii) of this section. (in kilograms)

e. The amount of sewage sludge applied to each site (in metric tons).

f. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the requirement to obtain information in §503.12(e)(2){Paragraphs 1e (i through iv) of this permit.} was prepared for each site on which bulk sewage sludge was applied under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including fine and imprisonment."

g. A description of how the requirements to obtain information Paragraphs 1.e. (i through iv) are met.

10. The person who applies the bulk sewage sludge shall develop and maintain the following information for five years:

a. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.14 was prepared for each site on which bulk sewage sludge was applied under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

b. A description of how the management practices in Paragraphs 7a through d are met for each site.

c. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the site restriction in §503.32(b)(5) for each site on which Class B sewage sludge was applied was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including fine and imprisonment."

d. A description of how the site restrictions are met for each site.

e. When the applier is responsible for meeting the vector attraction reduction requirements, the following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the vector attraction reduction requirement in [insert either §503.33(b)(9) or (b)(10)] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

f. When the applier is responsible for meeting the vector attraction reduction requirements, a description of how the vector attraction reduction requirement in either §503.33(b)(9) or (b)(10) is met.

11. The permittee shall report the information in Paragraphs 8a, b, c and annually on February 19. Reports shall be submitted to the address in the Monitoring and Reporting section of this permit.

12. When 90 percent or more of any of the cumulative pollutant loading rates are reached, the person who applies the bulk sewage sludge shall report the information in Paragraphs 10a through d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of this permit.

13. All sludge sampling and analysis shall be in accordance with the procedures detailed in 40 CFR §503.8

14. The permittee shall notify the applier of the following information/requirements:

a. Requirements in Paragraphs 1b, 1d, 1e, 1j, 2c and 2d.
b. Information in Paragraph 1c.
c. The management practices in Paragraphs 7a through d.
d. The site restrictions in paragraphs 6a through h.
e. Record keeping requirements is Paragraph 9a through g and Paragraphs 10a through d.
f. Reporting requirements in Paragraph 12.

15. If the permittee intends to apply sludge to land application sites not identified at the time of permit issuance, the permittee shall submit a land application plan 180 days prior to initial application at the new site. The plan shall:

a. Describe the geographic area covered by the plan;
b. Identify site selection criteria;
c. Describe how sites will be managed; and
d. Provide for advance public notice as required by state and local laws, and notice to landowners and occupants adjacent to or abutting the proposed land application site.

1.3.6. Scenario No.6

This scenario applies to bagged materials sold or given away meeting the annual pollutant loading rates at §503.32(a); and one of the vector attraction reduction requirements at §503.33(b)(1) through (b)(8).

SLUDGE CONDITIONS

1. The permittee and the applier shall meet the following requirements:

   a. The sewage sludge shall be applied in accordance with 40 CFR Part 503 Subpart B.

   b. The person who applies the sewage sludge shall obtain the information needed to comply with 40 CFR Part 503 Subpart B.

   c. When the permittee provides the sewage sludge to a person who prepares the sewage sludge, the permittee shall provide the person who prepares the sewage sludge notice and necessary information to comply with 40 CFR Part 503 Subpart B.

2. Pollutant Limitations

   a. The maximum concentration of metals in the sewage sludge that is applied to the land shall not exceed the following (dry weight basis):

Arsenic	75 mg/kg
Cadmium	85 mg/kg
Copper	4300 mg/kg
Lead	840 mg/kg
Mercury	57 mg/kg
Molybdenum	75 mg/kg

Nickel	420 mg/kg
Selenium	100 mg/kg
Zinc	7500 mg/kg

b. The sewage sludge shall not be applied to the land if any of the pollutant concentrations in Paragraphs 2a are exceeded.

c. The product of the concentration of each pollutant in the sewage sludge and the annual whole sludge application rate for the sewage sludge shall not cause the annual pollutant loading rate for the pollutant loading rates are specified below (kilograms per hectare per 365 day period):

Arsenic	2.0
Cadmium	1.9
Copper	75
Lead	15
Mercury	0.85
Nickel	21
Selenium	5.0
Zinc	140

d. The annual whole sludge application rate shall be determined in the following manner:

i. Analyze a sample of the sewage sludge to determine the concentration for each pollutant listed in Paragraph 2a.

ii Using the pollutant concentrations from Paragraph 2d(i) and the annual pollutant loading rates from Paragraph 2c, calculate the annual whole sludge application rate using the following equation:

$$AWSAR = \frac{APLR}{C \times 0.001}$$

Where:

AWSAR = Annual whole sludge application rate in metric tons per hectare per 365 day period (dry weight basis)

APLR = Annual pollutant loading rate in kilograms per hectare per 365 day period.

C = Pollutant concentration in milligrams per kilogram of total solids (dry weight basis)

0.001 = Conversion factor

iii The AWSAR for the sewage sludge is the lowest AWSAR calculated in Paragraph 2d(ii).

3. Label Requirements

a. Either a label shall be affixed to the bag or other container in which the sewage sludge is sold or given away or an information sheet shall be provided to any person who receives the sewage sludge.

b. The label information sheet shall contain the following information:

i. The name and address of the person who prepared the sewage sludge.

ii. A statement that application of sewage sludge to the land is prohibited except in accordance with the instructions on the label or information sheet.

iii. The annual whole sludge application rate which does not cause the annual pollutant loading rates in Paragraph 2c to be exceeded.

4. The permittee shall meet Class A pathogen requirements utilizing one of the methods specified in 40 CFR §503.32

5. The permittee shall meet one of the vector attraction reduction requirements specified in 40 CFR §503.33. The permittee may only utilize alternatives 1 through 8. If the permittee meets one of the vector attraction reduction alternatives 1 through 5, the Class A pathogen requirements must be met either prior to or at the same time as the vector attraction reduction requirement.

6. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2a, the pathogen density, and the vector attraction reduction requirement at the frequency specified in sludge condition 6 of the permit.

7. The permittee shall develop and retain the following information for five years:

   a. The annual whole sludge application rate that does not cause the annual pollutant loading rates in Paragraph 2c to be exceeded.

   b. The concentration of each pollutant in Paragraph 2a in the sewage sludge.

   c. The following certification statement:

   "I certify, under penalty of law, that the information that will be used to determine compliance with the management practice in §503.14(e), the Class A pathogen requirement in §503.32(a), and the vector attraction reduction requirement in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through (b)(8)] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine or imprisonment."

   d A description of how the Class A pathogen requirements are met.

   e. A description of how the vector attraction reduction requirements are met.

8. The permittee shall report the information in Paragraphs 7a through e annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting Section of this permit.

9. All sewage sludge sampling and analysis procedures shall be in accordance with procedures detailed in 40 FR §503.8.

2. SURFACE DISPOSAL

This section applies to sewage sludge from the permittee's facility which is by surface disposed. The permittee should answer the following questions. The answer to these questions need to be evaluated to determine which permitting scenario for sewage sludge surface disposal applies. After the permitting scenario is determined, the permittee must comply with the directives contained in the chosen scenario. The permittee must also note the run-off from surface disposal units may be subject to stormwater regulations.

2.1 Question Algorithm

The permittee should review and answer the following questions. The information gathered from answering these questions will aid the permittee in determine the appropriate surface disposal scenario which applies to the sludge generated at the permittee's wastewater treatment facility. The scenario selected will detail which specific Use or Disposal of Sewage Sludge, Part 503, regulations must be complied with for the land application method used by the permittee.

1. Is the facility regulated under 40 CFR §503?

   If the facility disposes of its sludge at a municipal solid waste landfill (MSWLF), 40 CFR §503 regulations do not apply. However, the permittee still has some responsibilities. Permit language is in Scenario No.4.

   The 40 CFR §503 regulations also do not apply in the case of storage of sewage sludge. An EPA rule of thumb is sludge stored on the land for longer than two years is defined as surface disposal. If a permittee claims storage, or treatment, the permittee's facility must be specifically equipped to support sewage sludge storage. Further, the permittee must ultimately have a clear, final disposition for the sewage sludge.

2. Does the following situations exist at a permittee's active sewage sludge disposal unit?

   a. The unit is located within 60 meters (200 feet) of a fault that has had displacement in the Holocene time (10,000 years);

   b. A unit located in a unstable area; or

   c. A unit located in a wetland without a Section 402 or 404 permit.

If any of these situations exist, the active sewage sludge unit should have closed by March 22, 1994. If the active sewage sludge disposal unit is still operating, but one of the previous situations does apply to the unit, that unit must be closed.

3. Can the permittee's sewage sludge disposal unit demonstrate they are designed to withstand seismic impacts? If this demonstration cannot be made, the unit must close. This demonstration should be made prior to permit issuance.

4. Does the facility have a liner and leachate collection system?

   The liner must have a hydraulic conductivity of 1×10^{-7} centimeters per second or less. If the liner does not meet the specified hydraulic conductivity, the sludge disposal unit is regulated as an **unlined** sewage sludge disposal site. There are no pollutant limitations for lined units.

5. What is the distance from the property boundary to the boundary of the active sewage sludge unit? Use the tables below to determine appropriate pollutant limitations for units without a liner or leachate collection on a dry weight basis.

§503.23 TABLE 1
Active Unit Boundary is 150 Meters or More
From Property Boundary

Arsenic	73 mg/kg
Chromium	600 mg/kg
Nickel	420 mg/kg

§503.23 TABLE 2
Active Unit Boundary is Less Than 150 Meters
From Property Boundary

Distance (meters)	Pollutant Concentrations (mg/kg)		
	Arsenic	Chromium	Nickel
0<Distance<25	30	200	210
25<Distance<50	34	220	240
50<Distance<75	39	260	270
75<Distance<100	46	300	320
100<Distance<125	53	360	390
125<Distance<150	62	450	420

6. Does the facility cover the sewage sludge placed in the unit daily?

This practice is considered to achieve both pathogen reduction and vector attraction reduction. If a facility covers the sludge, the permittee must monitor for methane gas.

2.2. Scenario Determination

After the information is gathered and evaluated from the questions in the preceding section, the permittee can select the appropriate surface disposal scenario.

Surface Disposal Scenario Selection Table

SCENARIO	LINED/UNLINED	DISTANCE TO UNIT BOUNDARY
No.1	Unlined	<150m
No.2	Unlined	0 to 150m
No.3	Lined	NA
No.4	Disposed in Municipal Solid Waste Land Fill	NA

2.3. Scenarios

2.3.1. Scenario No.1

Active sewage sludge unit without a liner and leachate collection system with active sewage sludge unit boundary 150 meters or more from the property boundary.

SLUDGE CONDITIONS

1. The permittee and the owner/operator of an active sewage sludge unit shall comply with the following requirements:

    a. Sewage sludge shall not be placed in an active sewage sludge unit unless the requirement of 40 CFR Part 503, Subpart C are met.

    b. An active sewage sludge unit located within 60 meters of a fault that has had displacement in Holocene time; located in an unstable area; or located in a wetland, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act, shall close by March 22, 1994, unless, in the case of an active sewage sludge unit located within 60 meters of a fault that has displacement n Holocene time, otherwise specified by the permitting authority.

i. The owner/operator of an active sewage sludge unit shall submit a written closure and post closure plan to EPA 180 days prior to the date an active sewage sludge unit closes.

ii. The closure plan shall consider the elements outlined in Section 6. If an element is not applicable, the owner/operator shall state the reasons in the plan.

c. The owner of a surface disposal site shall provide written notification to the subsequent owner of the site that sewage sludge was place on the site. The notice should include elements outlined in Section 7. A copy of the notification shall be submitted to the EPA.

2. Pollutant limitations

a. The maximum concentration of pollutants in the sewage sludge placed in an active sewage sludge unit shall not exceed the following:

Arsenic	73 mg/kg
Chromium	600 mg/kg
Nickel	420 mg/kg

b. Sewage sludge with metals concentrations which exceed the limitations in Paragraph 2a. shall not be placed in a surface disposal unit.

3. The permittee and the owner/operator shall comply with the following management practices:

a. The sewage sludge shall not be placed on an active sewage sludge unit if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat.

b. The run-off from an active sewage sludge unit shall be collected and disposed in accordance with applicable stormwater regulations.

c. The run-off collection system for an active sewage sludge unit shall have the capacity to control run-off from a 24 hour - 25 year storm event.

d. i. When a daily cover is placed on an active sewage sludge unit, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit, 1.25 percent by volume, for methane gas during the period that the sewage sludge unit is active.

ii The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas during the period that the sewage sludge unit is active.

e i When a final cover is placed on a sewage sludge unit at closure, and for three years after closure, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent by volume, for methane gas.

ii The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas for three years after the sewage sludge unit closes.

f. A food crop, a feed crop, or a fiber crop shall not be grown on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when crops are grown on a sewage sludge unit.

g. Animals shall not be grazed on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when animals are grazed on a sewage sludge unit.

h. Public access to a surface disposal site shall be restricted for the period that the surface disposal site contains an active sewage sludge unit and for three years after the last sewage sludge unit closes.

i. i. Sewage sludge placed in an active sewage sludge unit shall not contaminate an aquifer.

ii The permittee shall demonstrate that sewage sludge place in an active sewage sludge unit does not contaminate an aquifer by either (1) submission of results of a groundwater monitoring program developed by a qualified groundwater scientist; or (2) submission of a certification by a qualified groundwater scientist that the sewage sludge does not contaminate and aquifer.

4. The following conditions must be documented by the permittee and owner/operator:

   a. An active sewage sludge unit shall not restrict the flow of a base flood.

   b. If a surface disposal site is located in a seismic impact zone, an active sewage sludge unit shall be designated to withstand the maximum recorded horizontal ground level acceleration.

   c. An active sewage sludge unit shall be located 60 meters or more from a fault that has displacement in Holocene time.

   d. An active sewage sludge unit shall not be located in an unstable area.

   e. An active sewage sludge unit shall not be located in a wetland.

5. If the active sewage sludge unit is not covered daily, the permittee shall meet either Class A or Class B pathogen reduction utilizing one of the methods in Section 4, and one of the vector attraction reduction requirements in Section 5.

6. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2, the pathogen density, and the vector attraction reduction requirements at the following frequency:

SEWAGE SLUDGE PRODUCED (metric tons per 365 day period)	**SAMPLING FREQUENCY**
0<Sludge(tons)<290	Once per year
0≤Sludge(tons)<1500	Once per quarter (four times per year)
1500≤Sludge(tons)<15000	Once per 60 days (six times per year)
Sludge(tons)≤15000	Once per Month (12 times per year)

   7. When a daily cover is placed on an active sewage sludge unit, the air in the structures within a surface disposal site and at the property line of the surface disposal site shall be monitored continuously for methane gas during the time that the surface disposal site contains an active sewage sludge unit and for three years after the sewage sludge unit closes.

8. The permittee shall develop and retain the following information for five years:

   a. The concentration for each pollutant listed in Paragraph 2a.

   b. The following certification statement:

   "I, certify, under penalty of law, that the information that will be used to determine compliance with the pathogen requirements in [insert §503.32(a), §503.32(b)(3)or §503.32(b)(4) when one of those requirements is met] and the vector attraction reduction requirements in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through §503.33(b)(8) when one of those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including that possibility of fine or imprisonment."

   c. A description of how the pathogen requirements are met.

   d. When the permittee is responsible for the vector attraction reduction requirements, a description of how the vector attraction reduction requirements are met.

9. The owner/operator of the surface disposal site shall develop and retain the following information for five years:

a. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.24 and the vector attraction reduction requirement in [insert one of the requirements in §503.33(b)(9) through (b)(11) if one of those requirements is met] was prepared under my direct supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

b. A description of how the management practices in Paragraphs 3a through 3i are met.

c. Documentation that the requirements in Paragraphs 4a through 4e are met.

d. A description of how the vector attraction reduction requirements are met, if the owner/operator is responsible for vector attraction reduction requirements.

10. The permittee shall report the information in Paragraphs 7a through 7d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of the permit.

11. All sewage sludge sampling and analysis procedures shall be in accordance with the procedures detailed in Section 7.

12. If the permittee is not the owner/operator of the surface disposal site, the permittee shall notify the owner/operator of the following:

    a. The requirements in Paragraphs 1a through 1c;
    b. The management practices in Paragraphs 3a through 3i;
    c. The requirements in Paragraphs 4a through 4e;
    d. The requirement in Paragraph 7; and
    e. The record keeping requirements in Paragraph 9a through 9d.

2.3.2. Scenario No.2

Active sewage sludge unit without a liner and leachate collection system located less than 150 meters from the property line. The permittee is directed to §503.33 TABLE 2, <u>Active Unit Boundary is Less Than 150 Meters From Property Boundary</u> in order to determine the maximum concentrations pollutants for the appropriate distant to the units boundary.

SLUDGE CONDITIONS

1. The permittee and the owner/operator of an active sewage sludge unit shall comply with following requirements:

    i. Sewage sludge shall not be placed in an active sewage sludge unit unless the requirement of 40 CFR Part 503, Subpart C are met.

    ii. An active sewage sludge unit located within 60 meters of a fault that has had displacement in Holocene time; located in an unstable area; or located in a wetland, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act, shall close by March 22, 1994, unless, in the case of an active sewage sludge unit located within 60 meters of a fault that has displacement in Holocene time, otherwise specified by the permitting authority.

    i. The owner/operator of an active sewage sludge unit shall submit a written closure and post closure plan to EPA 180 days prior to the date an active sewage sludge unit closes.

ii The closure plan shall consider the elements outlined in Section 6. If an element is not applicable, the owner/operator shall state the reasons in the plan.

c. The owner of a surface disposal site shall provide written notification to the subsequent owner of the site that sewage sludge was place on the site. The notice should include elements outlined in Section 7. A copy of the notification shall be submitted to the EPA.

2. Pollutant limitations

a. The maximum concentration of pollutant in the sewage sludge placed in an active sewage sludge unit shall not exceed the following:

§503.23 TABLE
Active Unit Boundary is Less Than 150 Meters
From Property Boundary

Distance (meters)	**Pollutant concentrations (mg/kg)**		
	Arsenic	Chromium	Nickel
0<Distance<25	30	200	210
25<Distance<50	34	220	240
50<Distance<75	39	260	270
75<Distance<100	46	300	320
100<Distance<125	53	360	390
125<Distance<150	62	450	420

b. Sewage sludge with metals concentrations which exceed the limitations in Paragraph 2a. shall not be placed in a surface disposal unit.

3. The permittee and the owner/operator shall comply with the following management practices:

a. The sewage sludge shall not be placed on an active sewage sludge unit if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat.

b. The run-off form an active sewage sludge unit shall be collected and disposed in accordance with applicable stormwater regulations.

c. The run-off collection system for an active sewage sludge unit shall have the capacity to control run-off from a 24 hour - 25 year storm event.

d. i. When a daily cover is placed on an active sewage sludge unit, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit, 1.25 percent by volume, for methane gas during the period that the sewage sludge unit is active.

2. The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas during the period that the sewage sludge unit is active.

e. i. When a final cover is placed on a sewage sludge unit at closure, and for three years after closure, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit, 1.25 percent by volume, for methane gas.

2. The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas for three years after the sewage sludge unit closes.

f. A food crop, a feed crop or fiber crop shall not be grown on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when crops are grown on a sewage sludge unit.

g. Animals shall not be grazed on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when animals are grazed on a sewage sludge unit.

h. Public access to a surface disposal site shall be restricted for the period that the surface disposal site contains an active sewage sludge unit and for site contains an active sewage sludge unit and for three years after the last sewage unit closes.

i. i. Sewage sludge placed in an active sewage sludge unit shall not contaminate an aquifer.

2. The permittee shall demonstrate the sewage sludge place in an active sewage sludge unit does not contaminate an aquifer by either (i) submission of results of a groundwater monitoring program developed by a qualified groundwater scientist; or (2) submission of certification by a qualified groundwater scientist that the sewage sludge does not contaminate an aquifer.

4. The following conditions must be documented by the permittee and owner/operator:

   a. An active sewage sludge unit shall not restrict the flow of a base flood.

   b. If a surface disposal site is located in seismic impact zone, an active sewage sludge unit shall be designed to withstand the maximum recorded horizontal ground level acceleration.

   c. A active sewage sludge unit shall be located 60 meters or more from a fault that has displacement in Holocene time.

   d. An active sewage sludge unit shall not be located in an unstable area.

   e. An active sewage sludge unit shall not be located in a wetland.

5. If the active sewage sludge unit is not covered daily, the permittee shall meet either Class A or Class B pathogen reduction utilizing one of the methods in Section 4, and one of the vector attraction reduction requirements in Section 5.

6. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2, the pathogen density, and the vector attraction reduction requirements at the following frequency:

Sampling Frequency Table

SEWAGE SLUDGE PRODUCED (metric tons per 365 day period)	**SAMPLING FREQUENCY**
0<Sludge(tons)<290	Once per Year
0≤Sludge(tons)<1500	Once Per Quarter (four times per year)
1500≤Sludge(tons)<15000	Once per 60 Days (six times per year)
Sludge(tons)≤15000	Once per Month (12 times per year)

7. When a daily cover is placed on an active sewage sludge unit, the air in the structures within a surface disposal site and at the property line of the surface disposal site shall be monitored continuously for methane gas during the time that the surface disposal site contains an active sewage sludge unit and for three years after the sewage sludge unit closes.

8. The permittee shall develop and retain the following information for five years:

   a. The following certification statement:

   "I, certify, under penalty of law, that the information that will be used to determine compliance with the pathogen requirements in [insert §503.32(a), §503.32(b)(2), §503.32(b)(4) when one of those requirements is met] and the vector attraction reduction requirements in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through §503.33(b)(8) when one of those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine or imprisonment."

   b. A description of how the pathogen requirements are met.

   c. When the permittee is responsible for the vector attraction reduction requirements, description of how the vector attraction reduction requirements are met.

9. The owner/operator of the surface disposal site shall develop and retain the following information for five years:

   a. The concentration of each pollutant listed in Paragraph 2a.

   b. The following certification statement:

   "I certify, under penalty of law, that the information that will be used to determine compliance with the management practices in §503.24 and the vector attraction reduction requirement in [insert one of the requirements in §503.33(b)(9) through (b)(11) if one of those requirements is met] was prepared under my direct supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

   c. A description of how the management practices in Paragraphs 3a through 3i are met.

d. Documentation that the requirements in Paragraphs 4a through 4e are met.

e. A description of how the vector attraction reduction requirements are met, if the owner/operator is responsible for vector attraction reduction requirements.

10. The permittee shall report the information in Paragraphs 7a through 7d annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of the permit.

11. All sewage sludge sampling and analysis procedures shall be in accordance with the procedures detailed in Section 7.

12. If the permittee is not the owner/operator of the surface disposal site, the permittee shall notify the owner/operator of the following:

a. The requirements in Paragraphs 1a through 1c;
b. The management practices in Paragraphs 3a through 3i;
c. The requirements in Paragraphs 4a through 4e;
d. The requirement in Paragraph 7; and
e. The record keeping requirements in Paragraph 9a through 9e.

2.3.3. Scenario No.3

This applies to an active sewage sludge unit with a liner and a leachate collection system.

SLUDGE CONDITIONS

1. The permittee and the owner/operator of an active sewage sludge unit shall comply with the following requirements:

a. Sewage sludge shall not be placed in an active sewage sludge unless the requirement of 40 CFR Part 503, Subpart C are met.

b. An active sewage sludge unit located within 60 meters of a fault that has had displacement in Holocene time; located in an unstable area; or located in a wetland, except as provided in a permit issued pursuant to Section 402 or 404 of the Clean Water Act, shall close by March 22, 1994, unless, in the case of an active sewage sludge unit located within 60 meters of fault that has displacement in Holocene time, otherwise specified by the permitting authority.

i. The owner/operator of an active sewage sludge unit shall submit a written closure and post closure plan to EPA 180 days prior to the date an active sewage sludge unit closes.

ii. The closure plan shall consider the elements outlined in Section 6. If an element is not applicable, the owner/operator shall state the reasons in the plan.

c. The owner of a surface disposal site shall provide written notification to the subsequent owner of the site that sewage sludge was placed on the site. The notice should include elements outlined in Section 7. A copy of the notification shall be submitted to the EPA.

2. The permittee shall comply with the following management practices:

a. The sewage sludge shall not be placed on an active sewage sludge unit if it is likely to adversely affect a threatened or endangered species listed under Section 4 of the Endangered Species Act or its designated critical habitat.

b. The run-off from an active sewage sludge unit shall be collected and disposed in accordance with applicable stormwater regulations.

c. The run-off collection system for an active sewage sludge unit shall have the capacity to handle run-off from a 24 hour - 25 year storm event.

d. The leachate collection system for an active sewage sludge unit shall be operated and maintained during the period the sewage sludge unit is active and for three years the sewage sludge unit closes.

e. The leachate shall be collected and disposed of in accordance with applicable regulations during the period the sewage sludge unit is active and for three years after it closes.

f. i. When a daily cover is placed on an active sewage sludge unit, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit, 1.25 percent by volume, for methane gas during the period that the sewage sludge unit is active.

ii. The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas during the period that the sewage sludge unit is active.

g. i. When a final cover is placed on a sewage sludge unit at closure, and for three years after closure, the concentration of methane gas in air in any structure within the surface disposal site shall not exceed 25 percent of the lower explosive limit, 1.25 percent by volume, for methane gas.

   ii The concentration of methane gas in air at the property line of the surface disposal site shall not exceed the lower explosive limit, 5 percent by volume, for methane gas for three years after the sewage sludge unit closes.

h. A food crop, a feed crop, or fiber crop shall not be grown on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when crops are grown on a sewage sludge unit.

i. Animals shall not be grazed on an active sewage sludge unit. The owner/operator of the sewage sludge unit must demonstrate to EPA that public health and the environment are protected from reasonably anticipated adverse effects of pollutants in sewage sludge when animals are grazed on a sewage sludge unit.

j. Public access to a surface disposal site shall be restricted for the period that the surface disposal site contains an active sewage sludge unit and for three years the last sewage sludge unit closes.

k. i. Sewage sludge placed in an active sewage sludge unit shall not contaminate an aquifer.

   ii The permittee shall demonstrate that sewage sludge place in an active sewage sludge unit does not contaminate an aquifer by either (1) submission of results of a groundwater monitoring program developed by a qualified groundwater scientist; or (2) submission of a certification by a qualified groundwater scientist that the sewage sludge does not contaminate an aquifer.

3. The following conditions must be documented by the permittee and owner/operator:

   a. An active sewage sludge unit shall not restrict the flow of a base flood.

   b. If a surface disposal site is located in a seismic impact zone, an active sewage sludge unit shall be designed to withstand the maximum recorded horizontal ground level acceleration.

c. A active sewage sludge unit shall be located 60 meters or more from a fault that has displacement in Holocene time.

d. An active sewage sludge unit shall not be located in an unstable area.

e. An active sewage sludge unit shall not be located in a wetland.

4. If the active sewage sludge unit is not covered daily, the permittee shall meet either Class A or Class B pathogen reduction utilizing one of the methods in Section 4, and one of the vector attraction reduction requirements in Section 5.

5. The permittee shall monitor the sewage sludge for the pollutants in Paragraph 2, the pathogen density, and the vector attraction reduction requirements at the following frequency:

Sampling Frequency Table

SEWAGE SLUDGE PRODUCED (metric tons per 365 day period)	**SAMPLING FREQUENCY**
0<Sludge(tons)<290	Once per Year
0<Sludge(tons)<1500	Once Per Quarter (four times per year)
1500<Sludge(tons)<15000	Once per 60 Days (six times per year)
Sludge(tons)<15000	Once per Month (12 times per year)

6. When a daily cover is placed on an active sewage sludge unit, the air in the structures within a surface disposal site and at the property line of the surface disposal site shall be monitored continuously for methane gas during the time that the surface disposal site contains an active sewage sludge unit and for three years after the sewage sludge unit closes.

7. The permittee shall develop and retain the following information for five years:

a. The following certification statement:

"I, certify, under penalty of law, that the information that will be used to determine compliance with the pathogen requirements in [insert §503.32(a), §503.32(b)(2), §503.32(b)(3) or §503.32(b)(4) when one of those requirements is met] and the vector attraction reduction requirements in [insert one of the vector attraction reduction requirements in §503.33(b)(1) through §503.33(b)(8) when one of those requirements is met] was prepared under my direction and supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine or imprisonment."

b. A description of how the pathogen requirements are met.

c. When the permittee is responsible for the vector attraction reduction requirements, a description of how the vector attraction reduction requirements are met.

8. The owner/operator of the surface disposal site shall develop and retain the following information for five years:

a. The following certification statement:

"I certify, under penalty of law, that the information that will be used to determine compliance with management practices in §503.24 and the vector attraction reduction requirement in [insert one of the requirements in §503.33(b)(9) through (b)(11) if one of those requirements is met] was prepared under my direct supervision in accordance with the system designed to ensure that qualified personnel properly gather and evaluate this information. I am aware that there are significant penalties for false certification including the possibility of fine and imprisonment."

b. A description of how the management practices in Paragraphs 2a through 2k are met.

c. Documentation that the requirements in Paragraphs 3a through e are met.

d. A description of how the vector attraction reduction requirements are met, if the owner/operator is responsible for vector attraction reduction requirements.

9. The permittee shall report the information in Paragraphs 8a through c annually on February 19. Reports shall be submitted to EPA at the address in the Monitoring and Reporting section of the permit.

10. All sewage sludge sampling and analysis procedures shall be in accordance with the procedures detailed in Section 7.

11. If the permittee is not the owner/operator of the surface disposal site, the permittee shall notify the owner/operator of the following:

    a. The requirements in Paragraphs 1a through e;
    b. The management practices in Paragraphs 2a through k;
    c. The requirements in Paragraph 3a through e;
    d. The requirement in Paragraph 6; and
    e. The record keeping requirements in Paragraphs 8a through d.

2.3.4. Scenario No.4

A permittee who dispose of their sludge in a municipal solid waste land fill are regulated under 40 CFR Part 258.

SLUDGE CONDITIONS

1. The permittee must dispose of the sewage sludge in a landfill which is in compliance with 40 CFR Part 258.

2. Sewage sludge disposed of in a municipal solid waste landfill shall not be hazardous. The Toxicity Characterization Leachate Protocol (TCLP) shall be used as demonstration that the sludge is non-hazardous.

3. The sewage sludge must not be liquid as determined by the Paint Filter Liquids Test method (Method 9095 as described in “Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods, EPA publication No. SW-846).

3. Incineration

Each facility that incinerates sewage sludge is still subject to 40 CFR Part 503 regulations. Implementation of these regulations are site specific. A facility which incinerates sewage sludge will have specific conditions for that incineration process included in the facility's NPDES permit.

4. Pathogens Reduction

Allowable pathogen reduction alternatives are listed in this section. The corresponding reference to the regulation is listed in parenthesis.

4.1 Class A Pathogen Reduction

4.1.1. Class A – Alternative 1 (503.32(a)(3))

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge shall be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §5.3.10(c), §503.10(e) or §503.10(f).

ii. The temperature of the sewage sludge that is used or disposed shall be maintained at a specific value for a period of time.

a. When the percent solids of the sewage sludge is seven percent or higher, the temperature of the sewage sludge shall be 50 degrees Celsius or higher; the time period shall be 20 minutes or longer; and the temperature and time period shall be determined using equation (3), except when small particles of sewage sludge are heated by either warmed gases or an immiscible liquid.

$$D = \frac{13{,}700{,}000}{10^{0.1400t}} \qquad (3)$$

Where,

D = time in days
T = temperature in degrees Celsius

b. When the percent solids of the sewage sludge is seven percent or higher and small particles of sewage sludge are heated by either warmed gases or an immiscible liquid, the temperature of the sewage sludge shall be 50 degrees Celsius or higher; the time period shall be 15 seconds or longer; and the temperature and time period shall be determined using equation (3).

c. When the percent solids of the sewage sludge is less than seven percent and the time period is at least 15 seconds, but less than 30 minutes, the temperature and time period shall be determined using equation (3).

d. When the percent solids of the sewage sludge is less than seven percent; the temperature of the sewage sludge is 50 degrees Celsius or higher; and the time period is 30 minutes or longer, the temperature and time period shall be determined using equation (4).

$$D = \frac{50,070,000}{10^{0.1400t}} \qquad (4)$$

Where,

D = time in days.
t = temperature in degrees Celsius.

4.1.2. Class A - Alternative 2 (503.32(a)(4))

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge shall be less than Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §503.10(c), §503.10(e) or §503.10(f).

ii a.. The pH of the sewage sludge that is used or disposal shall be raised to above 12 and shall remain above 12 for 72 hours.

b. The temperature of the sewage sludge shall be above 52 degrees Celsius for 12 hours or longer during the period that the pH of the sewage sludge is above 12.

c. At the end of the 72 hour period during which the pH of the sewage sludge is above 12, the sewage sludge shall be air dried to achieve a percent solids in the sewage sludge greater than 50 percent.

4.1.3. Class A - Alternative 3 (503.32(a)(5))

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in sewage sludge shall be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §503.10(c), §503.10(e) or §503.10(f).

ii a. The sewage sludge shall be analyzed prior to pathogen treatment to determine whether the sewage sludge contains enteric viruses.

b. When the density of enteric values in the sewage sludge prior to pathogen treatment is less than one Plaque-forming Unit per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to enteric viruses until the next monitoring episode for the sewage sludge.

c. When the density of enteric viruses in the sewage sludge prior to pathogen treatment is equal to or greater than one Plaque-forming Unit per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to enteric viruses in the sewage sludge after pathogen treatment is less than one Plaque-forming Unit per four grams of total solids (dry weight basis) and when the values or ranges of values for the operating parameters for the pathogen treatment process that produces the sewage sludge that meets the enteric virus density requirement are documented.

d. After the enteric virus reduction in ii.c. of this subsection is demonstrated for the pathogen treatment process, the sewage sludge continues to be Class A with respect to enteric viruses when the values for the pathogen treatment process operating parameters are consistent with the values or ranges of values documented in ii.c. of this subsection.

iii. a. The sewage sludge shall be analyzed prior to pathogen treatment to determine Whether the sewage sludge contains viable helminth ova.

b. When the density of viable helminth ova in the sewage sludge prior to pathogen treatment is less than one per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to viable helminth ova until the next monitoring episode for the sewage sludge.

c. When the density of viable helminth ova in the sewage sludge prior to pathogen treatment is equal to or greater than one per four grams of total solids (dry weight basis), the sewage sludge is Class A with respect to viable helminth ova when the density of viable helminth ova in the sewage sludge after pathogen treatment is less than one per four grams of total solids (dry weight basis) and when the values or ranges of values for the operating parameters for the pathogen treatment process that produces the sewage sludge that meet the viable helminth ova density requirement are documented.

d. After the viable helminth ova reduction in iii.c. of this subsection is demonstrated for the pathogen treatment process, the sewage sludge continues to be Class A with respect to viable helminth ova when the values for the pathogen treatment process operating parameters are consistent with the values of ranges of values documented in (iii)(c) of this subsection.

4.1.4. Class A - Alternative 4 (503.32(a)(6))

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella sp. bacteria in the sewage sludge shall be less than three Most Probable Number per four grams of total solids (dry weight basis) at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10 (b), §503.10(c), §503.10(f).

ii. The density of enteric viruses in the sewage sludge shall be less than one Plaque-forming Unit per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §503.10(c), §503.10(e) or §503.10(f), unless otherwise specified by the permitting authority.

iii. The density of viable helminth ova in the sewage sludge shall be less than one per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b),§503.10(c), §503.10(e) or §503.10(f), unless otherwise specified by the permitting authority.

4.1.5. Class A - Alternative 5 (503.32(a) (8))

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the sludge shall be less than three Most Probable Number per four grams of total (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §503.10(c), §503.10(e) or §503.10(f).

ii. Sewage sludge that is used or disposed shall be treated in one of the Processes to Further Reduce Pathogens described in Section 4.3.

4.1.6. Class A - Alternative 6 (503.32(a)(8)

i. Either the density of fecal coliform in the sewage sludge shall be less than 1000 Most Probable Number per gram of total solids (dry weight basis), or the density of Salmonella, sp. bacteria in the sewage sludge shall be less than three Most Probable number per four grams of total solids (dry weight basis) at the time the sewage sludge is used or disposed; at the time the sewage sludge is prepared for sale or give away in a bag or other container for application to the land; or at the time the sewage sludge or material derived from sewage sludge is prepared to meet the requirements in §503.10(b), §503.10(c), §503.10(e) or §503.10(f).

ii. Sewage sludge that is used or disposed shall be treated in a process that is equivalent to a Process to Further Reduce Pathogens, as determined by the permitting authority.

4.2 Class B Pathogen Reduction

4.2.1. Class B - Alternative 1 (503.32(b)(2))

i. Seven representative samples of the sewage sludge that is used or disposed shall be collected.

ii. The geometric mean of the density of fecal coliform in the samples collected in (2) (i) of this subsection shall be less than either 2,000,000 Most Probable Number per gram of total solids (dry weight basis) or 2,000,000 Colony Forming Units per gram of total solids (dry weight basis).

4.2.2. Class B - Alternative 2 (503.32 (b)(3))

Sewage sludge that is used or diagnosed shall be treated in one of the Processes to Significantly Reduce Pathogens described in Section 4.3.

4.2.3. Class B - Alternative 3 (503.32(b)(4))

Sewage sludge that is used or disposed shall be treated in a process that is equivalent to a Process to Significantly Reduce Pathogens, as determined by the permitting authority.

4.3 Pathogen Reduction Processes

4.3.1. Process to Significantly Reduce Pathogens

1. Aerobic Digestion - Sewage sludge is agitated with air or oxygen to maintain aerobic conditions for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 40 days at 20 degrees Celsius and 60 days at 15 degrees Celsius.

2. Air Drying - Sewage sludge is dried on sand beds or on paved or unpaved basins. The sewage sludge dries for a minimum of three months. During two of the three months, the ambient average daily temperature is above zero degrees Celsius.

3. Anaerobic Digestion - Sewage sludge is treated in the absence of air for a specific mean cell residence time at a specific temperature. Values for the mean cell residence time and temperature shall be between 15 days at 35 to 55 degrees Celsius and 60 days at 20 degrees Celsius.

4. Composting - Using either the within vessel, static aerated pile, or window composting methods, the temperature of the sewage sludge is raised to 40 degrees Celsius or higher and remains at 40 degrees Celsius or higher for five days. For four hours during the five days, the temperature in the compost pile exceeds 55 degrees Celsius.

5. Lime Stabilization - Sufficient lime is added to the sewage sludge to raise the pH of the sewage sludge to 12 after two hours of contact.

4.3.2. Process to Further Reduce Pathogens

1. Composting - Using either the within vessel composting method or the static aerated pile composting method, the temperature of the sewage sludge is maintained at 55 degrees Celsius or higher for three days.

Using the windrow composting method, the temperature of the sewage sludge is maintained at 55 degrees or higher for 15 days or longer. During the period when the compost is maintained at 55 degrees or higher, there shall be a minimum of five turnings of the window.

2. Heat Drying - Sewage sludge is dried by direct or indirect contact with hot gases to reduce the moisture content of the sewage sludge to 10 percent or lower. Either the temperature of the sewage sludge particles exceeds 80 degrees Celsius or the wet bulb temperature of the gas in contact with sewage sludge as the sewage sludge leaves the dryer exceeds 80 degrees Celsius.

3. Heat Treatment - Liquid sewage sludge is heated to temperature of 180 degrees Celsius or higher for 30 minutes.

4. Thermophilic Aerobic Digestion - Liquid sewage sludge is agitated with air or oxygen to maintain aerobic conditions and the mean cell residence time of the sewage sludge is 10 days at 55 to 60 degrees Celsius.

5. Beta Ray Irradiation - Sewage sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20 degrees Celsius).

6. Gamma Ray Irradiation - Sewage sludge is irradiated with gamma rays for certain isotopes, such as ^{60}Cobalt and ^{137}Cesium, at dosages of at least 1.0 megarad at room temperature (ca. 20 degrees Celsius).

7. Pasteurization - The temperature of the sewage sludge is maintained at 70 degrees Celsius or higher for 30 minutes or longer.

5. Vector Attraction Reduction

The various vector attraction reduction means are listed in this section. The 40 CFR Part 503 section from with each reduction was excerpted is referenced in parenthesis.

5.1. Alternative 1 (503.33(b)(1))

The mass of volatile solids in the sewage sludge shall be reduced by a minimum of 38 percent.

5.2. Alternative 2 (503.33(b)(2))

When the 38 percent volatile solids reduction requirement in §503.33(b)(1) cannot be met for an anaerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge anaerobically in the laboratory in a bench-scale unit for 40 additional days at a temperature between 30 and 37 degrees Celsius. When at the end of the 40 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 17 percent, vector attraction reduction is achieved.

5.3. Alternative 3 (503.33(b)(3)

When the 38 percent volatile solids reduction requirement in §503.33(b)(1) cannot be met for an aerobically digested sewage sludge, vector attraction reduction can be demonstrated by digesting a portion of the previously digested sewage sludge that has a percent solids of two percent or less aerobically in the laboratory in a bench-scale unit for 30 additional days at 20 degrees Celsius. When at the end 30 days, the volatile solids in the sewage sludge at the beginning of that period is reduced by less than 15 percent, vector attraction reduction is achieved.

5.4. Alternative 4 (503.33(b)(4)

The specific oxygen uptake rate (SOUR) for sewage sludge treated in an aerobic process shall be equal to or less than 1.5 milligrams of oxygen per hour per gram of total solids (dry weight basis) at a temperature of 20 degrees Celsius.

5.5. Alternative 5 (503.33(b)(5))

Sewage sludge shall be treated in an aerobic process for 14 days or longer. During time, the temperature of the sewage sludge shall be higher than 40 degrees Celsius and the average temperature of the sewage sludge shall be higher than 45 degrees Celsius.

5.6. Alternative 6 (503.33(b)(6))

The pH of sewage sludge shall be raised to 12 or higher by alkali addition and, without the addition of more alkali, shall remain at 12 or higher for two hours and then at 11.5 or higher for an additional 22 hours.

5.7. Alternative 7 (503.33(b)(7))

The percent solids of sewage sludge that does not contain unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 75 percent based on the moisture content and total solids prior to mixing with other materials.

5.8. Alternative 8 (503.33 (b)(8)

The percent solids of sewage sludge that contains unstabilized solids generated in a primary wastewater treatment process shall be equal to or greater than 90 percent based on the moisture content and total solids prior to mixing with other materials.

5.9. Alternative 9 (503.33(b)(9))

i. Sewage sludge shall be injected below the surface of the land.

ii. No significant amount of the sewage sludge shall be present on the land surface within one hour after the sewage sludge is injected.

5.10. Alternative 10 (503.33(b)(10))

i. Sewage sludge applied to the land surface or placed on an active sewage sludge unit shall be incorporated into the soil within six hours after application to or placement on the land unless otherwise specified by the permitting authority.

ii. When sewage sludge that is incorporated into the soil is Class A with respect to pathogens, the sewage sludge shall be applied to or place on the land within eight hours after being discharged from the pathogen treatment program.

5.11. Alternative 11 (503.33(b)(11))

Sewage sludge placed on an active sewage sludge unit shall be covered with soil or other material at the end of each operating day.

6. CLOSURE AND POST CLOSURE PLAN

The closure and post closure plan shall describe how the sewage sludge unit will close and how it will be maintained for three years after closure.

6.1. Minimum Elements

The following items are the minimum elements that should be addressed in the closure plan.

6.1.1. General Information

a. Name, address, and telephone number of the owner/operator
b. Location of the site including size
c. Schedule for final closure

6.1.2. Leachate collection system

a. How the system will be operated and maintained for three years after closure
b. Treatment and disposal of the leachate

6.1.3. Methane Monitoring

a.. Description of the system to monitor methane within the structures at the property line
b. Maintenance of the system

6.1.4. Restriction of Public Access

a. Describe method of restricting public access for three years after the last surface disposal unit closes

6.1.5. Other Activities

a. Groundwater monitoring
b. Maintenance and inspection schedules
c. Discussion of land use after cover
d. Copy of notification to subsequent land owner

6.2. Notification to Land Owner

The notification to the subsequent land owner shall include the following information:

a. Name, address, and telephone number of the owner/operator of the owner/operator of the surface disposal site.

b. A map and description of the surface disposal site including locations of surface disposal units.

c. An estimate of the amount of sewage sludge placed on the site and a description of the quality of the sludge.

d. Results of the methane gas monitoring and groundwater monitoring

e. Discussion of the leachate collection system, if appropriate

f. Demonstration that the site was closed in accordance with closure plan

7. SAMPLING AND ANALYSIS

7.1 Sampling

Representatives samples of sewage sludge that is applied to the land, placed on a surface disposal site, or fired in a sewage sludge incinerator shall be collected and analyzed.

7.2 Analytical Methods

The following methods shall be used to analyze samples of sewage sludge.

a. Enteric Viruses

ASTM Method D 499-89, "Standard Practice for Recovery of Viruses from Wastewater Sludge", Annual Book of ASTM Standards: Section 11, Water and Environmental Technology, 1992.

b. Fecal Coliform

Part 9221 E or Part 9222 D, "Standard Methods for the Examination of Water and Wastewater", 18^{th} edition, American Public Health Association, Washington, D.C., 1992.

c. Helminth Ova

Yanko, W.A., "Occurrence of Pathogens in Distribution and Marketing Municipal Sludges", EPA 600/1-87-014, 1987. NTIS PB 88-154273/AS, National Technical Information Service, Springfield, Virginia.

d. Inorganic Pollutants

Method SW-846 in "Test Methods for Evaluating Solid Waste" U.S. Environmental Protection Agency, November 1986.

e. Salmonella sp. bacteria

Part 9260 D.1, "Standard Methods for the Examination of Water and Wastewater", 18^{th} edition, American Public Health Association, Washington, D.C., 1992; or Kenner, B.B. and H.A. Clark, "Determination and Enumeration of Salmonella and Pseudomonas aeruginosa", J. Water Pollution Control Federation, 46 (9): 2163-2171, 1974.

f. Specific Oxygen Uptake Rate

Part 2710 B, “Standard Methods for the Examination of Water and Wastewater”, 18th edition, American Public Health Association, Washington, D.C., 1992.

g. Total Solids, Fixed Solids, and Volatile Solids

Part 2540 G, Standard Methods for the Examination of Water and Wastewater”, 18th edition, American Public Health Association, Washington, D.C., 1992.

7.3 Percent Volatile Solids Reduction

Percent volatile solids reduction shall be calculated using a procedure in “Environmental Regulations and Technology - Control of Pathogens and Vectors in Sewage Sludge”, EPA 625/R-92/013, U.S. Environmental Protection Agency, Cincinnati, Ohio, 1992.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NEW ENGLAND
1 CONGRESS STREET
SUITE 1100
BOSTON, MASSACHUSETTS 02203

FACT SHEET

DRAFT NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE TO WATERS OF THE UNITED STATES

NPDES PERMIT NO.: **MA0100919**

NAME AND ADDRESS OF APPLICANT:

Town of Spencer
Sewer Commission
Spencer, MA 01562

NAME AND ADDRESS OF FACILITY WHERE DISCHARGE OCCURS:

Spencer Wastewater Treatment Plant
Route 9
Spencer, MA

RECEIVING WATER: **Cranberry Brook**

CLASSIFICATION: **B: warm water fishery (Chicopee Watershed)**

I. Proposed Action, Type of Facility, and Discharge Location

The above named applicant has applied to the U.S. Environmental Protection Agency for the reissuance of its NPDES permit to discharge into Cranberry Brook, a tributary to the Sevenmile River. The facility is engaged in the collection and treatment of municipal and commercial wastewater. Figure 1 shows the facility location.

The draft permit contains monthly average total phosphorus limits of 0.2 mg/l (May1- October 31) and 0.3 mg/l (November1 – April 30) which are more stringent than the limits in the existing permit. Also, seasonal average mass total phosphorus limits of 0.79 lbs/day (May 1 – October 31) and 1.19 lbs/day (November 1 – April 30) are included in the draft permit. These seasonal average mass total phosphorus limits are based on wasteload allocations established in the final phosphorus TMDLs developed by MassDEP for Quaboag and Quacumquasit Ponds (dated May 16, 2006). The basis for the new phosphorus limits are discussed in the *Phosphorus* Section of this Fact Sheet.

This draft permit continues to include detailed requirements regarding the control of inflow and infiltration (I/I) (see Section C.2. of the draft permit) and explicitly prohibits treatment process bypasses that have occasionally occurred at the treatment facility during high I/I events. The copper effluent limits in the draft permit are revised from the previous limit because of new hardness data and an updated determination of the 7Q10 low-flow (7Q10) for Cranberry Brook. Winter ammonia limits are included in the draft permit and the chronic whole effluent toxicity limitation has been revised based on the updated 7Q10 low-flow determination for Cranberry Brook.

The draft permit includes changes to the monitoring requirements for phosphorus, winter ammonia, TKN, nitrite, nitrate, and whole effluent toxicity. Additionally, monitoring requirements for Escherichia coli and bypass events (BOD_5, TSS, and total phosphorus) have been added to the draft permit. The bases for the monitoring requirements are further discussed in the respective sections of this Fact Sheet.

Collection System, Treatment Process and other Related Operational Information:

The wastewater collection system consists of 18.5 miles of interceptor and collector sewers that serve portions of the Town of Spencer. The West Main Street (Route 9) interceptor picks up flows from the other collectors and interceptor sewers, as well as the Meadow Road force main and conveys them to the wastewater treatment facility. The collection system includes both new and old sewers. No combined sewers are believed to be connected to the collection system. Wastewater is comprised of mostly domestic sewage with some septage, commercial, and industrial sewage. There are two small discharges of industrial wastewater received at the WWTP consisting of (1) heated non-contact process water and boiler blowdown and (2) cleaning water used in the preparation of jam and jellies.

Treatment Plant Flow:

The Spencer wastewater treatment facility has a design flow of 1.08 MGD. Wastewater enters the treatment plant through a 24-inch gravity sewer directly to the screening and grit removal facilities where it receives preliminary treatment to remove large solids and grit. Flow continues to the screw pump lift station and is pumped to the aeration basins for biological treatment, including nitrification. Following aeration, the biomass flows through a chemical feed manhole where alum and lime are introduced, as needed, to enhance phosphorus removal and adjust pH, respectively. The biomass and chemicals are blended in a rapid-mix box prior to flowing into the final clarifier. Settled solids are returned to the aeration tanks. Excess sludge is removed as waste sludge. Clarifier effluent enters wetland beds for tertiary treatment and then is disinfected using ultraviolet radiation. The final effluent is aerated and replenished with dissolved oxygen as it flows down a cascade outfall to Cranberry Brook.

A review of influent and effluent flow records reveals that the influent flow typically exceeds the effluent flow at the facility, indicating that a portion of the flow that enters the facility is being lost to groundwater. The loss of flow is most likely occurring in the wetland treatment system through groundwater recharge. Table 1 and Attachment B summarize the difference in influent and effluent flows at the WWTP. The loss of flow from the wetland system to ground water has been as high as high 45 percent or 0.5 MGD (April 2005), while on average, the loss of flow to ground water has been approximately 0.2 MGD.

Occasionally, secondary treatment process bypass events occur at the facility when influent flows exceed the capacity of the screw pump lift station (5.48 MGD). Influent flows exceeding 5.48 MGD discharge to the wet weather pump station and are pumped to the last two constructed wetland beds for treatment. Bypassed flows mix with the fully treated flows prior to disinfection. There have been four bypass events since issuance of the last permit in February of 2003. For the bypass events, flow data from the facility indicate that instantaneous peak influent flows exceeding 5.48 MGD occur for only short periods of time during the day of the event. The volumes of the bypassed flow during these events have ranged between 1.2 and 6.7 percent of the total influent flow volume received at the WWTP on the day of that the bypass occurred. In all cases, the bypass events were caused by wet weather conditions that resulted in high I/I in the collection system.

Sludge Processing:

Waste sludge from the final clarifiers is thickened by gravity to approximately 7% solids, and then pumped to the sludge holding tank for temporary storage. The sludge is then trucked to Rhode Island for incineration by SYNAGRO.

Nutrient Removal:

Phosphorus removal is accomplished by chemical precipitation using liquid alum. Alum is stored in a 6,000-gallon tank located in the south section of the solids building. The alum is injected into the process at the chemical manhole located after the aeration tanks and then mixed at the rapid mix/splitter box.

Nitrification is accomplished biologically in the aeration tanks. Lime is stored in a 2,000 cubic foot silo located outside the solids building on the southeasterly side. Lime is used for pH control to enhance nitrification, effluent pH adjustment, and to control septage odors. Lime slurry mix tanks are located inside the solids building where lime slurry is pumped to the aerated septage tank for process addition.

Constructed Wetlands:

The wetland beds were originally constructed in as sand beds, but over time, vegetation had grown in the beds creating a wetlands type of environment. As part of the treatment plant upgrade completed in 1988, six of the beds, Bed C through Bed H, were converted into constructed wetlands by removing existing vegetation and the top layer of soil, and installing inlet and outlet structures, underdrains, six inches of top sand and wetland vegetation. Four different types of vegetation were planted for phosphorus removal. Bed D and Bed F were planted with cattails and wool grass, Bed C and Bed E with reed grass and Bed G and Bed H with reed canary grass. The wetland beds are utilized throughout the year.

Septage Treatment:

Septage facilities are located just outside the eastern mid–point of the solids building. A receiving trough with a course bar screen empties into a 10,000 gallon aerated storage tank. Lime is added to control odors and for pH adjustment. Plant water is pumped at 20 gpm to dilute and feed the septage/lime mixture into the process through the septage tank overflow pipe which empties into the aerated grit tank.

Ultraviolet Radiation - Disinfection:

Final effluent is disinfected using ultraviolet radiation. Effluent collected by the underdrain system in the wetland cells passes under ultraviolet lamps for disinfection prior to discharge to Cranberry Brook.

Staffing:

Three employees staff the treatment facility full time Monday - Friday, 7:00 a.m. - 3:30 p.m. and rotate weekend shifts of 3 hours on Saturday, Sunday and holidays. Wastewater Treatment Operator Licenses held by employees are: two Grade-7 and one Grade-5. A part time clerk works at the Sewer Department Office, Monday through Thursday, processing bills, invoices, permits and phone calls.

Outside contractors are used for engineering, electrical, mechanical, welding, machine shop services and collection system cleaning, repair and replacement.

II. Description of Discharge

Flow and effluent quality data for the Spencer WWTP are summarized below in Table 1 for the two year period (October 2003 - September 2005). Monthly average and maximum daily values for each month during this period may be found in Attachment 1. Data are summarized to demonstrate recent performance history of the facility. As indicated, the Spencer WWTF has maintained a high quality effluent and has been in compliance with effluent limitations for all parameters except for copper. During the summer of 2006, the permittee will undertake a corrosion control program within the Town's drinking water distribution system to help address the elevated copper levels.

Table 1. Summary of flow and effluent quality for Spencer WWTP (October 2003 – September 2005)

Parameter	**Average monthly average (range of monthly averages)**	**Average daily maximum (range of daily maximums)**
Influent flow (MGD)	0.75 (0.47 – 1.28)	1.48 (0.55 - 2.90)
Effluent Flow (MGD)	0.55 (0.15 – 1.36)	1.34 (0.30 - 2.85)
BOD_5 (mg/l)	1.98 (0.90 – 3.50)	2.78 (1.40 – 5.60)
TSS (mg/l)	0.39 (0.20 – 1.90)	0.84 (0.20 – 6.80)
Total Phosphorus (mg P/l)	0.17 (0.13 – 0.24)	-----
Ammonia (mg N/l)	0.07 (0.03 – 0.29)	-----
Copper (µg/l)	55 (28 – 130)	-----
Effluent toxicity (%) (number of tests)		
LC50	-----	>100 (7)
C-NOEC	-----	89 (1), >100 (6)

III. Permit Limitations and Conditions

The effluent limitations and monitoring requirements of the draft permit may be found in the draft NPDES permit.

IV. Permit Basis and Explanation of Effluent Limitation Derivation

Waterbody Classification and Usage:

The effluent from the Spencer WWTP discharges into Cranberry Brook approximately 500 feet upstream from its confluence with the Sevenmile River. Further downstream, the Sevenmile

River joins the East Brookfield River and then eventually discharges into Quaboag Pond which, at times, is hydraulically connected to Quacumquasit Pond. Cranberry Brook, Sevenmile River, East Brookfield River, Quaboag Pond and Quacumquasit Pond are all classified in the Massachusetts Surface Water Quality Standards (314 CMR 4.00) as Class B-warm water fisheries. Class B waters are designated as habitat for fish, other aquatic life, and wildlife and for primary and secondary contact recreation. Where designated, Class B waters shall be suitable as a source of public water supply with appropriate treatment. They shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.

Municipal Waste Water Treatment Facility [also referred to as "Publicly Owned Treatment Works" (POTW Discharges)] Effluent Limits Regulatory Basis

EPA is required to consider technology and water quality requirements when developing permit effluent limits. Technology-based treatment requirements represent the minimum level of control that must be imposed under Sections 402 and 301(b) of the Clean Water Act (CWA) (see 40 CFR 125 Subpart A). For publicly owned treatment works, technology based requirements are effluent limitations based on secondary treatment as defined in 40 CFR Part 133.

Under Section 301(b)(1)(C) of the CWA, discharges are subject to effluent limits based on water quality standards. The Massachusetts Surface Water Quality Standards (314 CMR 4.00) include requirements for the regulation and control of toxic constituents, and also require that EPA criteria, established pursuant to Section 304(a) of the CWA, shall be used unless a site-specific criteria are established. The state will limit or prohibit discharge of pollutants to surface waters to assure that water quality of the receiving waters are protected and maintained and consistent with Massachusetts Surface Water Quality Standards.

The permit must limit any pollutant or pollutant parameter (conventional, non-conventional, toxic, and whole effluent toxicity) that is or may be discharged at a level that causes, or has reasonable potential to cause, or contribute to an excursion above any water quality criterion. An excursion occurs if the projected or actual receiving water concentrations do not comply with the applicable criterion. In determining reasonable potential, EPA considers existing controls on point and non-point sources of pollution, variability of the pollutant in the effluent, sensitivity of the species to toxicity and where appropriate, the dilution of the effluent in the receiving water.

A permit may not be renewed, reissued, or modified with less stringent limitations or conditions than those contained in the previous permit unless in compliance with the anti-backsliding requirements of the CWA. Anti-backsliding provisions are found in Sections 402(o) and 303(d)(4)of the Clean Water Act and at 40 CFR 122.44(l) and require that the limits in a reissued permit be at least as stringent as those in the previous permit, except under certain circumstances. Effluent limits based on technology standards, water quality, and state certification requirements must all meet anti-backsliding provisions.

Flow:

The stream flow information used to calculate effluent limits in the draft permit is presented below in Table 2. The 7-day, 10-year low flow (7Q10) and the seasonal (December 1 – April 30) 30-day, 10-year low flow (30Q10) used in the draft permit are based on continuous flow data collected at the USGS gage located on the Sevenmile River and adjusted for the drainage area at the discharge location. Flow factors, expressed as flow per square mile, for 7Q10 and 30Q10 were derived using data collected at the Sevenmile River gage. These flow factors were then multiplied by the drainage area at the Spencer WWTP to determine 7Q10 and 30Q10 low-flow conditions at the point of discharge. As indicated in Table 2, the 7Q10 used in the draft permit is 0.15 cfs at the Spencer WWTP. The 7Q10 flow value is updated from the previous permit and reflects the daily flow record (1962-2004) for the Sevenmile gage. The 7Q10 flow value was used to calculate effluent limits for copper and chronic whole effluent toxicity, while the seasonal 30Q10 flow was used to calculate the winter ammonia effluent limit for the period of December 1 to April 30.

Table 2. Low-flow statistics for the Sevenmile River gage (1962-2004) and Spencer WWTP.

	Sevenmile River USGS Gage 01175670	Spencer WWTP Cranberry Brook
Drainage Area (square miles)	8.81	6.4
7Q10 flow (cfs)	0.2	0.15
7Q10 flow factor (cfs/square mile)	0.023	0.023
Seasonal 30Q10 flow (cfs) (December – April)	3.9	2.8
30Q10 flow factor (cfs/square mile)	0.443	0.443

Dilution factors, which account for the magnitude of the Spencer WWTP discharge (1.08 MGD or 1.67 cfs) and the available dilution in Cranberry Brook at the discharge location, were calculated for both 7Q10 and 30Q10 flow conditions. As discussed below, the dilution factors are used with applicable criteria to determine allowable effluent limits for ammonia and copper. The dilution factors for the Spencer WWTP are calculated as follows.

Monthly average dilution factor for 7Q10 conditions (DF_{7Q10})

$DF_{7Q10} = (7Q10_{\text{Cranberry Brook}} + \text{WWTP flow})/\text{WWTP flow}$

$DF_{7Q10} = (0.15 \text{ cfs} + 1.67 \text{ cfs})/1.67 \text{ cfs}$

$DF_{7Q10} = 1.09$

Monthly average dilution factor for seasonal 30Q10 conditions (DF_{30Q10})

$DF_{30Q10} = (30Q10_{\text{Cranberry Brook}} + \text{WWTP flow})/\text{WWTP flow}$

$DF_{30Q10} = (2.8 \text{ cfs} + 1.67 \text{ cfs})/1.67 \text{ cfs}$

$DF_{30Q10} = 2.68$

The effluent limits for the various parameters are discussed below:

***BOD_5* and total suspended solids**: The limits are based upon the previous permit and vary according to seasons. During the colder weather season (November – April) the limits are technology based requirements while during the warmer weather season (May – October) the limits are water quality based. In previous permits, the limits have been reduced since the 1975 Massachusetts Water Quality Management Plan waste load allocation (WLA) based upon facility planning efforts and updates of the WLA.

pH: The limit is based upon the previous permit and reflects the ambient Class B standard in Massachusetts Surface Water Quality Standard (MASWQS).

Minimum dissolved oxygen concentration: The limit is based upon the previous permit and is necessary to maintain an in-stream dissolved oxygen level above the MASWQS of 5.0 mg/l particularly during low flow periods.

Fecal coliform: The limit is based upon the previous permit and reflects the in-stream Class B standard. This is a seasonal limit (April – October).

Escherichia coli: The seasonal monthly monitoring requirement is based on the Escherichia coli (E. Coli) criteria proposed in the revisions to MASWQS. Massachusetts intends to adopt proposed revisions to the SWQS including changing the indicator bacteria organism from fecal coliform to E. coli by the end of 2006. Concurrent fecal coliform and E. coli data collected from the effluent are needed to ensure that MASWQS will be attained during the period between final adoption of the revised SWQS and reissuance of Spencer's permit to include an E. coli limit.

Ammonia: The seasonal limit for May to October is based upon the previous permit and reflects the need to reduce the oxygen demanding component of the nitrogen cycle during nitrification and also reflects the need to reduce ammonia to prevent toxicity. The November ammonia limit is also based on the previous permit to prevent toxicity in Cranberry Brook. The draft permit includes a new winter season (December 1 – April 30) ammonia limit to prevent in-stream toxicity. EPA has promulgated water quality criteria which address ammonia toxicity including "winter" conditions. The determination of the winter ammonia ambient criterion for Cranberry Brook is dependent on pH and temperature as explained in the 1999 Update of Ambient Water Quality Criteria for Ammonia, 64 Federal Register 71973-71980.

The winter limit for ammonia is included in the draft permit to insure that the Spencer WWTP continues to maintain nitrification throughout the winter season. A review of effluent data for the discharge indicates that the Spencer WWTP does an excellent job of maintaining very low ammonia levels in its discharge throughout the year. However, if nitrification were to cease during the winter season, the discharge could potentially cause ammonia toxicity in Cranberry Brook. Therefore, as a precaution, an ammonia winter limit is included in the draft permit. Based on an in-stream pH of 7.1 and temperature of 5° C, the winter ammonia criterion to prevent chronic toxicity in Cranberry Brook at the discharge is 5.67 mg N/l. Using the seasonal (December – April) 30Q10 dilution factor, the monthly average winter effluent limit for ammonia is 15.2 mg N/l or 136 lbs N/day.

Monthly average ammonia concentration limit ($C\text{-}NH_3$)

$C\text{-}NH_3$ = chronic criterion x 30Q10 dilution factor
$C\text{-}NH_3$ = 5.67 mg N/l x 2.68
$C\text{-}NH_3$ = 15.2 mg N/l

Monthly average ammonia mass limit ($M\text{-}NH_3$)

$M\text{-}NH_3$ = $C\text{-}NH_3$ x monthly average permit flow x conversion factor
$M\text{-}NH_3$ = 15.2 mg N/l x 1.08 MGD x 8.28
$M\text{-}NH_3$ = 136 lbs N/day

While the draft permit includes winter ammonia limits, the frequency of monitoring for ammonia during the winter season (December 1 to April 30) is reduced from once per week in the existing permit to twice per month in the draft permit. Monitoring for ammonia twice per month during this period will be sufficient to determine whether the facility has continued to nitrify and remove ammonia.

Total Nitrogen: The need for monitoring requirements for nitrogen is based on the previous permit. It has been determined that excessive nitrogen loadings are causing significant water quality problems in Long Island Sound, including low dissolved oxygen. The State of Connecticut has begun to impose nitrogen limitations on Connecticut River discharges to Long Island Sound and its tributaries. EPA believes there is a need to determine the loadings of nitrogen from sources in Massachusetts which are tributary to Long Island Sound, to determine whether these loadings are impacting the water quality in Long Island Sound, and to help determine what limits, if any, should ultimately be imposed on discharges in Massachusetts. During operation under the existing permit, the permittee monitored for TKN, nitrite, and nitrate nitrogen once per month. The draft permit reduces the frequency of this monitoring to four times per year (February, May, August, and November). The new quarterly data along with the monthly data collected under the existing permit will be sufficient to characterize the total nitrogen loading being discharged by the Spencer WWTP. The nitrogen data will help to establish a database of nitrogen loadings, which can be used to quantitatively assess the impact of loading and transport of nitrogen to Long Island Sound. The data will be used in future decisions relating to nitrogen loadings to the Sound. No numerical limitations for these pollutants are established in the draft permit.

Metals

Relatively low concentrations of trace metals in receiving waters can be toxic to resident aquatic life species. Effluent metals data submitted with toxicity test results were reviewed to determine if any of the metals in the discharge have the potential to exceed aquatic life criteria in Cranberry Brook. The data indicate that the discharge has the potential during low flow conditions to cause/and or contribute to exceedances of the ambient copper criteria as adopted in MASWQS. The copper criteria adopted in the MASWQS are set at levels to protect aquatic life from both acute and chronic toxicity. The limits for copper in the draft permit are changed from the existing permit and are based on a revised 7Q10 flow and more current hardness data. Hardness data for the effluent and Cranberry Brook submitted with toxicity test results indicate an in-stream hardness of 100 mg/l just downstream of the discharge during 7Q10 flow conditions. Based on this hardness, the acute and chronic copper criteria for Cranberry Brook used to calculate the maximum daily and monthly average copper limits are 14.0 µg/l and 9.3 µ/l, respectively. Based on the 7Q10 dilution factor, the draft permit includes a daily maximum limit equal to15.3 µg/l and a monthly average limit of 10.3 µg/l.

Maximum daily copper limit ($C\text{-}CU_{MD}$)

$C\text{-}CU_{MD}$ = acute criterion x 7Q10 dilution factor
$C\text{-}CU_{MD}$ = 14.0 µg/l x 1.09
$C\text{-}CU_{MD}$ = 15.3 µg/l

Monthly average copper limit ($C\text{-}CU_{MA}$)

$C\text{-}CU_{MA}$ = acute criterion x 7Q10 dilution factor
$C\text{-}CU_{MA}$ = 9.3 µg/l x 1.09
$C\text{-}CU_{MA}$ = 10.3 µg/l

The reasonable potential analysis for other trace metals did not indicate that Spencer's discharge has a reasonable potential to cause or contribute to exceedences of metals criteria in Cranberry Brook. Metals data submitted with toxicity test reports were evaluated against potential water quality-based effluent limits based on the respective water quality criteria for each metal. The criteria were determined based on a hardness of 100 mg/l $CACO_3$ and potential effluent limits were calculated using the 7Q10 instream dilution (dilution factor of 1.09) for Cranberry Brook. The data show that metals levels in the discharge are low and consistently below the respective potential limits for this discharge. For example, Table 3 summarizes the criteria, potential water quality-based limits, and discharge quality for three trace metals (aluminum, lead, and zinc) that are commonly present in the effluent of POTWs. As indicated, the arithmetic means of the data are well below the criteria and there was only one reported value for each of these metals that exceeded a criterion. A review of the data indicates that the high values are outliers of the data sets and are not representative of the typical quality of the effluent.

Table 3. Summary of Reasonable Potential Analysis for selected Trace Metals

Metal	Acute Criterion (μg/l)	Chronic Criterion (μg/l)	Maximum Daily Limit (μg/l)	Average Monthly Limit (μg/l)	Effluent		
					Mean (μg/l) reported	Range(μg/l)	no. of exceedences
Aluminum	750.0	87.0	817.0	94.8	54.7	20 - 410	1 of 15
Lead	81.7	3.2	89.0	3.5	2.6	0.5 - 6	1 of 15
Zinc	119.8	119.8	130.6	130.6	64.6	30 - 140	1 of 15

Whole Effluent Toxicity Testing

Under Section 301(b)(1) of the CWA, discharges are subject to effluent limitations based on water quality standards. The State Surface Water Quality Standards (314 CMR 4.05(5)(e.)), include the following narrative statements and require that EPA criteria established pursuant to Section 304(a)(l) of the CWA be used as guidance for interpretation of the following narrative criteria:

All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. Where the State determines that a specific pollutant not otherwise listed in 3.14 CMR 4.00 could reasonably be expected to adversely affect existing or designated uses, the State shall use the recommended limit published by EPA pursuant to 33 U.S.C. 1251 §304(a) as the allowable receiving water concentrations for the affected waters unless a site-specific limit is established. Site specific limits, human health risk levels and permit limits will be established in accordance with 314 CMR 4.05(5)(e)(1)(2)(3)(4).

National studies conducted by the EPA have demonstrated that domestic sources contribute toxic constituents to POTWs above those, which may be contributed from industrial users. These pollutants include metals, chlorinated solvents, aromatic hydrocarbons and other constituents. As a result, EPA New England and the MassDEP have developed toxicity control policies. These policies require wastewater treatment facilities to perform toxicity bioassays on their effluent. Discharges having a dilution of less than 10:1 require acute and chronic toxicity limits.

The principal advantages of biological techniques are: (1) the effects of complex discharges of many known and unknown constituents can be measured only by biological analysis; (2) bioavailability of pollutants after discharge is measured by toxicity testing including any synergistic effect of pollutants; and (3) pollutants for which there are inadequate analytical methods or criteria can be addressed. Therefore, toxicity testing is being used in connection with pollutant-specific control procedures to control the discharge of toxic pollutants.

The draft permit continues to require toxicity testing for one specie, the daphnid, (**Ceriodaphnia dubia**). However, the frequency of testing is reduced from four times per year to two times per year. Whole effluent toxicity testing of the effluent during the past five years indicate that the discharge from the facility has exhibited no acute toxicity and has been in compliance with chronic limits. However, as a contingency, the draft permit proposes to require that if any future toxicity test should fail to comply with the limits, the permittee must re-test the effluent within fourteen days of the original test.

Differing from the existing permit, the draft permit proposes to require the permittee to use the receiving water sample collected upstream of the discharge as the test control and dilution water. A review of toxicity test results on samples collected from Cranberry Brook show that water from Cranberry Brook does not exhibit toxicity and is suitable for use as dilution water. Tests are to be conducted the second week in May and August using the protocol in the Toxicity Testing attachment.

The Chronic - No Observed Effect Concentration (C-NOEC) limitation of 92% in the draft permit prohibits chronic adverse effects (e.g., on survival, growth, or reproduction) when aquatic organisms are exposed to the POTW discharge at the calculated available dilution. This limit has changed from the existing permit because of the revised 7Q10 flow used to calculate the limit. The limit is derived by calculating the in-stream waste concentration using 7Q10 flow conditions and WWTP design flow (1.67 cfs).

C-NOEC (percent) = In-stream waste concentration= (flow WWTP/(flow WWTP + 7Q10 flow)) x 100
C-NOEC = (1.67 cfs/(1.67 cfs + 0.15 cfs)) x 100
C-NOEC = 92%

Chlorine:

The Spencer WWTP now uses ultraviolet radiation to disinfect the effluent and no longer uses chlorine in any of the treatment processes. As a result, total residual chlorine limits are no longer necessary and are not included in the draft permit

Phosphorus

Phosphorus is an essential nutrient for aquatic plant growth in receiving waters. When in excess, phosphorus contributes to excessive growth of aquatic plants that can interfere with the attainment of recreational and aquatic life uses. High levels of aquatic plants (phytoplankton or algae and rooted plants) cause aesthetic impairments by reducing water clarity, imparting color, and choking water ways with excessive vegetative matter. Aquatic life uses in receiving waters are impacted by from excessive plant growth which can cause low dissolved oxygen levels because of dissolved oxygen consumption from plant respiration and biological decay of dead plant matter. Additionally, the excessive growth of certain phytoplankton species can exhibit toxicity to aquatic life, as well as bad odors. The process of producing high amounts of plant biomass in waters is referred to as eutrophication. When nutrients such as phosphorus are discharged because of human activities (e.g., WWTPs, and storm water), the process is referred to cultural or accelerated eutrophication. MASWQS specifies in 314 CMR: 4.05 that nutrients shall not exceed the site-specific limits necessary to control accelerated or cultural eutrophication in receiving waters.

Massachusetts Water Quality Standards also require that any existing point source discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be provided with the highest and best practical treatment to remove such nutrients (see 314 CMR 4.04 (5)). MassDEP has determined that an effluent total phosphorus concentration of 0.2 mg/l (200 µg/l) represents highest and best practical treatment for municipal wastewater treatment facilities. This limit was derived from a literature search and generally accepted treatment technology for phosphorus. Furthermore, EPA's Technical Transfer guidance published in 1987 (EPA/625/6–87/017) concludes that 0.2 mg/l is achievable with existing treatment technology.

The existing permit contains monthly average phosphorus limits of 0.3 mg/l and 0.75 mg/l for the growing season (May 1 – October 31) and winter season (November 1 – April 30), respectively, in order to address cultural eutrophication in receiving waters downstream of the discharge. Quaboag Pond, located downstream from the Spencer WWTF, is a highly used recreational pond that continues to experience excessive growth of plants and algae, and as a result, is in nonattaiment with MASWQS. Quaboag Pond is currently included on Massachusetts' final 2004 Clean Water Act Section 303(d) list of waters requiring the development of Total Maximum Daily Loads (TMDLs).

To address the cultural eutrophication of Quaboag Pond, MassDEP has recently conducted a TMDL study of the pond. In accordance with Section 303(d) of the Clean Water Act, States are required to establish TMDLs for all listed waters where existing required pollution controls are not stringent enough to attain water quality standards. The TMDL must define the maximum amount of a pollutant load that a waterbody can receive and still attain water quality standards. Moreover, the TMDL must allocate the total allowable load to the contributing sources. The final TMDL for Quaboag Pond is included in the MassDEP report entitled *Total Maximum Daily Loads of Phosphorus for Quaboag & Quacumquasit Pond,* and dated May 16, 2006. The final report has undergone public review and has been submitted to EPA for approval. The TMDL report is now under review at EPA.

The technical analysis used in the development of the TMDL is based on extensive water quality monitoring of Quaboag and Quacumquasit Ponds and the tributary drainage areas, and the use of empirical loading and lake models. The monitoring data and technical analysis performed for the TMDL confirm that the pond is undergoing cultural eutrophication due to excessive phosphorus loading and that reductions in phosphorus loadings are needed. Phosphorus allocations were established for the Spencer WWTP, permitted storm water sources in the Spencer including Mass Highway, and nonpoint sources in the watershed based on land cover categories (e.g. agriculture). The TMDL sets an overall allowable load of phosphorus for Quaboag Pond of 2588 kg/yr or 7.09 kg/day. The wasteload allocation for the Spencer WWTP for the growing season represents approximately 5% of the allowable daily phosphorus load to the Pond.

The load allocation for the Spencer WWTP is divided into two seasons. There is an allocation for the growing season from May 1 – October 31, and another for the winter season from November 1 – April 30. The growing season phosphorus allocation was set at 0.79 lbs/day, which corresponds to a total phosphorus effluent concentration of 0.2 mg/l at an average discharge flow of 0.47 MGD, about half of the WWTP design flow of 1.08 MGD. The winter season allocation accounts for the increase in-stream flow that occurs during the winter season, and is set at 1.19 lbs/day, which corresponds to an effluent concentration limit of 0.3 mg/l at an average effluent flow of 0.47 MGD.

Federal regulations found at 40 CFR Part 122.44(d) (1)(vii)(B) require that effluent limits developed to protect water quality be consistent with the assumption and requirements of any available wasteload allocation for the discharge prepared by the State and approved by EPA pursuant to 40 CFR Part 130.7 (TMDLs and individual water quality-based effluent limitations). The draft permit therefore includes limits that are based on the technical analysis of the TMDL, and are consistent with the allocations discussed above. The growing season phosphorus limits in the draft permit an overall seasonal average mass limit of 0.79 lbs/day and a new winter seasonal average mass limit of 1.19 lbs/day which is based on the TMDL analysis. EPA concludes that the technical analysis performed for the TMDL study satisfactorily identifies allowable phosphorus loadings to Quaboag Pond, including the WLA for the Spencer WWTP, that are consistent with attaining eutrophication-related water quality standards in the Pond.

The monthly average summer concentration limit of 0.2 mg/l is also consistent with the highest and best practical treatment requirements of the Massachusetts Water Quality Standards. It should be recognized that effluent concentrations lower than this limit may have to be achieved in order to meet the TMDL-based mass limit when the treatment plant exceeds about half of its design flow (as shown above, a mass limit of 0.79 lbs per day and a concentration limit of 0.2 mg/l correspond to a flow of 0.47MGD).

The winter average monthly concentration limit has been reduced from 0.75 mg/l in the existing permit to 0.3 mg/l in the draft permit based on the TMDL's winter season phosphorus allocation to the facility (1.19 lbs/day) and an average effluent flow of 0.47 MGD. The average weekly concentration limit from the existing permit (1 mg/l) has been retained in the draft permit. It should be recognized that effluent concentrations lower than the winter seasonal average limit will have to be achieved in order to meet the TMDL-based mass limit (a mass limit of 1.19 lbs/day). For example, the allowable winter season concentration is reduced to 0.2 mg/l when the average effluent flow increases to 0.7 MGD.

As described, the TMDL is based on attaining water quality standards in the ponds downstream of the discharge. The rivers conveying the discharge to the ponds (i.e., Cranberry Brook and the Sevenmile River) are not listed for nonattainment of water quality standards for nutrients, DO, aquatic plants or indicators of eutrophication, so water quality-based limits more stringent than the highest and best limits required by MAWQS have not been considered to protect these water bodies. However, should new water quality information become available or if the state develops water quality criteria, the permit may be re-opened and modified.

Monitoring: The effluent monitoring requirements have been specified in accordance with 40 CFR 122.41(j), 122.44(i) and 122.48 to yield data representative of the discharge.

V. Sludge Information and Requirements

Section 405(d) of the Clean Water Act requires that sludge conditions be included in all POTW permits. The Spencer Wastewater Treatment Plant has its sludge hauled off-site for treatment. The sludge requirements for the facility are outlined in the permit and defined the sludge attachment. If the ultimate sludge disposal method changes, the permit requirements pertaining to sludge monitoring and other conditions would change accordingly.

VI. Infiltration/Inflow Requirements

Infiltration/inflow is extraneous water entering the wastewater collection system through a variety of sources. Infiltration is groundwater that enters the collection system though physical defects such as cracked pipes, or deteriorated joints. Inflow is extraneous flow entering the collection system through point sources such as roof leaders, yard and area drains, sump pumps, manhole covers, tide gates, and cross connections from storm water systems. Significant I/I in a collection system may displace sanitary flow reducing the capacity and the efficiency of the treatment works and may cause bypasses of secondary treatment. It greatly increases the potential for sanitary sewer overflows (SSO) in separate systems, and combined sewer overflows in combined systems.

The draft permit includes requirements for the permittee to continue to implement a program to control infiltration and inflow (I/I) in the collection system. These requirements are continued from the existing permit. Annual I/I program reports submitted by the permittee, demonstrate that the permittee has made progress in removing I/I through the replacement of several deteriorating sewer pipes. The permittee has also developed a sewer bank which requires persons wanting to connect to the sewer system to address known areas of I/I. Nevertheless, a review of influent flow records to the Spencer WWTP clearly show that I/I still represents a substantial portion of the total flow treated by the WWTP. Additionally, on occasions during extreme high I/I events, secondary treatment bypasses have occurred at the facility which are prohibited by the draft permit. Finally, the permittee will need to continue to reduce I/I in order to comply with the seasonal mass phosphorus limits included in the draft permit.

The permit standard conditions for 'Proper Operation and Maintenance' are found at 40 CFR §122.41(e). These require proper operation and maintenance of permitted wastewater systems and related facilities to achieve permit conditions. Similarly, the permittee has a 'duty to mitigate' as stated in 40 CFR §122.41 (d). This requires the permittee to take all reasonable steps to minimize or prevent any discharge in violation of the permit which has a reasonable likelihood of adversely affecting human health or the environment. EPA and MassDEP maintain that an I/I removal program is an integral component to insuring permit compliance under both of these provisions.

The MassDEP has stated that inclusion of the I/I conditions in the draft permit shall be a standard State Certification requirement under Section 401 of the Clean Water Act and 40 CFR §124.55(b).

VII. Essential Fish Habitat Determination (EFH)

Under the 1996 Amendments (PL 104-267) to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. § 1801 et seq. (1998)), EPA is required to consult with the National Marine Fisheries Services (NMFS) if EPA's action or proposed actions that it funds, permits, or undertakes, may adversely impact any essential fish habitat as: waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (16 U.S.C. § 1802 (10)). Adversely impact means any impact which reduces the quality and/or quantity of EFH (50 C.F.R. § 600.910 (a)). Adverse effects may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions. Essential fish habitat is only designated for species for which federal fisheries management plans exist (16 U.S.C. § 1855(b) (1) (A)). EFH designations for New England were approved by the U.S. Department of Commerce on March 3, 1999. After coordination with NMFS, EPA has concluded that no species listed under NMFS jurisdiction occur in the receiving waters identified in this fact sheet.

VIII. Endangered Species Act

Section 7(a) of the Endangered Species Act of 1973, as amended (ESA) grants authority to and imposes requirements upon Federal agencies regarding endangered or threatened species of fish, wildlife, or plants ("listed species") and habitat of such species that has been designated as critical (a "critical habitat"). The ESA requires every Federal agency, in consultation with and with the assistance of the Secretary of Interior, to insure that any action it authorizes, funds, or carries out, in the United States or upon the high seas, is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat. The United States Fish and Wildlife Service (USFWS) administers Section 7 consultations for freshwater species, where as the National Marine Fisheries Service (NMFS) administers Section 7 consultations for marine species and anadromous fish.

As the federal agency charged with authorizing the discharge from this facility, EPA consulted with the USFWS as required under section 7 (a)(2) of the Endangered Species Act (ESA), for potential impacts to federally listed species. Based on a letter from the USFWS (July 20, 2006), it is EPA's understanding that no federally-listed or proposed, threatened or endangered species or critical habitat, under the jurisdiction of the US Fish and Wildlife Service, are known to occur in the in the receiving waters identified in this permit. Furthermore, the effluent limitations and other permit requirements identified in this Fact Sheet are designed to be protective of all aquatic species.

IX. State Certification Requirements

The staff of the Massachusetts Department of Environmental Protection has reviewed the draft permit. EPA has requested permit certification by the State and expects that the draft permit will be certified.

X. Comment Period, and Procedures for Final Decisions

All persons, including applicants, who believe, any condition of the draft permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, to the U.S. EPA, Massachusetts Office of Ecosystem Protection (CMP), One Congress Street-Suite 1100 Boston, Massachusetts 02114-2023. Any person, prior to such date, may submit a request in writing for a public hearing to consider the draft permit to EPA and the State Agency. In reaching a final decision on the draft permit, the Regional Administrator will respond to significant comments and make these responses available to the public at EPA's Boston office.

Following the close of the comment period after the public hearing the Regional Administrator will issue a final permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice.

Within 30 days following the notice of the final permit decision, interested parties may petition the Environmental Appeals Board to review any condition of the permit decision. Regulations regarding the appeal of NPDES permits may be found at 40 CFR Part 124.19.

XI. EPA Contact

Additional information concerning the draft permit may be obtained between the hours of 9:00 a.m. and 5:00 p.m., Monday through Friday, excluding holidays from:

Mark Voorhees Office of Ecosystem Protection U.S. Environmental Protection Agency 1 Congress Street Boston, Massachusetts 02114-2023 Telephone: 617-918-1537	or	Paul Hogan Massachusetts Department of Environmental Protection Division of Watershed Management Worcester, MA 01608 Telephone: 508-767-2796 627 Main Street

Date: ____________________

Linda M. Murphy, Director
Office of Ecosystem Protection
US Environmental Protection Agency

Attachment 1. Outfall 001 Effluent Characteristics Based on Average Monthly Data

Date	Influent Flow (MGD)		Effluent Flow (MGD)		BOD_5 (mg/l)		BOD_5 % Removal	TSS (mg/l)		TSS % Removal	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Copper (ug/l)	*Fecal coliform* (cfu/100 ml)		LC50	C-NOEL 7-Day
	Monthly average	Maximum Daily	Monthly average	Maximum daily	Monthly average	Maximum Daily	Monthly average	Monthly average	Maximum Daily	Monthly average	Monthly average	Monthly average	Monthly average	Monthly average	Maximum Daily	Ceriodaphina	Ceriodaphina
Existing Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.3 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.)	4	200	400	≥100	≥89
Proposed Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.2 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.) 15.3 (Dec-Apr.)	10	200	400	≥100	>92
Sep. 2005	0.52	0.60	0.30	0.60	2.4	2.6	98.9	0.3	0.4	99.9	0.19	0.04	50	1	2	---	---
Aug. 2005	0.47	0.55	0.25	0.49	3.0	4.3	98.8	0.4	0.7	99.8	0.20	0.04	68	2	2	---	---
July 2005	0.55	0.94	0.29	1.18	2.7	3.5	98.6	0.6	1.4	99.8	0.19	0.11	69	6	105	---	---
June 2005	0.58	0.69	0.15	0.30	2.5	4.6	98.6	0.7	1.3	99.7	0.18	0.09	80	2	2	---	---
May 2005	0.77	1.09	0.35	0.56	1.3	1.8	99.0	0.2	0.3	99.9	0.17	0.12	28	0	0	>100	>100
Apr. 2005	1.12	2.51	0.62	2.85	1.3	1.6	98.7	0.2	0.3	99.8	0.17	0.15	48	---	---	---	---
Mar. 2005	0.80	2.90	0.47	1.15	1.8	4.5	97.4	0.8	2.3	98.3	0.16	0.29	130	---	---	---	---
Feb. 2005	0.70	1.27	0.53	1.04	1.4	1.6	98.9	0.2	0.3	99.9	0.13	0.05	70	---	---	>100	>100
Jan. 2005	0.96	2.54	0.75	2.35	1.3	1.4	98.8	0.3	0.4	99.8	0.14	0.06	30	---	---	---	
Dec. 2004	0.94	1.52	0.71	1.16	1.3	1.5	98.5	0.2	0.2	99.9	0.15	0.05	35	---	---	---	
Nov. 2004	0.61	1.18	0.41	0.86	1.7	2.1	99.0	0.3	0.4	99.9	0.17	0.04	50	---	---	>100	>100
Oct. 2004	0.68	1.06	0.47	0.95	1.7	2.0	99.0	0.2	0.4	99.9	0.17	0.04	36	1	1	---	---
Sep. 2004	0.86	1.82	0.69	1.88	1.6	1.9	98.8	0.3	0.5	99.8	0.20	0.03	37	0	0	---	---
Aug. 2004	0.69	1.34	0.46	1.37	1.3	2.0	99.3	0.3	0.3	99.9	0.22	0.04	38	5	21	>100	>100
July 2004	0.59	2.74	0.34	2.65	1.8	2.4	99.1	0.2	0.2	99.9	0.20	0.04	58	5	8	---	---

Date	Influent Flow (MGD)		Effluent Flow (MGD)		BOD_5 (mg/l)		BOD_5 % Removal	TSS (mg/l)		TSS % Removal	Total Phosphorus (mg/l)	Ammonia Nitrogen (mg/l)	Copper (ug/l)	*Fecal coliform* (cfu/100 ml)		LC50	C-NOEL 7-Day
	Monthly average	Maximum Daily	Monthly average	Maximum daily	Monthly average	Maximum Daily	Monthly average	Monthly average	Maximum Daily	Monthly average	Monthly average	Monthly average	Monthly average	Monthly average	Maximum Daily	Ceriodaphina	Ceriodaphina
Existing Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.3 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.)	4	200	400	≥100	≥89
Proposed Limits	1.08 note 1	****			note 2	***	85%	note 2	***	85%	0.2 (Apr -Oct) 0.75 (Nov-Mar)	0.56 (May -Oct.) 8.5 (Nov.) 15.3 (Dec-Apr.)	10	200	400	≥100	>92
June 2004	0.61	0.76	0.41	0.64	1.9	2.0	98.9	0.2	0.2	99.9	0.18	0.05	63	1	3	---	---
May 2004	0.80	1.29	0.75	1.37	2.4	2.7	95.0	0.6	0.7	99.6	0.16	0.09	46	0	0	>100	89
Apr. 2004	1.28	2.43	1.36	2.45	3.1	4.1	96.2	0.2	0.3	99.8	0.14	0.03	53	---	---	---	---
Mar. 2004	0.71	1.52	0.73	1.55	3.5	5.6	97.1	0.2	0.4	99.9	0.14	0.06	----	---	---	---	---
Feb. 2004	0.50	0.56	0.44	0.69	2.3	2.8	98.7	0.3	0.4	99.9	0.14	0.08	---	---	---	>100	>100
Jan. 2004	0.65	0.96	0.63	1.17	1.3	2.0	99.1	0.2	0.4	99.9	0.13	0.04	---	---	---	---	---
Dec. 2003	1.04	2.34	1.09	2.70	2.8	4.8	97.1	1.9	6.8	97.2	0.19	0.03	---	---	---	---	---
Nov. 2003	0.78	1.01	0.55	0.71	2.2	3.5	98.7	0.2	0.3	99.9	0.20	0.03	---	---	---	>100	>100
Oct. 2003	0.79	1.97	0.44	1.55	0.9	1.5	99.1	0.4	1.2	99.7	0.24	0.03	---	0	0	---	---
Maximum	1.28	2.90	1.36	2.85	3.5	2.8	99.3	1.9	6.8	99.9	0.24	0.29	130	6	105		
Minimum	0.47	0.55	0.15	0.30	0.9	1.4	95.0	0.2	0.2	97.2	0.13	0.03	28	0	0		
Average	0.75	1.48	0.55	1.34	2.0	2.8	98.4	0.4	0.8	99.7	0.17	0.07	55	2	12		

1. The 1.08 MGD flow limit is running annual arithmetic average
2. BOD_5 and TSS monthly average for May 1 - Oct 31 is 5.6 mg/l. BOD_5 and TSS monthly average for Nov 1 - Apr 30 is30 mg/l.

RESPONSE TO PUBLIC COMMENTS

From August 22, 2006 until September 20, 2006, the United States Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) solicited Public Comments on a draft NPDES permit, developed pursuant to an application from the Town of Spencer Wastewater Sewer Commission for its wastewater treatment plant, located in Spencer, Massachusetts. After reviewing the comments received, EPA has made the final decision to issue the permit authorizing the discharge. The following describes and responds to comments, and describes any subsequent changes to the draft permit. A copy of the final permit may be obtained by writing to Mark Voorhees, United States Environmental Protection Agency, 1 Congress Street, Suite 1100 (CPE), Boston, Massachusetts, 02114-2023 or by calling (617) 918-1537.

Copies may also be obtained from http://www.epa.gov/region1/npdes/index.html.

A. Comments Submitted by Cindy Delpapa, Commonwealth of Massachusetts, Riverways Program

Comment A1: The Fact Sheet notes there have been bypass events at this facility. Since the monthly average effluent and most of the influent volumes are consistently well below the design flow of the facility, the need to bypass indicates a significant inflow and infiltration problem in the collection system. The standard permit requirements outlining I/I reduction efforts are a start but the permittee needs to implement I/I reduction strategies quickly, not just develop a reduction plan, if more bypass events are to be avoided. The prohibition against bypasses is strong incentive for immediate I/I removal and it is our hope the Permittee will work on I/I removal in addition to finalizing its remediation plan.

Response A1: Part I. B of the permit, Unauthorized Discharges, recognizes that bypass events are not permitted. Specifically, Part I. B states that, “Flow in excess of the plant’s treatment capacity which does not receive full secondary treatment is not a permittable bypass under 40 CFR §122.41(m) and is not authorized by this permit”. Thus, during any bypass event, the permittee would be in noncompliance with the conditions of the permit and subject to enforcement action. As noted by the commenter, prohibition against bypasses is a strong incentive for immediate I/I removal.

Furthermore, it is stated in the conditions of the permit, under Part I. C. 3, that The Permittee shall develop and implement a plan to control infiltration and inflow (I/I) to the separate sewer system. This plan is to be submitted to EPA and MassDEP within six months of the effective date of the permit, and must describe the Permittee♣s means for preventing infiltration/inflow related effluent limit violations and all unauthorized discharges of wastewater, including overflows and bypasses due to excessive infiltration/inflow. In this plan, the Town is required to provide the funding level and funding sources that will be used to remove sources of I/I. While we expect the Town to move forward expeditiously to secure the necessary funding, we recognize that the Town must secure the funding using defined appropriation procedures.

Comment A2: The (phosphorus) limits in the draft permit are partially technology based and also a result of TMDL load allocations for downstream impoundments. The 0.2 mg/l limit is likely to fall short of reaching the EPA recommended ecoregional instream concentration in Cranberry Brook since there is limited dilution of the effluent in summer months but the load limits appear to be adequate to meet the TMDL load allocation for Quaboag Pond. The daily load limit is to be calculated as a seasonal average and reported at the end of the season. It is our opinion the end of season calculation is not an ideal approach to controlling phosphorus loads in the receiving water-especially with a facility struggling with excessive I/I. We hope this seasonal load limit will be reconsidered if the actual monthly and daily loads indicate problematic trends correlated to water quality problems (algal blooms, depressed DO, organic enrichment, aesthetic issues). While, as the Fact Sheet notes, Cranberry Brook is not listed as nonattainment for the indicators usually associated with cultural eutrophication it is not accurate to say Cranberry Brook does not experience these problems since the brook is listed as unassessed, as opposed to attaining uses, by the MassDEP, thus its status is unknown.

Response A2: EPA commits to reevaluate the phosphorus limitations based on a review of future daily and monthly phosphorus loading from the facility and available receiving water quality data. If a future review shows that a shorter averaging period is necessary to achieve water quality standards, EPA will consider reopening the permit and proposing such a limit (e.g., monthly average limit) in a permit modification.

As stated in the Fact Sheet, Cranberry Brook and the Sevenmile River are not listed for excursions of water quality standards for nutrients, DO, aquatic plants or other indicators of eutrophication. The purpose of this statement was to clarify that there is **not** current information available to ascertain whether the rivers are experiencing cultural eutrophication and whether water quality based phosphorus limits more stringent than those needed for Quaboag Pond are warranted at this time. However, EPA acknowledges the unknown status of these receiving waters. During the site visit the permit writer viewed Cranberry Brook in the vicinity of the discharge outfall and its confluence with the Sevenmile River and did not observe any evidence of cultural eutrophication. In any event, the Fact Sheet clearly states that should new water quality information become available or if the state develops water quality criteria that would require more stringent limits, the permit may be reopened and modified.

Comment A3: We agree with the statement in the Fact Sheet regarding the Spencer Facility's admirable efforts in maintaining low ammonia concentrations year-round. We also agree with the reasoning provided for the year-round ammonia limits. With such a low dilution in the Brook and the status of the waterway unassessed, providing the safe guard of a year-round ammonia limit is a sound idea.

Response A3: Comment noted for the record.

<u>Comment A4</u>: The facility is unique because it is one of the few plants which frequently treats more influent than it discharges due to “loss” of treated wastewater in the (created) wetland beds. Since there is often a significant dichotomy in the influent and effluent numbers, we hope the Permittee will continue to report influent volumes. Because of the difference in the flow treated at the facility and the discharge volume, we would like to recommend a slight modification to Part I.A.1.f to have the annual <u>influent</u> flow exceeding 80% design flow in a calendar year act as the trigger for a report to MassDEP. This request is based on the intent of this clause which revolves around the capacity of the plant to treat flows and this volume is better reflected by influent numbers for the facility.

<u>Response A4</u>: EPA agrees with this comment and has clarified Part I.A.1.f in the final permit to require the annual <u>influent</u> flow exceeding 80% design flow in a calendar year act as the trigger for a report to MassDEP.

<u>Comment A5</u>: The draft permit proposes to reduce the frequency of the whole effluent toxicity testing to twice annually based on recent test results. The PCS database indicates there was no WET data submitted for August 2005 which could be construed as a failure of the tests. May 2004 had a C-NOEL test result that would be a failure based on the new dilution factor. While we appreciate the requirement for retesting of the effluent should there be a WET test failure, we would still like to support the reduction in WET testing be delayed for at least another permit cycle given the change in the C-NOEL to 92%, and the ongoing copper exceedences.

<u>Response A5</u>: In August 2005, the LC50 was reported as >100%. The C-NOEC was not reported because the test was determined to be invalid due to 70% survival (less than the EPA acceptability criterion of $\geq$ 80%) in the dilution water sample taken from Cranberry Brook, collected on August 19, 2005. As explained in a letter from the Town of Spencer to EPA (dated September 29, 2005), although no value was reported for C-NOEC, the test showed that treatment plant effluent (sample of 100% effluent) was not toxic to the test organisms.

The May 2004 chronic test reported a C-NOEC of 89%. The dilutions (percent effluent concentrations) used for this test were 6.25, 12.5, 25, 50, 89, and 100%. Only the 100% test failed the reproduction portion of the test. It cannot be deduced from this test whether a sample with an effluent concentration of 92% would have failed the test because this dilution was not analyzed. Therefore, EPA views the results of this test as passing or complying with the permit limit. However, EPA has reviewed more recent WET tests submitted for February, May, and August 2006. The results of these tests for LC50 (48-hour and 7-day), C-NOEC and C-LOEC were all >100%. Given the recent results and demonstrated consistency in the WWTF’s ability to meet the WET limits, the final permit retains the requirement for two annual WET tests. However, as a contingency, the permit proposes to require that if any future toxicity test should fail to comply with the limits, the Permittee must re-test the effluent within fourteen days of the original test.

<u>Comment A6</u>: The 7Q10 flow for this facility was extrapolated using watershed area and flow data from the Seven Mile River gage. One potentially complicating factor was not mentioned in the narrative on the flow and this is the 0.97 mgd permitted and registered withdrawal of potable water in this river section. It is possible that a withdrawal of this size could have an affect on base flow since water withdrawals tend to peak during low flow months drawing from groundwater reserves feeding the river. Withdrawals from the groundwater of such a small drainage could mean there is a local dewatering in the stream. Has data been collected or observations made to see if the withdrawal does influence low flows? If this is a possibility, the dilution factor is likely not conservative enough and we hope the permit conditions can be reconsidered.

<u>Response A6</u>: EPA and MassDEP are not aware of existing data that could be used to evaluate the potential impacts of well withdrawals on low flow conditions in Cranberry Brook. It is difficult to ascertain whether the well is affecting the estimated 7Q10 flow for Cranberry Brook without site specific data. Without such data, EPA is relying on continuous stream flow data from a nearby gage on continuous flow data collected at the nearby USGS gage located on the Sevenmile River to estimate low flow conditions for this permit.

B. <u>Comments Submitted by Gregory J. McVeigh, Wright-Pierce on behalf of the Spencer Sewer Commission</u>

<u>Comment B1</u>: EPA/MADEP have included in Part I.A.1.f, "The Permittee is required, when the average annual flow in any calendar year exceeds 80 percent of design flow, to submit a report to MassDEP on how the Permittee will remain in compliance with the limitations in the permit, specifically flow." Please confirm that the "average annual flow" reference is the influent flow. Also, explain the need to comply with influent flow limitations if discharge limitations are being met?

<u>Response B1</u>: The annual average flow referred to Part I.A.1.f is for influent flow. Part I.A.1.f in the final permit has been revised to clarify this requirement.

Influent flow limitations are necessary, even when discharge limitations are currently being met, to ensure that that future growth will not cause high flow-related effluent violations. As noted in the Fact Sheet, bypasses of secondary treatment have occurred at the facility because of excessive I/I in the collection system. Spencer is required to address excessive I/I and prevent future bypasses from occurring.

The flow limit, which is established at the design flow of the facility, also ensures that the water quality based limits in the permit are protective. The dilution factor used to calculate water quality-based effluent limits is established using the design flow. If discharge flows were to exceed the flow limit, the dilution factor would decrease and the water quality-based limits would not be protective of water quality standards.

<u>Comment B2</u>: 1/Month E. coli bacteria sampling during May 1- October 31 has been added. This is in advance of MADEP moving to E. coli testing at the end of 2006.

Therefore, for a period of time Spencer WWTP will be conducting 1/month, between May 1-October 31, E. coli and fecal coliform bacteria sampling. The Commission requests that the need to test for Fecal Coliform time out at the time the proposed revisions to the Massachusetts Water Quality Standards is adopted.

Response B2: EPA has revised the final permit such that the fecal coliform limits and monitoring will be eliminated one year from the effective date of the permit, when the *E. coli* limits go into effect. *E. coli* will be monitored and reported once per month for the first year of the permit, and thereafter increase to 1/week. The seasonal period during which both the fecal coliform and the *E. coli* limits are effective has been extended to April 1 – October 31 to ensure that the complete recreational season is covered.

Comment B3: Ammonia-Nitrogen limits for December 1 – April 30 of 15.2 mg/l or 136 lbs/day has been added. The winter limits are "precautionary" (if, nitrification were to cease during the winter) and does not seem warranted based on Spencer's past performance. Also, the winter limits were developed based on less critical in-stream conditions than the November limits (pH 7.1 @ 5 degrees C) vs. pH 6.5 @ 5 degrees C and instream limit of 5.0 mg/l). This means that either the November limits are too low or the December limits are too high. Why are instream criteria for determining the limits different?

Response B3: While the Spencer WTF has performed very well at maintaining ammonia removal and discharging very low effluent ammonia concentrations during the cold-weather seasons, a reasonable potential still exists for the facility to cause or contribute to in-stream ammonia toxicity if nitrification were to fail at the facility during the cold weather season. Therefore, ammonia limits for the months of December to April are included in the final permit.

The existing permit includes an ammonia limit of 8.5 mg/l for the month November. As discussed, the facility has complied with this limit. This limit has been established to prevent in-stream toxicity and has been retained in accordance with antibacksliding requirements. The limits developed for the months of December to April are based on estimated in-stream pH and on the available dilution (30Q10), which was calculated for this period using stream flow data as discussed in the Fact Sheet. These conditions differ from conditions for the month of November, which has a lower available dilution flow and higher pH, resulting in a more stringent limit.

Comment B4: Total phosphorus (TP) May 1-October 31 seasonal average limit (0.79 lbs/day) is based on 0.2 mg/l and assumes that the limit could be met if the average summer discharge flow is 0.47 MGD. The current TP loading for May-October in the TMDL was based on Spencer WWTP's DMR flows and concentrations reported (see second paragraph, page 42 of the TMDL). Please identify which DMR flow and load data were used by EPA/MassDEP to determine the current 131 kg/yr or 0.79 lbs/day loading.

The Fact Sheet shows that monthly average summer discharge flow during May 1-October 31 at the Spencer WWTP was 0.644 MGD. If the loading limit is based on actual discharge flows then why is an undocumented average summer discharge flow at the Spencer WWTP of 0.433 MGD required to meet the limit?

Response B4: The Spencer WLA is based on the TMDL analyses for Quaboag Pond. The analysis used a water quality model, ambient water quality data collected in the lake, and data collected from strategic locations in the watershed, including effluent data from the Spencer WWTF. This analysis is based on data collected during 2003. For the critical growing season, the WLA for the Spencer WWTF was set at 131 kg/yr. This WLA was derived using the model, which is based on data collected during 2003 and after considering reductions from other watershed phosphorus sources. The TMDL states that the Spencer WWTF would meet this WLA during the growing season if the effluent total phosphorus concentration is no higher than 0.2 mg/l as phosphorus and the average effluent flow was below 0.47 MGD. This flow value is in agreement with the average daily effluent flow rate for the growing season of 2003.

The commenter states that the monthly average summer discharge flow is 0.644 MGD, but does not specifically identify which data in the Fact Sheet were used to calculate this value. It appears that the commenter may have used the influent flow data in Attachment 1 and calculated the average flow for the months of May-September for 2004 and 2005. Based on using the effluent flow data in Attachment 1 for the same months, the summer average effluent flow is 0.399 MGD, which more closely reflects the TMDL flow value of 0.47 MGD.

Comment B5: The total phosphorus November 1-April 30 seasonal average limit (1.19 lbs/day) is based on a "winter flows are typically 50% higher" over the May 1-October 31 seasonal average limit, holding the concentration at 0.3 mg/l and assuming that the limit could be met if the average winter discharge flow is 0.47 MGD. Does EPA/MassDEP have site specific stream data to substantiate the "winter flows are typically 50% higher"?

Seeing "there is no specific information concerning the possible effect of winter adsorption or storage of phosphorus with subsequent release" why not establish a November 1-April 30 seasonal average limit based on a concentration of 0.3 mg/l and realistic monthly average winter discharge flow of 0.8257 MGD (see Fact Sheet). This equates to a limit of 2.07 lbs/day which provides a reduction in winter phosphorus concentrations and loads in keeping with the TMDL and provides a protective winter loading to both groundwater and soils between the constructed wetlands and nearby surface waters.

Response B5: The TMDL states that the winter instream flows are typically 50 % higher than summer flows and uses this as part of the basis for determining the seasonal phosphorus wasteload allocation for the Spencer WWTF. The average winter and summer flows for the Sevenmile River at gage 01175670 for 2003 were 23.22cfs and

10.63 cfs, respectively (Socolow, Zanca, Driskell, and Ramsbey 2003). The winter flow is approximately 50 % higher than the summer flow.

The total phosphorus November 1-April 30 seasonal average limit of 1.19 lbs/day is based on the TMDL analysis which considered seasonal tributary flow rates when calculating the seasonal wasteload allocation (WLA) for the Spencer WWTF. The commenter is requesting a higher seasonal phosphorus load than the WLA in the TMDL. The permit limits must be consistent with the WLA in the TMDL. Also, it appears that the commenter used the influent flows rather than the effluent flows in their calculation.

Comment B6: The second paragraph of “Paragraph B. Unauthorized Discharges” of the Draft NPDES permit requires all flows to receive full secondary treatment. The Spencer Sewer Commission, as part of the 1987 WWTP upgrade, had the existing Flo-Matcher wastewater pump station redesigned to be used as an influent high stormwater pump station to eliminate sanitary sewer overflows (SSO’s) within the collection system. This pump station redirects influent flows, above 5.4 MGD, into the treatment plant into the last two wetland beds for storage and discharge into the wetland effluent line to UV disinfection via underdrain flow from the wetlands. The influent high storm water pump station historically is used less than once per year. The current treatment process configuration prevents the Spencer WWTP and collection system from discharging untreated wastewater to surface waters, and enables the Spencer WWTP to comply with their effluent discharge limits during peak storms. The Commission request that the second paragraph be removed from the Draft NPDES permit.

Response B6: Occasional bypasses of secondary treatment occur at the Spencer WWTF because of excessive of wet-weather related I/I in the collection system. While partially treated bypasses are environmentally preferable to untreated SSOs, bypasses of the nature occurring in Spencer may not be authorized in NPDES permits (see 40 CFR 122.41(m)(4)(i), *Prohibition of bypass*). Such bypasses may be subject to enforcement since they do not meet the conditions defined in 40 CFR §122.41(m)(i)(A-C) because the removal of excessive I/I to reduce influent flow is a feasible alternative to the bypasses. Therefore, the final permit does not authorize secondary treatment bypasses at the facility. Continued efforts by the Town of Spencer to remove excessive I/I should eliminate the occurrence of bypasses at the facility.

Comment B7: Page 2 of the Fact Sheet discusses additional monitoring (BOD, TSS and total phosphorus), but conditions are not found in the permit. Please clarify.

Response B7: The reference on page 2 of the Fact Sheet that indicates additional monitoring (BOD, TSS and total phosphorus) for bypass events is in error. The final permit does not include new monitoring requirements for bypasses.

Comment B8: Paragraph C. 3, Infiltration/Inflow Control Plan. The Spencer Sewer department personnel, as a part of the current NPDES permit, have developed and submitted an annual I/I control plan addressing those items outlined in the Draft NPDES permit. Is it necessary for the Sewer Department to develop and submit a new I/I Control

Plan within 6 months of the effective date of the new permit or can they submit the annual update of the current I/I Control Plan by March 31, 2007?

<u>Response B8</u>: The final permit requires that that Spencer submit an Infiltration/Inflow Control Plan within six months of the effective date of the permit and that the plan must address all of the requirements specified in the final permit. Spencer's existing plan may be submitted if it meets these requirements or revised to meet the requirements.

C. <u>Comments Submitted by Andrea F. Donlon, River Steward, Connecticut River Watershed Council</u>

The commenter notes that because the Spencer WWTP discharges near the confluence with the Sevenmile River, it affects the water quality along part of a proposed canoe route, Quaboag River Canoe Trail.

<u>Comment C1</u>: The Fact Sheet associated with this permit was very complete, and contained rationale that is often missing in other Fact Sheets we have reviewed.

<u>Response C1</u>: Comment noted.

<u>Comment C2</u>: We are glad to see that this facility is using ultraviolet radiation treatment for bacteria, given impairments downstream for chlorine and pathogens. The recent bacteria levels shown in the Fact Sheet Attachment 1 indicate that bacteria levels are quite low. Chlorine has been eliminated. We are also pleased to see tertiary treatment through (created) wetland beds. This provides some beneficial groundwater recharge and an extra level of treatment.

<u>Response C2</u>: Comment noted.

<u>Comment C3</u>: We support the addition of *E. coli* testing in addition to fecal coliform testing, in preparation to the proposed changes in the state water quality standards. However, we recommend that *E. coli* testing be done as frequently (at the same time as) fecal coliform.

<u>Response C3</u>: The final permit requires E. coli monitoring and includes limits that will become effective in one year from the effective date of the permit (see Response B2). When the E. coli limits become effective, the monitoring frequency will increase to 1/week.

<u>Comment C4</u>: Seasonal limits for BOD, TSS, nutrients and dissolved oxygen (DO) should incorporate recreation period of April 1 to October 31 every year.

<u>Response C4</u>: The seasonal limits for these constituents are based on a seasonal period that represents the critical conditions under which these pollutants will have maximum impact on water quality. The selection of the critical period for these parameters is independent of the recreational period because the water quality impacts of concern for these constituents are related to aquatic life health, not recreational use. For example, DO criteria are included in the Massachusetts Water Quality Standards to protect aquatic life. Critical conditions for DO which is impacted by BOD and ammonia occurs during warm-weather low-flow conditions when the oxygen carrying capacity of water is at its lowest and when biochemical oxidation and respiration rates (oxygen demand) are highest. During the month of April in Massachusetts, receiving waters typically have higher flow rates (more dilution and faster retention times) and always have cooler temperatures than the warm-weather summer and early fall season. As a result, it is unnecessary to extend these seasonal limits to include April because the impacts to aquatic life from these constituents are significantly less in April than during the low-flow high temperature conditions for which the permit limits were developed.

Comment C5: We support more stringent total phosphorus limits and more frequent testing of total phosphorus as proposed in the draft permit. This is being done as part of a TMDL to reduce nutrient loads in Quaboag Pond, which lies downstream of the Sevenmile River. However, although there are no numerical criteria for total phosphorus, the 1986 Quality Criteria of Water recommends in-stream phosphorus concentrations of 0.1 mg/L for any stream not discharging directly to lakes or impoundments and 0.05 mg/L in any stream entering a lake or reservoir. Given the small dilution factor for Cranberry Brook, the proposed permit limits may not be stringent enough to meet ecoregional recommendations for instream phosphorus in Cranberry Brook. Thus, even more stringent total phosphorus limits may be more appropriate for protection of the receiving waters directly downstream.

Response C5: As indicated in the Fact Sheet, Cranberry Brook and the Sevenmile River are not listed for nonattainment of water quality standards for nutrients, DO, aquatic plants or other indicators of eutrophication. Currently, available information is insufficient to determine whether the rivers are experiencing cultural eutrophication and whether water quality-based phosphorus limits more stringent than needed for Quaboag Pond are warranted at this time. However, EPA acknowledges the unknown status of these receiving waters. During the site visit the permit writer viewed Cranberry Brook in the vicinity of the discharge outfall and its confluence with the Sevenmile River and did not observe any evidence of cultural eutrophication. In any event, the Fact Sheet clearly states that should new water quality information become available or if the state develops water quality criteria that would require more stringent limits, the permit may be re-opened and modified.

Comment C6: The facility has not been complying with its permit limits for copper, nor is it likely to comply with the proposed (less stringent) limits. It is not clear when or how the facility will come into compliance. The permit should establish deadlines for complying with the Clean Water Act.

Response C6: EPA can only establish schedules in permits for new or more stringent permit limitations. However, the Town of Spencer is presently under and administrative order from EPA's Office of Environmental Stewardship (OES) to take steps to address the copper limit violations.

Comment C7: We notice that chronic NOEC and LC50 testing is proposed to be changed from quarterly to twice a year. We would like to see quarterly testing remain in place for this facility, especially given the high copper levels in the discharge.

Response C7: As shown by the WET tests results, the discharge of copper does not appear to be causing either acute or chronic toxicity to the test organisms. (Also, please see Response A5).

Comment C8: The Fact Sheet for this permit acknowledges the Infiltration and Inflow (I/I) problem at this facility. On page 2 of the Fact Sheet, it states that secondary treatment process bypass events occur at the facility due to wet weather conditions that result in high I/I in the collection system. According to the Fact Sheet, there have been four bypass incidents since February of 2003. The draft permit in Section C2 calls for a preventative maintenance program to prevent overflows and bypasses, including an inspection program. Section C3 of the permit calls for an I/I plan to be submitted to EPA and MassDEP within six months of the effective date of the permit. With respect to the bypass issue, there are no deadlines or milestones established in the draft permit. Given the seriousness of the I/I problem at this facility, we request that the final permit set certain conditions and timelines for making bypass events a thing of the past.

Response C8: EPA compliance will review the situation and take appropriate steps to reduce and eventually eliminate the high flow bypasses. The permit does not authorize the bypasses thus their occurrences must be handled by the EPA Enforcement Office.

REFERENCES

USGS Water Resources Data Report for Massachusetts and Rhode Island, Water Year 2003 By R.S. Socolow, J.L. Zanca, T.R. Driskell, and L.R. Ramsbey
Water-Data Report MA-RI-03-1

WRIGHT-PIERCE
Engineering a Better Environment

C

Flow (2012-2017)

	INF MGD Mnth Ave	INF MGD Max 24 Hr	EFF MGD Mnth Ave	EFF MGD Max 24 Hr
1/1/2012	0.92	1.34	0.22	0.35
2/1/2012	0.71	0.91	0.15	0.25
3/1/2012	0.75	1.02	0.24	0.42
4/1/2012	0.61	1.04	0.24	0.54
5/1/2012	0.61	0.84	0.29	0.50
6/1/2012	0.55	0.79	0.27	0.43
7/1/2012	0.36	0.80	0.17	0.52
8/1/2012	0.47	0.85	0.18	0.48
9/1/2012	0.49	0.76	0.13	0.25
10/1/2012	0.64	1.32	0.21	0.88
11/1/2012	0.71	0.92	0.25	0.55
12/1/2012	0.74	1.46	0.26	0.59
1/1/2013	0.81	1.28	0.28	0.60
2/1/2013	0.89	2.27	0.34	1.02
3/1/2013	1.27	2.92	0.48	1.55
4/1/2013	0.76	1.11	0.14	0.23
5/1/2013	0.70	1.43	0.39	1.47
6/1/2013	1.44	3.28	0.57	2.14
7/1/2013	0.55	0.78	0.19	0.38
8/1/2013	0.51	1.16	0.23	0.53
9/1/2013	0.56	1.12	0.18	0.68
10/1/2013	0.50	0.61	0.14	0.22
11/1/2013	0.53	1.13	0.11	0.34
12/1/2013	0.76	1.40	0.24	0.57
1/1/2014	0.92	1.51	0.35	0.65
2/1/2014	0.64	0.88	0.17	0.29
3/1/2014	1.16	3.57	0.42	2.71
4/1/2014	1.41	2.51	0.55	1.65
5/1/2014	1.00	2.17	0.26	0.71
6/1/2014	0.56	0.69	0.10	0.21
7/1/2014	0.49	0.72	0.25	0.35
8/1/2014	0.45	0.96	0.29	0.58
9/1/2014	0.52	0.74	0.33	0.47
10/1/2014	0.67	1.42	0.33	0.52
11/1/2014	0.73	1.10	0.32	0.54
12/1/2014	1.32	2.51	0.50	1.45
1/1/2015	0.75	1.41	0.19	0.41
2/1/2015	0.53	0.62	0.12	0.16
3/1/2015	1.04	2.04	0.30	0.57
4/1/2015	1.41	2.66	0.51	1.39
5/1/2015	1.71	0.77	0.24	0.39
6/1/2015	0.57	0.85	0.30	0.58
7/1/2015	0.49	0.67	0.15	0.37
8/1/2015	0.42	0.54	0.24	0.43
9/1/2015	0.41	0.81	0.13	0.23
10/1/2015	0.50	0.65	0.15	0.19
11/1/2015	0.54	0.68	0.15	0.22
12/1/2015	0.68	0.94	0.13	0.33
1/1/2016	0.85	1.46	0.22	0.46
2/1/2016	1.10	2.21	0.38	0.83
3/1/2016	1.09	1.37	0.36	0.56
4/1/2016	1.03	1.70	0.32	0.86
5/1/2016	0.65	0.83	0.13	0.21
6/1/2016	0.48	0.59	0.12	0.19
7/1/2016	0.40	0.46	0.17	0.24
8/1/2016	0.42	0.56	0.19	0.26
9/1/2016	0.47	0.83	0.21	0.31
10/1/2016	0.58	0.84	0.22	0.41
11/1/2016	0.65	1.18	0.25	0.53
12/1/2016	0.83	1.27	0.38	1.30
1/1/2017	1.15	1.57	0.56	0.87
2/1/2017	1.04	1.60	0.53	1.04
3/1/2017	0.99	1.67	0.51	1.12
4/1/2017	1.45	3.07	0.93	2.14
5/1/2017	0.91	1.26	0.48	0.77
6/1/2017	0.77	1.20	0.43	0.82
7/1/2017	0.51	0.61	0.21	0.32
8/1/2017	0.44	0.55	0.20	0.28
9/1/2017	0.45	0.75	0.23	0.51
10/1/2017	0.61	1.92	0.29	1.07
11/1/2017				
12/1/2017				
MAX	1.71	3.57	0.93	2.71
MIN	0.36	0.46	0.10	0.16
AVG	0.75	1.28	0.28	0.66

BOD (2012-2017)

	INF BOD Ave mg/L	INF BOD Ave lbs	EFF BOD Ave mg/L	EFF BOD Ave lbs
		2012		
1/1/2012	267	1945	2	4
2/1/2012	358	2160	2	3
3/1/2012	362	2222	3	5
4/1/2012	301	1479	3	6
5/1/2012	259	1367	2	5
6/1/2012	337	1582	2	5
7/1/2012	362	933	3	3
8/1/2012	327	1382	3	5
9/1/2012	320	1342	2	3
10/1/2012	251	1403	2	3
11/1/2012	260	1405	2	4
12/1/2012	284	1558	2	4
		2013		
1/1/2013	166	1142	2	4
2/1/2013	161	1265	3	10
3/1/2013	115	1189	3	7
4/1/2013	191	1212	3	3
5/1/2013	328	1416	3	6
6/1/2013	231	1858	2	14
7/1/2013	239	1112	3	5
8/1/2013	304	1157	3	4
9/1/2013	226	1047	4	5
10/1/2013	400	1923	3	4
11/1/2013	328	1484	3	3
12/1/2013	246	1344	3	4
		2014		
1/1/2014	150	1082	2	7
2/1/2014	218	1048	2	3
3/1/2014	158	1231	3	7
4/1/2014	136	1747	6	32
5/1/2014	328	2407	5	11
6/1/2014	332	1564	4	3
7/1/2014	240	974	2	5
8/1/2014	270	1119	2	5
9/1/2014	313	1301	2	4
10/1/2014	310	1510	1	3
11/1/2014	233	1381	2	5
12/1/2014	152	1876	2	13
		2015		
1/1/2015	205	1193	3	5
2/1/2015	254	1164	2	3
3/1/2015	167	1234	2	3
4/1/2015	126	1335	3	9
5/1/2015	251	1092	5	9
6/1/2015	221	1029	2	6
7/1/2015	278	1035	4	4
8/1/2015	287	1032	2	4
9/1/2015	326	1231	4	5
10/1/2015	318	1408	1	2
11/1/2015	315	1341	2	2
12/1/2015	253	1359	3	3
		2016		
1/1/2016	184	1195	3	4
2/1/2016	201	1979	3	11
3/1/2016	158	1409	2	7
4/1/2016	185	1411	4	8
5/1/2016	241	1326	2	2
6/1/2016	291	1214	3	3
7/1/2016	277	951	3	3
8/1/2016	266	933	2	4
9/1/2016	313	1242	2	3
10/1/2016	400	1772	2	3
11/1/2016	235	1302	3	7
12/1/2016	274	1779	2	7
		2017		
1/1/2017	224	2331	3	14
2/1/2017	148	1168	1	6
3/1/2017	154	1284	1	5
4/1/2017	221	2236	4	23
5/1/2017	236	1661	3	12
6/1/2017	367	2406	3	9
7/1/2017	356	1597	2	4
8/1/2017	249	1089	2	3
9/1/2017	271	1156	4	10
10/1/2017	407	1606	2	4
11/1/2017				
12/1/2017				
MAX	407	2407	6	32
MIN	115	933	1	2
AVG	259	1424	3	6
	2757.958		14.21951	

TSS (2012-2017)

	INF TSS Ave mg/L	INF TSS Ave lbs	EFF TSS Ave mg/L	EFF TSS Ave lbs
		2012		
1/1/2012	268	1947	2	3
2/1/2012	420	2413	1	1
3/1/2012	395	2406	1	2
4/1/2012	524	2599	2	5
5/1/2012	215	1147	0	1
6/1/2012	363	1704	1	2
7/1/2012	530	1323	1	1
8/1/2012	463	1925	1	1
9/1/2012	490	2050	1	1
10/1/2012	347	1888	0	1
11/1/2012	394	2086	1	2
12/1/2012	468	2460	1	1
		2013		
1/1/2013	214	1470	1	1
2/1/2013	149	1202	1	3
3/1/2013	130	1373	1	5
4/1/2013	237	1494	0	0
5/1/2013	499	2473	0	1
6/1/2013	192	1889	1	5
7/1/2013	506	2317	2	3
8/1/2013	520	2011	1	2
9/1/2013	262	1200	1	1
10/1/2013	648	2996	2	2
11/1/2013	477	2147	1	1
12/1/2013	305	1608	1	1
		2014		
1/1/2014	158	1121	1	2
2/1/2014	280	1359	1	1
3/1/2014	225	1724	1	2
4/1/2014	178	2226	3	15
5/1/2014	424	3046	3	5
6/1/2014	446	2113	2	1
7/1/2014	334	1362	0	1
8/1/2014	370	1541	1	3
9/1/2014	436	1898	1	2
10/1/2014	493	2415	0	1
11/1/2014	271	1558	1	2
12/1/2014	140	1650	1	8
		2015		
1/1/2015	212	1200	2	3
2/1/2015	313	1440	1	1
3/1/2015	177	1307	1	2
4/1/2015	169	1799	2	8
5/1/2015	400	1781	2	4
6/1/2015	299	1385	1	2
7/1/2015	456	1694	1	1
8/1/2015	464	1674	2	3
9/1/2015	473	1757	2	2
10/1/2015	469	2023	1	1
11/1/2015	700	3001	1	1
12/1/2015	341	1808	1	1
		2016		
1/1/2016	185	1190	0	1
2/1/2016	168	1730	1	4
3/1/2016	126	1122	1	3
4/1/2016	225	1663	1	1
5/1/2016	335	1834	1	1
6/1/2016	386	1524	1	1
7/1/2016	682	2353	1	2
8/1/2016	565	1988	1	2
9/1/2016	563	2254	1	2
10/1/2016	517	2289	0	1
11/1/2016	296	1749	1	3
12/1/2016	333	2155	1	2
		2017		
1/1/2017	216	2269	1	6
2/1/2017	135	1074	1	4
3/1/2017	150	1268	1	5
4/1/2017	236	2309	2	17
5/1/2017	253	1783	1	4
6/1/2017	405	2698	1	5
7/1/2017	504	2264	1	2
8/1/2017	481	1747	1	2
9/1/2017	394	1680	1	3
10/1/2017	481	1882	0	1
11/1/2017				
12/1/2017				
MAX	700	3046	3	17
MIN	126	1074	0	0
AVG	355	1855	1	3
	3786.457		5.787582	

Ammonia (2012-2017)

	INF NH3 Ave mg/L	INF NH3 Ave lbs	EFF NH3 Ave mg/L	EFF NH3 Ave lbs
		2012		
1/1/2012	14	104	0.04	0.07
2/1/2012	18	119	0.04	0.05
3/1/2012	17	114	0.03	0.05
4/1/2012	23	109	0.21	0.40
5/1/2012	19	89	0.02	0.05
6/1/2012	17	88	0.11	0.31
7/1/2012	24	75	0.05	0.07
8/1/2012	25	94	0.02	0.02
9/1/2012	26	95	0.02	0.02
10/1/2012	18	103	0.03	0.06
11/1/2012	16	103	0.04	0.09
12/1/2012	22	105	0.04	0.05
		2013		
1/1/2013	18	103	0.13	0.21
2/1/2013	14	89	0.33	0.74
3/1/2013	7	103	0.19	1.79
4/1/2013	14	96	0.07	0.11
5/1/2013	15	76	0.03	0.08
6/1/2013	8	87	0.04	0.19
7/1/2013	17	78	0.16	0.21
8/1/2013	21	88	0.22	0.40
9/1/2013	16	86	0.17	0.27
10/1/2013	23	100	0.04	0.05
11/1/2013	25	103	0.02	0.01
12/1/2013	22	117	0.02	0.02
		2014		
1/1/2014	8	82	0.03	0.15
2/1/2014	19	90	0.02	0.02
3/1/2014	18	104	0.02	0.02
4/1/2014	6	86	0.36	4.69
5/1/2014	11	89	0.21	0.45
6/1/2014	24	111	0.17	0.15
7/1/2014	27	117	0.02	0.03
8/1/2014	28	102	0.02	0.03
9/1/2014	24	106	0.05	0.14
10/1/2014	23	109	0.02	0.04
11/1/2014	22	110	0.02	0.04
12/1/2014	10	111	0.02	0.07
		2015		
1/1/2015	19	119	0.06	0.09
2/1/2015	25	110	0.07	0.07
3/1/2015	31	147	1.21	1.28
4/1/2015	7	95	1.44	6.78
5/1/2015	22	101	0.73	1.43
6/1/2015	21	114	0.10	0.20
7/1/2015	29	117	0.14	0.16
8/1/2015	27	101	0.04	0.10
9/1/2015	35	121	0.05	0.05
10/1/2015	29	118	0.02	0.02
11/1/2015	25	113	0.03	0.03
12/1/2015	28	140	0.02	0.01
		2016		
1/1/2016	19	141	0.02	0.04
2/1/2016	32	206	0.02	0.03
3/1/2016	22	191	0.03	0.09
4/1/2016	16	153	0.05	0.20
5/1/2016	29	155	0.18	0.18
6/1/2016	32	129	0.20	0.24
7/1/2016	28	93	0.26	0.40
8/1/2016	33	119	0.04	0.07
9/1/2016	34	150	0.04	0.07
10/1/2016	29	139	0.05	0.09
11/1/2016	27	142	0.03	0.06
12/1/2016	18	128	0.10	0.31
		2017		
1/1/2017	17	170	0.02	0.11
2/1/2017	22	164	0.02	0.07
3/1/2017	26	196	0.07	0.24
4/1/2017	7	129	3.53	36.85
5/1/2017	17	134	0.23	0.97
6/1/2017	24	147	0.25	0.88
7/1/2017	26	116	0.06	0.11
8/1/2017	41	157	0.53	0.80
9/1/2017	40	152	0.68	1.38
10/1/2017	34	142	0.11	0.44
11/1/2017				
12/1/2017				
MAX	41	206	3.53	36.85
MIN	6	75	0.02	0.01
AVG	22	117	0.19	0.93
	232.7551		1.047218	

Phosphorous (2012-2017)

	INF Total P Ave mg/L	INF Total P Ave lbs	EFF Total P Ave mg/L	EFF Total P Ave lbs	Alum GPD Mnth Ave
		2012			
1/1/2012	3.54	27.30	0.17	0.32	40
2/1/2012	5.75	34.50	0.19	0.23	40
3/1/2012	6.13	38.19	0.21	0.50	40
4/1/2012	4.83	25.52	0.24	0.60	50
5/1/2012	4.18	21.58	0.18	0.44	100
6/1/2012	5.06	24.47	0.18	0.43	100
7/1/2012	6.34	18.07	0.21	0.27	100
8/1/2012	5.94	22.62	0.21	0.30	144
9/1/2012	5.47	22.20	0.21	0.24	167
10/1/2012	4.25	23.82	0.19	0.46	96
11/1/2012	4.92	30.85	0.19	0.40	50
12/1/2012	5.89	33.05	0.18	0.40	50
		2013			
1/1/2013	3.38	21.85	0.18	0.44	50
2/1/2013	3.03	20.94	0.18	0.46	40
3/1/2013	2.44	28.37	0.19	0.89	40
4/1/2013	5.17	30.18	0.22	0.25	49
5/1/2013	4.91	21.75	0.39	0.70	117
6/1/2013	2.51	25.64	0.12	0.49	120
7/1/2013	4.71	21.82	0.15	0.24	92
8/1/2013	5.53	22.56	0.15	0.27	97
9/1/2013	4.27	20.79	0.16	0.28	100
10/1/2013	7.29	31.00	0.13	0.16	100
11/1/2013	5.42	22.47	0.17	0.14	80
12/1/2013	2.96	20.03	0.17	0.44	50
		2014			
1/1/2014	2.61	21.87	0.15	0.52	50
2/1/2014	4.23	21.74	0.16	0.22	50
3/1/2014	3.13	21.34	0.16	0.37	50
4/1/2014	2.40	27.96	0.10	0.61	86
5/1/2014	4.00	31.12	0.18	0.35	88
6/1/2014	5.37	25.23	0.17	0.15	100
7/1/2014	5.30	22.05	0.19	0.39	100
8/1/2014	6.42	23.72	0.17	0.41	100
9/1/2014	6.86	29.79	0.14	0.40	100
10/1/2014	6.24	29.90	0.15	0.40	100
11/1/2014	4.10	26.12	0.16	0.52	80
12/1/2014	3.02	29.82	0.14	0.55	80
		2015			
1/1/2015	3.89	24.31	0.10	0.19	80
2/1/2015	4.58	20.30	0.11	0.10	80
3/1/2015	3.67	23.96	0.15	0.34	80
4/1/2015	2.80	30.01	0.21	0.73	82
5/1/2015	4.71	21.59	0.16	0.30	90
6/1/2015	5.20	26.71	0.19	0.51	90
7/1/2015	6.39	25.47	0.20	0.26	90
8/1/2015	7.18	26.21	0.23	0.52	80
9/1/2015	7.18	25.42	0.22	0.26	134
10/1/2015	6.72	28.16	0.16	0.19	94
11/1/2015	5.56	25.28	0.14	0.17	79
12/1/2015	5.18	27.86	0.17	0.14	79
		2016			
1/1/2016	3.47	24.75	0.13	0.28	63
2/1/2016	3.81	28.43	0.11	0.27	76
3/1/2016	4.13	39.56	0.10	0.25	74
4/1/2016	3.89	31.25	0.07	0.15	66
5/1/2016	5.73	30.92	0.16	0.17	81
6/1/2016	6.47	26.50	0.21	0.21	91
7/1/2016	6.96	23.85	0.16	0.23	109
8/1/2016	7.45	26.63	0.18	0.30	105
9/1/2016	6.73	27.56	0.15	0.29	106
10/1/2016	6.95	31.93	0.14	0.24	108
11/1/2016	5.01	26.38	0.14	0.30	76
12/1/2016	4.04	27.78	0.12	0.33	89
		2017			
1/1/2017	3.31	30.13	0.15	0.72	74
2/1/2017	3.64	31.23	0.09	0.38	73
3/1/2017	4.56	35.18	0.09	0.35	62
4/1/2017	2.95	33.74	0.18	1.40	76
5/1/2017	4.07	32.07	0.13	0.53	76
6/1/2017	5.89	38.99	0.15	0.55	78
7/1/2017	6.48	28.96	0.18	0.33	71
8/1/2017	8.80	32.72	0.21	0.35	79
9/1/2017	7.83	30.44	0.26	0.55	119
10/1/2017	7.52	32.42	0.20	0.50	89
11/1/2017					
12/1/2017					
MAX	8.80	39.56	0.39	1.40	167
MIN	2.40	18.07	0.07	0.10	40
AVG	5.00	27.10	0.17	0.38	83
	53.33105		0.923516		

D

Combined Address	TANK AGE	TYPE	TNKSIZE	CAPACITY	BDRMS	WELL	Failures
99 Ash Street	21	CM	1000	440	4	No	Fail
121 Ash Street	1	CM	1500	343	3	Y	Fail
122 Ash Street	21	CM	1500	330	3	Yes	Fail
127 Ash Street		CM	1500	330	3	Yes	Fail
135 Ash Street	25	CM	1500	330	3	Yes	Fail
140 Ash Street	12	CM	1500	354	3	Yes	Fail
142 Ash Street	24	CM	1500	440	4	UNK	Fail
143 Ash Street	9	Pump/CM	1500/1000	333	4	Yes	Fail
152 Ash Street	16	CM	1000	440	4	Yes	Fail
155 Ash Street	11	Pump/INF	1500/1000	351	3	Yes	Fail
173 Ash Street	13	CM	1000	330	3	Yes	Fail
166 Ash Street	0	CM	1500/2	330	3	Y	Fail
167 Ash Street Extension	25	CM	1500	330	3	Yes	Fail
39 Bacon Hill Road	24	CM	1500	330	3	Yes	Fail
48 Bacon Hill Road	23	CM	1500	330	3	Yes	Fail
50 Bacon Hill Road	17	CM	1500	684	4	Yes	Fail
51 Bacon Hill Road	19	CM	1500	477	3	YES	Fail
52 Bacon Hill Road	1	Presby	1500	440	4	Y	Fail
58 Bacon Hill Road	12	CM	1500	220	2	Yes	Fail
72 Bacon Hill Road	13	CM	1500	330	3	Yes	Fail
81 Bacon Hill Road	7	Q4	1500	440	4	Yes	Fail
139 Bacon Hill Road	23	CM	1500	330	3	Yes	Fail
73 Bacon Hill Road	0	CM	1500	333	3	Y	Fail
3 Barclay Road	22	CM	1000	330	3	Yes	Fail
30 Belleview Drive	30	CM	1500	330	2	Yes	Fail
6 Bellevue Drive	9	Pump/EQ36	1500/425	220	2	Yes	Fail
14 Bellevue Drive	7	E4 Cultec drain	1000/500	375	3	Yes	Fail
17 Bellevue Drive	22	Other	1000			Yes	Fail
19 Bellevue Drive	37	?	1000			Yes	Fail
22 Bellevue Drive	3	Geoflow	1500/1000	198*	3	y	Fail
4 Bellflower Lane	9	CM	1500	561	4	yes	Fail
6 Blueberry Hill Road	25	CM	1500	330	3	Yes	Fail
8 Blueberry Hill Road	22	OTHER	1000	330	3	Yes	Fail
15 Blueberry Hill Road	14	PUMP	2500	330	3	Yes	Fail
32 Bond Street	13	INF	1500	496	4	Yes	Fail
7 Brewer Lane	24	OTHER	2000	330	3	Yes	Fail
61 Browning Pond Road	11	CM	1500	330	3	Yes	Fail
125 Charlton Road	1	CM	1500	330	3	Y	Fail
221 Charlton Road	2	CM	1000	236	2	Y	Fail
240 Charlton Road	7	Q4	1500	336	3	Yes	Fail
68 Chickering Road	3	CM	1500	336	3	Y	Fail
109 Clark Road	14	CM	1500	355.2	3	Yes	Fail
4 Collier Circle	5	CM	1500/1000	530	4	EXIST	Fail
32 Condon Drive	6	CM	1500	336	3	NO	Fail
104 Cranberry Meadow Road	19	CM	1500	358	2	Yes	Fail
11 Donnelly Cross Road	1	CM	1500	345	3	Y	Fail
35 Donnelly Cross Road	7	CM	1500/2	330	3	Yes	Fail

Combined Address	TANK AGE	TYPE	TNKSIZE	CAPACITY	BDRMS	WELL	Failures
36 Donnelly Cross Road	11	INF	1000	330	3	Yes	Fail
24 Donnelly Road	0	CM/pump	1500/1000	330	3	Y	Fail
8 East Avenue	10	ELJEN	1000/500	330	3	Yes	Fail
6 Fairview Drive	7	CM	1500	336	3	Yes	Fail
5 First Street	12	PUMP	1500/1000	372.9	2	Yes	Fail
43 Greenville Street	20	CM	1500	220	2	NO	Fail
184 Greenville Street	0	CM	1500	330	3	Y	Fail
43 Hastings Road	3	CM	1500	468	4	Y	Fail
116 Hastings Road	13	CM	1500	340	3	Yes	Fail
120 Hastings Road	1	CM	1500	440	4	Y	Fail
53 Highland Street	18	TT	2000	25	1	No	Fail
3 Howe Road	13	CM	1500	341	3	Yes	Fail
2 I Capen Road	13	Infiltrator	1500	381	4	Yes	Fail
91 Jolicoeur Avenue	15	CM	1500	255	2	Yes	Fail
12 Kittredge Road	6	CM	1500	440	4	Y	Fail
19 Lake Avenue	15	CM	1500	330	3	Yes	Fail
49 Lake Avenue	14	CM	1500	343	3	Yes	Fail
45 Lake Avenue	7	TruTap	1500/1000	346	3	Y	Fail
49 Lake Street	5	CM	1500/1000	358	3	NO	Fail
51 Lakeshore Drive	11	Q4	1000	330	3	Yes	Fail
64 Lakeshore Drive	14	PUMP	2500	175	2	Yes	Fail
81 Lakeshore Drive	10	PUMP	1500/1000	332	3	Yes	Fail
85 Lakeshore Drive	14	Alt Tech	1000/alt/pd	172	3	Yes	Fail
35 Lakeshore Drive	7	TT	2000	2000	2	Yes	Fail
28 Lakeview Drive	8	Q4	1500	440	4	Yes	Fail
30 Lambs Grove	13	CM	1500	225	2	Yes	Fail
3 Lyford Cross Road	13	Cultek	1500	330	3	Yes	Fail
99 Maple Street	7	CM	1000/1000	330	3	NO	Fail
12 North Brookfield Road	4	CM	1500	450	4	Y	Fail
24 North Brookfield Road	6	CM	1000	360	3	Y	Fail
76 North Brookfield Road	8	INF	1500	375	3	Yes	Fail
33 North Spencer Road	7	CM	1500	399	3	Yes	Fail
136 North Spencer Road	1	CM	1500	333	3	Y	Fail
202 North Spencer Road	13	CM	1500	660	6	Yes	Fail
229 North Spencer Road	3	CM	1500	345	3	Y	Fails
11 Northwest Road	13	CM	1500	362	3	Yes	Fail
6 Oak Lane	11	INF	1500	256	2	Yes	Fail
4 Oakland Drive	1	CM	1500	330	3	Y	Fail
89 Paxton Road	5	CM	1500	336	3	Y	Fail
94 Paxton Road	1	CM	1500	226	2	y	Fail
22 Point Eastalee Drive	13		1500	330	3	Yes	Fail
34 Point Eastalee Drive	3	CM	1500	240	2	y	Fail
21 Rustic Lane	11	WHITEKNIGHT	EXIST 1000	330	3	Yes	Fail
12 Sherman Grove	4	cm	1500/1000	330	3	y	Fail
21 Shore Drive	6	Q4	1500	335.3	3	Y	Fail
64 Smithville Road	1	Presby	1500	330	3	y	Fail
100 Smithville Road	12	PUMP	1000/1000	335	3	Yes	Fail

Combined Address	TANK AGE	TYPE	TNKSIZE	CAPACITY	BDRMS	WELL	Failures
118 Smithville Road	12	PUMP	1000/1000	331	3	Yes	Fail
122 Smithville Road	13	PUMP	2500	341	3	Yes	Fail
128 Smithville Road	0	Presby	1500	330	3	Y	Fail
69 South Spencer Road	7	CM	1500	477	4	Yes	Fail
94 South Spencer Road	14	CM	1500	444	4	Yes	Fail
1 Terkanian Drive	2	CM	1500/1000	336	3	Y	Fail
4 Tom Casey Road	16	CM	1500	330	3	Yes	Fail
56 Valley Street	12	CM	1500	336	3	NO	Fail
1 West Avenue	13	INFLT	1500	262	2	Yes	Fail
2 Wilson Avenue	9	Presby	1500	220	2	Yes	Fail
71 Wilson Avenue	1	Elgen/sand	1500	246	2	y	Fail
117 Wilson Avenue	2	CM	1500/1000	344	3	Y	Fail
65 Wilson Street	11	CM	1000/1500	330	3	Yes	Fail
6 Woodbine Terrace	13	Dpusing	2500	630	3	Yes	Fail
7 Woodland Lane	5	CM/PUMP	2000/2	365	3	Y	Fail
20 G H Wilson Road							Fail
25 Hastings Road							Fail
11 Lake Avenue							Fail
27 Lake Avenue							Fail
102 Maple Street							Fail
103 Maple Street							Fail
1 Vine Street							Fail
39 Wilson Street							Fail

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SPENCER, MASSACHUSETTS

OCT 2018

Comprehensive Wastewater Management Plan

13927A

Phase 2 - Alternatives Identification & Screening

WRIGHT-PIERCE
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COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

FOR THE

TOWN OF SPENCER

OCTOBER 2018

PREPARED BY:

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TOWN OF SPENCER

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

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SECTION 1

INTRODUCTION

1.1 BACKGROUND INFORMATION

The Town of Spencer continues to analyze its current wastewater collection, treatment and disposal needs through its Comprehensive Wastewater Management Plan (CWMP). Approximately 40 percent of the residents of Spencer rely upon the Town's existing wastewater system to collect, transport, treat, and dispose of their wastewater at the Wastewater Treatment Facility (WWTF). The remaining residents, which reside outside of the sewered service area, rely on individual onsite wastewater disposal systems. The intent of the CWMP is to provide a wastewater management planning tool to guide the Town moving forward.

The *Phase 1 - Existing Conditions, Problem Identification and Needs Assessment* report was completed and submitted to the Massachusetts Department of Environmental Protection (MA DEP) on May 7, 2018. The Phase I report remains under review by MA DEP.

This report, entitled *Phase 2 Alternatives Identification and Screening*, presents the results of the second phase of the three-phase CWMP undertaken by the Town of Spencer to determine the viability of current wastewater disposal practices in non-sewered areas. In general, the intent of this phase of the CWMP is to identify and evaluate alternative wastewater solutions to address the Phase 1 "needs areas" use of individual on-site wastewater disposal systems.

The Town of Spencer continues its efforts to evaluate, update, and improve its wastewater collection system and treatment facilities to remain in compliance with its regulatory requirements. The Town was issued a draft National Pollutant Discharge Elimination System (NPDES) permit on February 23, 2018 by EPA with stringent limits to reduce phosphorus and nitrogen loadings from its effluent discharge to the Cranberry River.

1.2 PURPOSE AND SCOPE OF SERVICES

In October 2017, Wright-Pierce was retained by the Town to develop a CWMP. This document satisfies the Phase 2 requirements of the three phase CWMP process and is prepared in accordance with DEP's Guide to Comprehensive Wastewater Management Planning as outlined below:

- Phase 1: Assessed existing conditions, problem identification and needs assessment for the Town. The completed needs assessment determined areas with a "need for further study" in Phase 2;

- **Phase 2: Alternatives Identification and Screening. Identify and short-list appropriate means of wastewater management alternatives to address any "needs areas" identified in Phase 1. The analysis includes a review of technical, environmental, institutional and economic factors;** and

- Phase 3: Provide a detailed evaluation of alternatives short-listed in Phase 2 and development of recommended wastewater management plan.

1.3 SUMMARY OF PHASE 1 STUDY AREAS

Study areas were delineated and evaluated in Phase 1 and 24 of the 33 were estimated to be well suited for the continued use of on-site individual septic systems. Those 24 study areas were categorized as having Average, Low or Very Low wastewater disposal needs and were removed from further analysis.

The Phase 1 analysis also concluded that the Town has nine "needs areas" (Study Areas 11, 12, 13, 15, 16, 18, 20, 28 and 30) as shown in **Table 1-1** and in **Figure 5-7** in Phase 1 Section 5. These nine areas are the focus of the CWMP Phase 2 Alternatives Identification and Screening. Wastewater management alternatives for each area that were investigated include Innovative and Alternative (I/A) systems; local shared systems; sewer system extensions to Spencer's existing collection system; extensions to regional treatment and disposal facilities; and continued use of individual septic systems.

TABLE 1-1

AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name
11	Wire Village Road and Sugden Reservoir, north and west
12	Sugden Reservoir, south and east
13	Cooney Road
15	High Ridge Road
16	Lake Whittemore
18	Route 9/49, North
20	Route 49
28	Stiles Reservoir, West
30	Cranberry Meadow Pond

1.4 PUBLIC REVIEW

The report for each phase of the CWMP will be available for review and comment by all interested stakeholders. There will also be opportunity for the public and interested stakeholders to provide input for the CWMP during the planned public hearing. A public hearing will be held towards the completion of the Phase 3 CWMP.

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SECTION 2

WASTEWATER MANAGEMENT ALTERNATIVES

The Phase 1 CWMP identified nine areas (Study Areas 11, 12, 13, 15, 16, 18, 20, 28, and 30) with need for further evaluation. The intent of further evaluation is to determine if these nine study areas need a wastewater management solution different than the existing conventional individual septic systems. Wastewater alternatives were evaluated for treatment, collection and disposal for the needs areas include the following:

- Optimizing on-site conventional individual septic treatment systems,
- On-site Innovative and Alternative (I/A) treatment systems
- Decentralized treatment systems including shared conventional septic and I/A systems,
- Spencer collection system extensions
- Regional collection system alternatives
- Effluent disposal alternatives

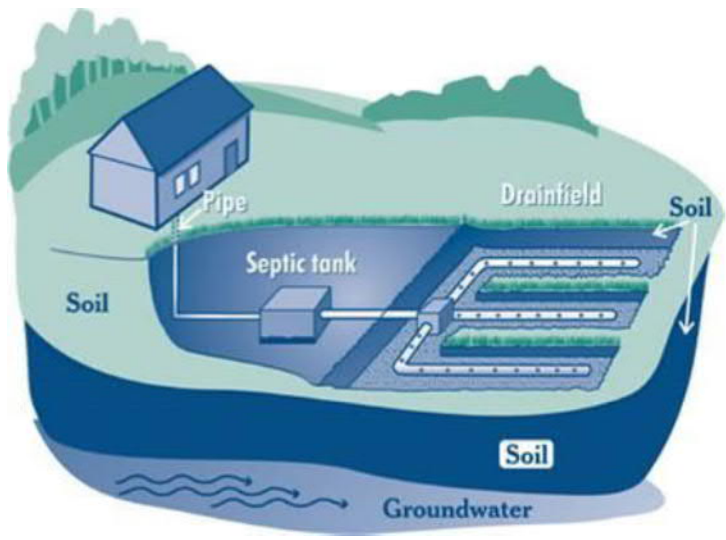
The above listed wastewater alternatives are generally described below and reviewed in detail in **Section 3**.

2.1 ON-SITE WASTEWATER TREATMENT SYSTEMS

Approximately 60 percent of the residents of the Town of Spencer use on-site wastewater disposal systems. On-site wastewater treatment systems are defined as wastewater from a non-sewered property that is collected, treated, and disposed of via subsurface groundwater recharge, typically within the boundaries of that property. There are two types of on-site systems typically used, including conventional septic systems and Innovative/Alternative (I/A) systems. Examples are shown in **Figures 2-1** and **2-2**.

2.1.1 Conventional Individual Septic Systems

FIGURE 2-1
TYPICAL SEPTIC SYSTEM SCHEMATIC



As shown in **Figure 2-1**, the standard components of an on-site septic system are a building sewer pipe, a septic tank, a distribution box, a leach field, and a reserve area. Wastewater exits the building through a building sewer pipe and enters a septic tank where solids, scum and sludge are separated from the liquid and retained within the tank. To improve scum and solids capture, septic tanks are typically designed with baffle walls or multi-compartments to increase wastewater detention time. Anaerobic bacteria contained within the constituents in the tank will digest organic materials. Depending on the influent waste concentration, a properly operating septic tank can typically produce an effluent with a BOD_5 from 140 to 200 mg/L and TSS from 50 to 90 mg/L, or approximately 50 to 55 percent removal. Individual septic systems only remove a small percentage of nutrients (nitrogen and phosphorus).

Following the septic tank, the partially treated wastewater flows through the distribution box and to the leach field where it is evenly distributed into the subsurface soils. To maximize its effectiveness, a leach field must be constructed in soils capable of accepting, dispersing, and properly treating the wastewater. Advantages of septic systems include systems being self-sufficient and a relatively inexpensive method for treating and disposing of wastewater.

Disadvantages of septic systems include not providing for nutrient (i.e. nitrogen or phosphorous), bacteria, or virus removal. In addition, the siting of conventional on-site systems can be difficult depending on the location. Areas with a shallow depth to groundwater or poorly draining soils can result in the need for a mounded system as shown in **Figure 2-2**, which may be considered aesthetically unattractive.

FIGURE 2-2
MOUNDED SEPTIC SYSTEM

2.1.1.1 Technical Considerations for Individual Septic Systems

Title 5 of The Massachusetts Environmental Code, 310 CMR 15.000, effective March 31, 1995 (last updated in January 2014), governs the subsurface disposal of sanitary wastewater through conventional on-site septic tanks and leach fields. Title 5 provides standard design requirements for basic treatment and subsurface disposal of sanitary wastewater as necessary for the minimum state requirements for the protection of public health, safety, welfare and the environment.

The regulations include standards for the design, siting, construction, upgrade and maintenance of on-site wastewater disposal systems and require appropriate means for the disposal of septage. A sample of the design requirements and standards are summarized below:

- Minimum horizontal separation distance between the components of the conventional on-site system and specified points of potential concern such as property lines, surface waters, wetlands, tributaries to surface water supplies, public wells, and private wells;
- Flow and lot size limitations in nitrogen sensitive areas;
- Minimal vertical separation from the bottom of the leach field to the top of the seasonally high groundwater table, typically 4 or 5 ft;
- Depth of naturally occurring pervious soil below the leach field and reserve area, typically 4 ft;
- Minimum depth to bedrock;
- Allowable soil percolation rates, typically less than 60 minutes per inch is acceptable; and
- Additional local Health Department regulations.

2.1.1.2 Optimum Operation of Existing Individual Septic Systems

As required per MassDEP guidelines, optimizing the performance of existing conventional on-site treatment systems must be considered as part of the evaluation. This includes optimizing septage management, maintenance, and repair and upgrade of on-site systems as necessary. If this alternative were to be selected, all presently developed lots in that study area would remain dependent on conventional individual septic systems.

Conventional septic systems can often be an efficient and effective means for wastewater treatment. A successful septic system installation is typically constructed in the proper site conditions and routinely maintained. Improper operation of septic systems can lead to system damage and failures resulting in public health hazards. In order to optimize conventional septic systems, it is required to perform periodic pumping to remove the excess buildup of solids, scum, and grease within the septic tank. Regular pumping should generally occur every 2 to 4 years and is dependent on use and intensity. If solids accumulate to the level of the septic tank outlet, solids can pass into the leach field and clog the piping and leach field. This clogging of the leach field will cause the system to fail. For households with a garbage disposal, it is typically recommended to have pumping occur on an annual basis as the system will incur additional solids loading.

Public education concerning the importance of proper maintenance of on-site wastewater disposal systems is essential for prolonging the life of individual septic systems. The Town should consider the implementation of a Septage Management Plan to help residents improve and maintain the operation of their septic systems. As a start, the Septage Management Plan should include such items as mandated septage pump-out frequencies and proper maintenance practices for conventional septic systems.

2.1.1.3 Title 5 Betterments

The Town of Spencer used to participate in the Commonwealth's Title 5 Betterments Help for Homeowners with Failed Septic Systems: The Community Septic Management Program. However, the Town no longer does. The program targets homeowners with failed septic systems for upgrade/repair to Title 5 systems or connection to an existing municipal sewer line. Funding for the program is through the State Revolving Fund (SRF) loan and Water Pollution Abatement Trust (WPAT). The homeowners pay their betterment through their taxes at a 5 percent interest rate.

2.1.2 Innovative/Alternative (I/A) Systems

Innovative/Alternative (I/A) wastewater treatment systems are recognized by MassDEP as providing at least the same level of treatment, and typically achieving better treatment, than a conventional septic system. In general, most of these I/A systems rely upon proven methods of treatment that have been used at WWTFs for a number of years. The new I/A systems are generally using the same concepts, except that they are now being applied to on-site systems in order to achieve an enhanced level of treatment.

There are a number of different types of I/A systems, which will be discussed in detail in the following sections. Most of the approved I/A systems utilize many basic components of a conventional septic system, including the septic tank and leach field. I/A systems are sometimes recommended for use in areas where the site is small and/or the ground water table is high. According to Title 5, "alternative systems, when properly designed, constructed, operated and maintained, may provide enhanced protection of public health, safety, welfare and the environment." I/A systems most often utilize the well-established "suspended growth" or "fixed-film" processes for the biological treatment of wastewater. In a suspended growth system, also known as "activated sludge system", the wastewater is mixed and aerated to provide constant contact between the bacteria and wastewater in the presence of oxygen. Fixed film treatment provides a surface in contact with the wastewater for the bacteria to grow on. The main drawbacks to I/A systems are typically the capital cost and level of operation and maintenance of the systems.

2.1.2.1 DEP I/A Approval Process

The MassDEP has a detailed approval process for prospective I/A technologies, including the following four categories that must be approved:

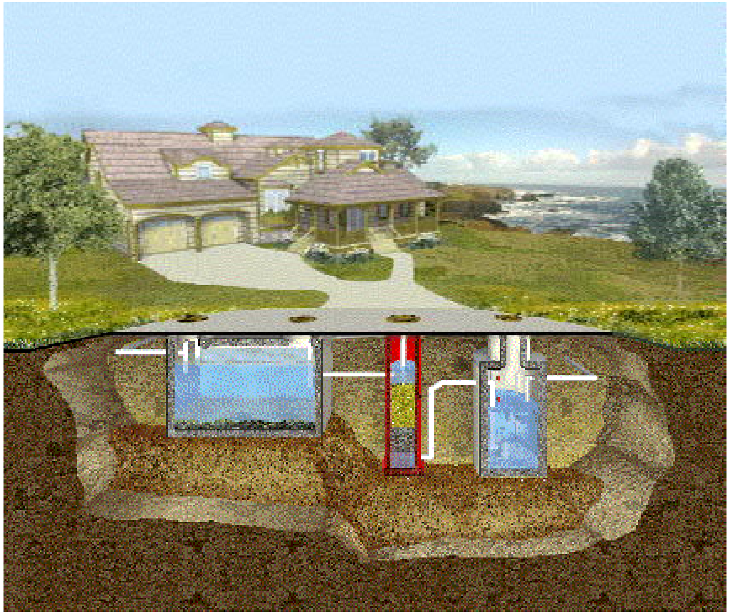
1. Approval for Piloting – I/A effluent must be connected to WWTF or a Title 5 septic system.
2. Provisional Approval – I/A system passed the piloting approval and is now tested in actual field conditions.
3. Certification for General Use – I/A system proven to provide same level of treatment as conventional systems.
4. Approval for Remedial Use – for rapid approval of an I/A technology that is needed to upgrade facilities currently served by a failed system.

A current list of the DEP approved I/A technologies is provided in **Appendix A**. The DEP approved on-site I/A technologies, which will be evaluated for use in each needs area in Spencer include Amphidrome™, Bioclere™, FAST®, RUCK®, and Enviro-Septic®.

2.1.2.2 Amphidrome System

As shown in **Figure 2-3**, the Amphidrome™ system is a submerged, attached-growth, sequencing bioreactor approved for general, provisional, and remedial use. The treatment process consists of an anoxic equalization tank, the Amphidrome™ reactor/sand filter, and clear well. Effluent from the anoxic tank flows downward through the sand filter, providing contact with the bacterial population adhering to the sand particles, and then flows into a clear well. From the clear well, the wastewater can be mixed with a supplemental carbon source and pumped through a second sand filter (included in the Amphidrome™ Plus process) for increased nitrogen removal. Liquid from the clear well is pumped back through the Amphidrome™ reactor/sand filter to backwash the filter and return liquid to the anoxic tank. After a series of cycles, the effluent is sent to a leach field for disposal.

FIGURE 2-3
AMPHIDROME™ SCHEMATIC

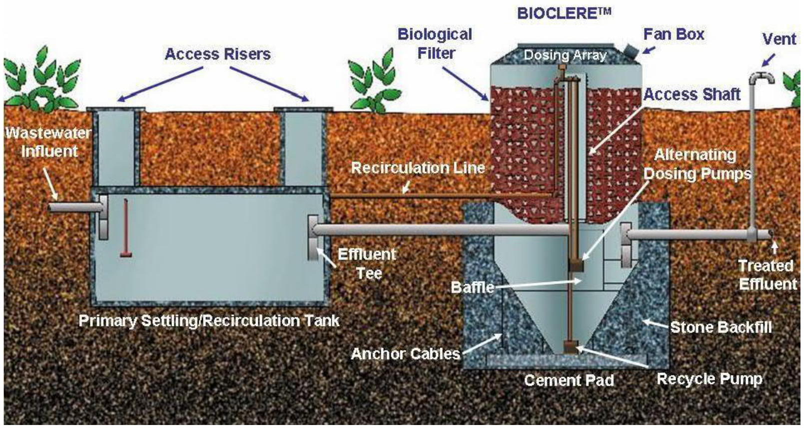


Regulated by the DEP, the Amphidrome™ process must meet effluent standard concentrations of 30 mg/L BOD_5 and 30 mg/L TSS. Effluent pH must be within the standard of 6 to 9. Similarly, effluent nitrogen concentrations shall not exceed 19 mg/L or 25 mg/L depending on the selected size and model of the system.

2.1.2.3 Bioclere™ System

The Bioclere™ system is a fixed film, modified trickling filter over a clarifier approved for general, provisional, and remedial use as shown in **Figure 2-4**. The treatment process consists of a traditional septic tank and the Bioclere™ unit. Effluent from the septic tank flows by gravity into a baffled chamber in the clarifier portion of the Bioclere™ unit. The wastewater is distributed by dosing pumps over the trickling filter media, where a biological film develops and provides the treatment. This process is a continuous cycle with the effluent being sent to a leach field.

FIGURE 2-4
BIOCLERE™ SCHEMATIC



Regulated by the DEP, the Bioclere™ system must meet effluent standard concentrations of 30 mg/L BOD_5 and 30 mg/L TSS. Effluent pH must be within the standard of 6 to 9. Similarly, effluent nitrogen concentrations shall not exceed 19 mg/L or 25 mg/L depending on the selected size and model of the system.

The Bioclere™ unit typically has a five-foot diameter footprint and is installed partially above-grade. Potential problems with the Bioclere™ system relate to the biology of the wastewater and the habits of the property owner. For example, excessive oil and grease may impact the system performance.

2.1.2.4 FAST® System

As shown in **Figure 2-5**, the single-home, Fixed Activated Sludge Treatment (FAST) system is a fixed film, aerated system utilizing a combination of attached and suspended growth that is approved for general, provisional, and remedial use. The FAST® treatment process consists of the FAST® unit installed within a two-compartment conventional septic tank. The first compartment is a primary settling zone, and the second is an aerobic biological zone.

FIGURE 2-5
FAST® SYSTEM

Regulated by the DEP, the FAST® system must meet effluent standard concentrations of 30 mg/L BOD_5 and 30 mg/L TSS. Similarly, effluent nitrogen concentrations shall not exceed 19 mg/L or 25 mg/L depending on the selected size and model of the system.

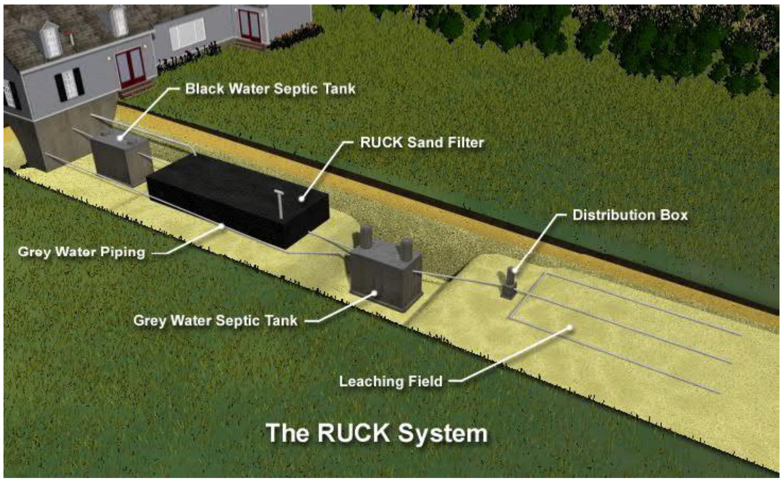
The FAST® system is relatively maintenance free following installation with the exception of recommended tank pumping. The system is relatively odorless and typically located entirely below-grade with the exception of a blower that can be housed up to 100 feet away from the system. This blower must operate continuously, increasing electricity usage and generating a noise source that may need to be mitigated.

2.1.2.5 RUCK® System

The RUCK® system is a passive nitrogen removal system approved for general use as shown in **Figure 2-6**. The RUCK® treatment process consists of two parallel septic tanks and the RUCK® filter. Influent wastewater is separated into blackwater and graywater by dual plumbing systems within the building unit. Blackwater consists of wastewater generated from toilets and kitchen sink drains equipped with garbage grinders. Graywater, also referred to as washwater, consists of the wastewater from showers, washing machines, dishwashers and other sinks. The blackwater flows into the blackwater septic tank where primary settling occurs. Effluent from the blackwater septic tank flows through the RUCK® sand filter and into the graywater septic tank where it is mixed with the graywater. The effluent from the graywater tank flows to a conventional leach field.

Regulated by DEP, the RUCK® system has the same effluent discharge limits as conventional septic systems.

FIGURE 2-6
RUCK® SCHEMATIC



2.1.2.6 Enviro-Septic® System

The Enviro-Septic® system consists of a conventional septic tank followed by the Enviro-Septic® leaching system approved for general and remedial use as shown in **Figure 2-7**. The septic tank effluent flows into the specially designed Enviro-Septic® pipes. The pipes are corrugated and perforated with a series of ridges at the peak of each corrugation and skimmers protruding on the interior designed to further capture grease and suspended solids from the effluent. The pipe is surrounded by a mat of randomly oriented, course plastic fibers providing additional treatment. Covering the mat is a geo-textile fabric which is surrounded by coarse sand.

The Enviro-Septic® system uses only natural processes for standard installations, eliminating the need for any pumps, filters, electricity, chemicals, or special maintenance. While this system is not approved to be used with a pressure distribution system, pumps and electricity may be necessary to lift the wastewater up to a mounded disposal field. A reduction in the leaching area required for this system is allowed by Title 5. This system has the same effluent discharge limits as conventional septic systems. However, a study completed in 2004 indicates that the Enviro-Septic® leaching system is capable of removing significant amounts of BOD and TSS as well as a significant amount of nitrogen and phosphorous when compared to a conventional on-site system.

FIGURE 2-7
ENVIRO-SEPTIC® SYSTEM

2.1.2.7 Phosphorous Removal

In order to remove phosphorous from wastewater, an additional step is typically added to the end of the treatment system (conventional or I/A). For I/A systems, it is typically an "add on" chemical precipitation treatment process where a chemical such as alum, PAC (poly aluminum chloride) or ferric chloride is added to precipitate out the phosphorus. Other types of treatment can also be considered, including biological phosphorous removal (BPR), dissolved air floatation (DAF) or ballasted flocculation. There are other filtering processes, such as the PhosRID™ add-on system, that can also remove phosphorous from septic tank effluent.

2.1.3 Advantages/Disadvantages of On-site Systems

A summary of the advantages and disadvantages of on-site (conventional individual septic and I/A) systems are summarized in **Table 2-1** and highlighted in the following sections.

2.1.3.1 Conventional Individual Septic Systems

Conventional individual septic systems are a cost-effective treatment technology for providing wastewater treatment and disposal for a household when properly sited. They can also provide excellent distribution of groundwater recharge at a local level. A major drawback of conventional septic systems is that they do not typically provide for nutrient (i.e., nitrogen or phosphorous) removal, which may not be adequate for the protection of public and/or private water supplies or surface waters. In addition, conventional septic systems do not provide reliable removal of potentially harmful bacteria or viruses (pathogens) from wastewater.

2.1.3.2 I/A Systems

I/A systems may be retrofitted into parcels of land that have small lot sizes, a high groundwater table, poor soils, and/or other constraints that may prevent an existing on-site system from meeting Title 5 requirements. In addition, I/A systems provide a higher level of treatment for removal of BOD, TSS, and nutrients compared with conventional septic systems. However, I/A systems typically have higher capital, operation and maintenance costs.

TABLE 2-1

ADVANTAGES/DISADVANTAGES OF ON-SITE WASTEWATER TREATMENT SYSTEMS

Method of Treatment	Advantages	Disadvantages
Conventional Individual Septic Systems	• Cost-effective for low flows • Local groundwater recharge • Basic treatment of wastewater	• Acceptable level of treatment and protection of public health and welfare of the environment only when properly sited • May not be adequate method for protection of public/private water supplies and surface waters from nutrients (nitrogen and phosphorous) • Difficult to site on small properties with poor soils and/or shallow depth to ledge and/or groundwater • Not capable of providing reliable removal of bacteria or viruses
I/A Systems	• Provides local groundwater recharge • Advanced treatment and bacteria, virus, and nutrient reduction • Less stringent disposal setbacks, easier to site • Reduction in the size of leach field, depth to high groundwater and required depth of pervious soils	• More expensive than conventional individual septic systems • Higher operation and maintenance costs • Less effective when serving a seasonal property

2.2 DECENTRALIZED SYSTEMS

Decentralized wastewater treatment systems are larger scale versions of on-site treatment systems and are usually divided into three categories:

1. Shared septic systems;
2. Shared I/A systems;
3. Small public or private treatment facilities designed to serve larger individual sites or small areas of a community (i.e., specific neighborhoods for example).

These systems require a small collection system to collect and transfer the wastewater from a specific area (a "needs area" for example) to the treatment and disposal site. Decentralized facilities that treat flows less than 10,000 gpd are designed, permitted and constructed under Title 5 regulations. Facilities that treat flow over 10,000 gpd require a Groundwater Discharge Permit (GWDP) and are regulated under the DEP "Small Treatment Facility Guidelines.

Decentralized wastewater treatment systems can provide solutions to areas where conventional systems are unsuitable, individual I/A systems are unfeasible, and connection to an existing wastewater collection system is not practical or economical. Benefits of these types of systems include local groundwater recharge and reduced infrastructure costs by keeping collection and treatment systems small compared to "centralized" systems.

2.2.1 Decentralized Treatment Technologies

2.2.1.1 Shared Septic Systems

Shared or cluster on-site treatment systems utilize similar septic tanks and leaching fields as compared to conventional systems, but on a larger scale. A shared system typically combines the wastewater from two or more properties into one single treatment system located within these properties or on a neutral site. Shared systems are allowed by Title 5 for upgrades of existing systems, new construction, and for increased flow to an existing system.

2.2.1.2 Shared Innovative/Alternative Systems

Any of the previously discussed I/A technologies, with the exception of the RUCK® system, are suitable for use with shared systems. The RUCK® system is not recommended for use as a shared system for Spencer due to its requirement for separate plumbing (separate black water and gray water) within each residence (system is considered cost prohibitive to the individual property/building owners due to plumbing separation needs).

Shared I/A systems can provide a more cost-effective treatment solution for properties or neighborhoods, which cannot support conventional Title 5 septic systems by dividing the increased cost of an I/A system among several users.

2.2.1.3 Small Wastewater Treatment Facilities

For the purposes of this CWMP, small wastewater treatment facilities (WWTFs) are considered to be facilities acceptable for use with a DEP Groundwater Discharge Permit (GWDP). This applies to facilities with flow in excess of 10,000 gpd. The Amphidrome™, Bioclere™, and FAST® I/A systems discussed previously are common alternatives for small wastewater treatment facilities. The layout and operation of these I/A systems is essentially the same, except on a larger scale. In addition, there are three additional technologies that are prevalent for use in small WWTFs including rotating biological contactors (RBCs), sequencing batch reactors (SBRs), and membrane bioreactors (MBRs). Each of these types of WWTF's will be discussed in the following sections.

2.2.1.4 Rotating Biological Contactors

As shown in **Figure 2-8**, rotating biological contactor (RBC) wastewater treatment systems have historically been the preferred biological treatment process for small WWTFs. RBCs are able to operate more efficiently than many other treatment processes and are capable of producing a high-quality effluent. The systems are quite reliable primarily due to the development of a large biological population during operation over a wide range of hydraulic and organic loading scenarios. The system is also able to adjust quickly to increases and decreases in the strength and volume of the influent wastewater flow.

RBCs consist of a series of typically circular polyethylene discs, mounted close together on a steel shaft within a tank. The tanks can either be installed within a building or outside with fiberglass covers. Typically, 40 percent of the disc media is submerged in the wastewater. In operation, the steel shafts are rotated to ensure a peripheral velocity of approximately 60 feet per minute creating an environment in which the disks alternately contact the biomass with the organic material in the wastewater and then with the atmosphere for absorption of oxygen. RBC systems also require pretreatment and secondary clarification to complete the treatment process, which can increase the size and cost of the facility.

FIGURE 2-8
RBC SYSTEM

The RBC units themselves do not require any regular use of chemicals to operate the facility. However, the other processes complimenting the RBC may or may not require chemicals depending on the degree of treatment required.

2.2.1.5 Sequencing Batch Reactors

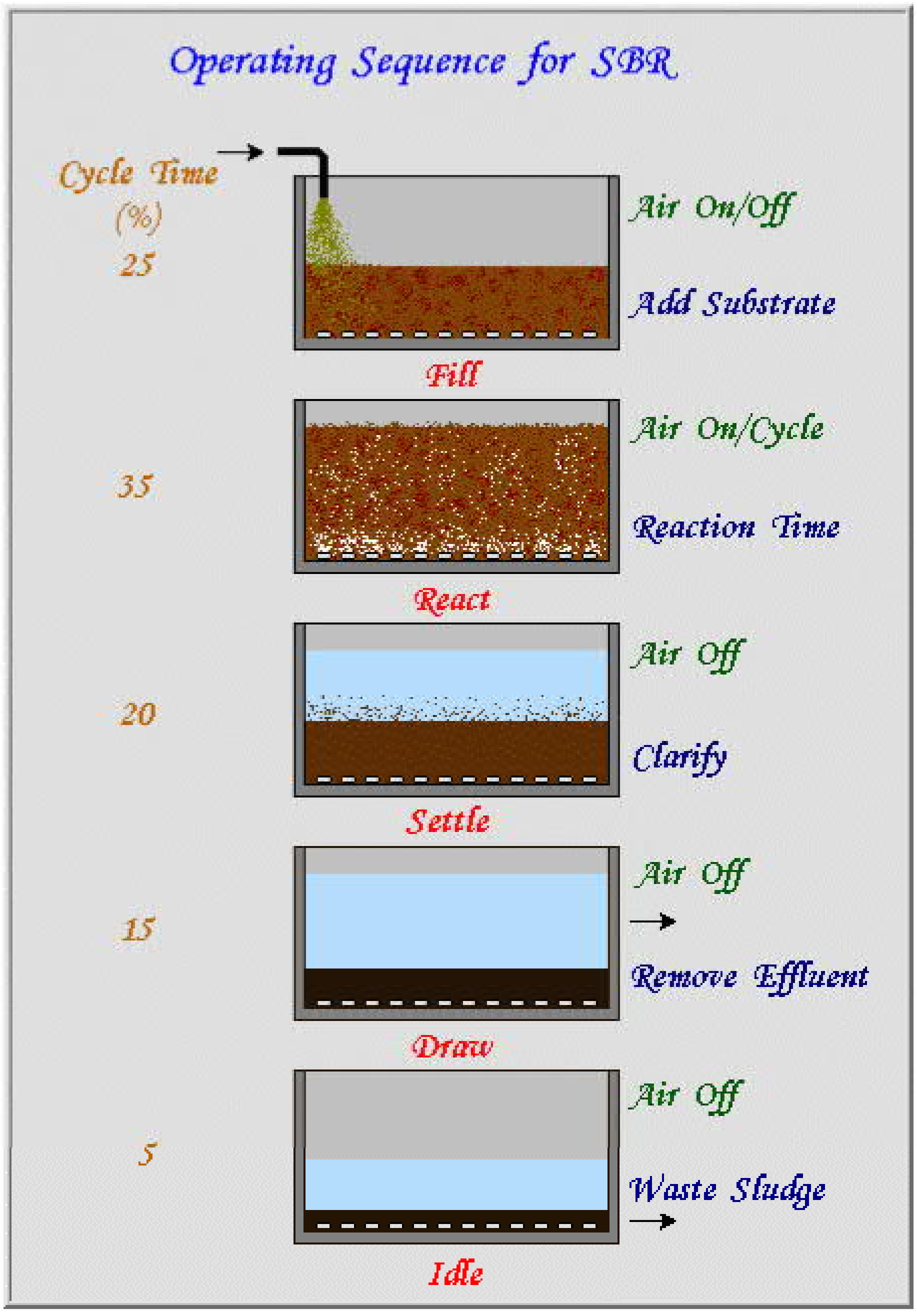
Sequencing batch reactor (SBR) wastewater treatment system is a modified activated sludge treatment process that utilizes a batch treatment cycle to perform the necessary steps for wastewater treatment. SBRs minimize the facility footprint by combining multiple treatment processes into one tank, thereby reducing the capital cost. The process incorporates the introduction of wastewater to a reactor, providing time for the necessary reactions to occur, and sequentially discharging a volume of treated effluent that is essential equal to the original volume of influent. An SBR is a well-established treatment process that is capable of producing a high-quality effluent, while operating over a wide range of hydraulic and organic loadings.

The SBR process typically operates as a five step "fill and draw" system, which is carried out in sequential order within a specific time period as shown in **Figure 2-9**. The steps are as follows:

1. Mix/Fill - to add preliminary treated wastewater to the reactor (under mixing);
2. React- to complete reactions initiated during Fill (under aeration)
3. Settle - to allow solids separation to occur
4. Decant - to remove treated and clarified wastewater from the reactor tank
5. Sludge Wasting/Idle - to remove excess sludge from the reactor tank

In a two-tank system, the general principal is to have one reactor continue to receive the influent flow while the other reactor proceeds through the React, Settle, Decant, and Sludge Wasting stages. SBRs have recently become highly automated, with the prevalent use of reliable Programmable Logic Controllers (PLCs), making the systems much more practical for use in small systems.

FIGURE 2-9
TYPICAL SBR SEQUENCE



2.2.1.6 Membrane Bioreactors

Membrane bioreactor (MBR) wastewater treatment systems utilize a combination of the conventional activated sludge treatment process and advanced filtration of the membrane units. MBRs are being used with more frequency for small wastewater treatment facilities. When operated correctly, MBRs are capable of producing a very high-quality effluent that can be used for reuse applications.

MBR systems utilize a bioreactor and a membrane unit as shown in **Figure 2-10**. MBRs are typically preceded by pretreatment, screening, and flow equalization and may be supplemented with disinfection. The bioreactor consists of several baffled zones or even separate tanks that make up the activated sludge process, which typically uses aerobic suspended growth to separate treated wastewater from the suspended solids (active biomass). The treated effluent is drawn through the membrane by a vacuum, filtering out the suspended solids. The membranes are essentially microfilters that come in two main designs, flat-plate and hollow-fiber, which is shown in **Figure 2-11**. The membrane microfiltration units can be immersed within the bioreactor or located in a separate unit. When they are located in a separate unit, the separated suspended solids are recirculated into the bioreactor. The membrane units are continuously scoured with air bubbles to prevent membrane clogging and fouling.

MBR systems have the advantage of producing a very high-quality effluent without the need for several additional processes. This allows them to have a relatively small facility footprint that can be a combination of above and below grade components. The effluent quality is such that it can, and has been used for wastewater reuse applications. MBRs can also be installed as a phased process where additional membrane modules can be added to the process as flows and loads dictate. However, MBRs typically include higher capital costs, potential high cost of membrane replacement, and higher energy costs.

FIGURE 2-11
MBR SYSTEM SCHEMATIC

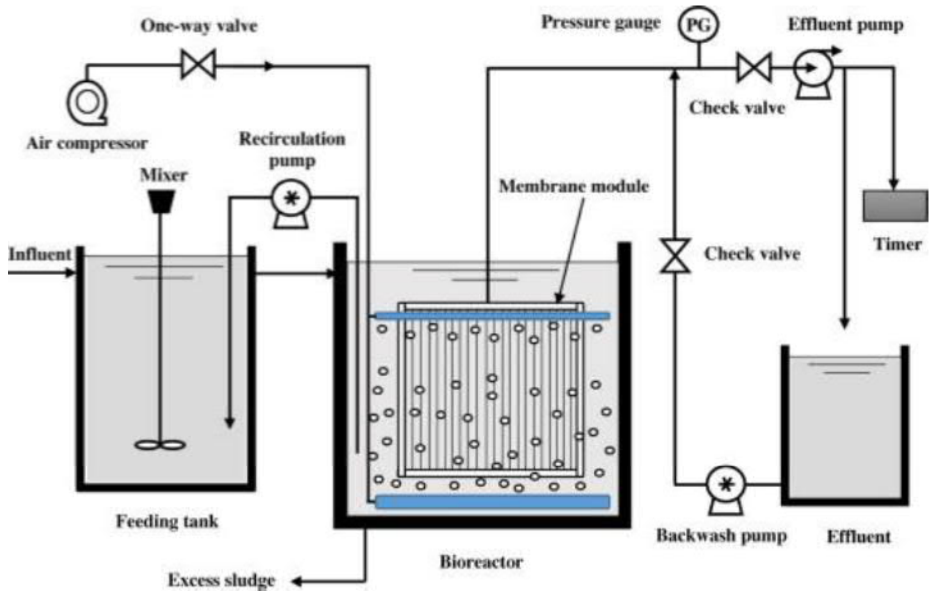


FIGURE 2-10
HOLLOW-FIBER MEMBRANE UNITS

2.2.1.7 Operation and Maintenance Requirements

In accordance with "Operation and Maintenance and Pretreatment Standards for Wastewater Treatment Works and Indirect Discharges" (314 CMR 12.00), the permittee bears the ultimate responsibility of providing for the proper operation and maintenance of the permitted WWTF. The permittee, whether public or private, must have a WWTF Operator who is certified in accordance with the "Rules and Regulations for Certification of Operators of Wastewater Treatment Facilities." (275 CMR 2.00) The licensed operator may be part-time or full-time depending on the size of the system and its chosen technology.

The treatment facility operator is typically present at the facility approximately two hours per day, five days per week. In addition to routine system maintenance, the operator is required to record the daily influent and effluent flow as well as several other parameters. Once a month, the operator is required to collect samples to determine if the facility is in compliance with its GWDP. A monthly inspection report including the results of the sampling and daily flow analysis must be submitted to the DEP and local Health Department.

Small WWTFs are required to include an automatic transfer switch and standby generator that is adequate to power the entire facility in the event of a power failure. The operator is also “on call” and must respond to alarms at the facility, typically through an electronic auto-dial telephone or paging system.

2.2.1.8 Permitting and Regulatory Requirements

As mentioned above, small WWTFs are considered to be decentralized facilities with flow in excess of 10,000 gpd. These facilities are regulated by the MassDEP. The majority of technical standards and design guidance can be found in the "Guidelines for the Design, Construction, Operation, and Maintenance of Small Wastewater Treatment Facilities with Land Disposal." (also known as the Small Treatment Facility Guidelines). The regulations that govern small WWTFs are primarily the Massachusetts Groundwater Discharge Permit Program (314 CMR 5.00) and the Massachusetts Groundwater Quality Standards (314 CMR 6.00).

The prevalent permit issued by DEP for these systems is the Groundwater Discharge Permit (GWDP). DEP has an initiative to retain local groundwater recharge, and the GWDP process allows for the effluent to recharge the local aquifer.

There may be some applications, especially in nutrient sensitive areas, where a GWDP could be required by DEP for small WWTF's that discharge less than 10,000 gpd. An engineering report detailing the proposed new or upgraded facilities must be submitted along with: plans for the collection, treatment and effluent disposal components of the facility; a hydrogeologic study of the disposal and surrounding area; a groundwater monitoring plan; and a statement by a Registered Professional Engineer that the plans and specifications have been prepared in accordance with 314 CMR 5.00.

2.2.2 Existing Small Wastewater Treatment Facilities

There are currently no areas within the Town of Spencer that are serviced by small private wastewater treatment facilities.

2.2.3 Decentralized Systems Advantages/Disadvantages

There are several advantages and disadvantages to a decentralized wastewater treatment system as listed in **Table 2-2**. In general, decentralized systems can provide relief for areas with urgent wastewater needs, as well as provide for local groundwater recharge. In particular, I/A systems and small WWTF's can be designed to provide an enhanced level of treatment. The negative aspects of decentralized systems include the potential difficulty in siting the systems or facilities due to the need for a localized site with adequate site conditions (emphasis on effluent disposal). These systems may also have high capital and operation and maintenance costs. In constructing decentralized facilities, they often are not large enough to develop an "economy of scale" for the equipment. Therefore, the cost per gallon is higher than for a larger centralized facility.

TABLE 2-2

ADVANTAGES/DISADVANTAGES OF DECENTRALIZED WASTEWATER TREATMENT SYSTEMS

Method of Treatment	Advantages	Disadvantages
Shared Septic Systems	• Cost-effective for low flows • Local groundwater recharge • Basic treatment of wastewater • Minimal operation and maintenance	• Acceptable level of treatment and protection of public health and welfare of the environment only when properly sited • May not be adequate method for protection of public/private water supplies and surface waters from nutrients • Can be difficult to site on properties with poor soils and/or shallow depth to ledge and/or groundwater • Not capable of providing reliable removal of bacteria or viruses
Shared I/A Systems	• Provides local groundwater recharge • Advanced treatment and bacteria, virus, and nutrient removal • Less stringent disposal setbacks, easier to site	• More expensive than shared Septic systems • High operation and maintenance demands/costs • Less effective when serving seasonal properties
Small Wastewater Treatment Facilities	• Provides local groundwater recharge • Advanced treatment and bacteria, virus, and nutrient removal • Less stringent disposal setbacks, easier to site	• Significantly more expensive than cluster Septic systems • Higher operation and maintenance demands/costs • Less effective when serving seasonal properties, although better than shared I/A systems

2.3 WASTEWATER COLLECTION SYSTEMS SOLUTIONS

Extending the Town of Spencer's municipal collection system is a possible solution that was evaluated for each of the needs areas. Connection to the Town's municipal collection system could prove beneficial where individual septic, I/A systems, or decentralized facilities are not feasible. The benefits of connecting to the Town's existing municipal collection system are described in the following sections.

2.3.1 Connecting to Town of Spencer Municipal Wastewater System

The Town of Spencer WWTF treats wastewater from approximately 40 percent of the Town's residents. The existing collection system could be extended to connect properties that currently have on-site treatment systems. However, Study Areas 28 and 30 are located a significant distance from the existing sewer system and WWTF, and as such, due to the length of new sewer, it might not be economically feasible to connect to Spencer's collection system. Study Areas 11, 12, 13, 15, 16, 18, and 20 are in closer proximity to the existing collection system and this may be a feasible option. Depending on the depth of the existing collection system and the local topography, sewer collection system expansion may include gravity sewers, force mains, low pressure systems or a combination of these types of systems.

2.3.2 Permitting and Regulatory Requirements

The Town may need to obtain permits associated with extension of the existing collection system, including a DEP Sewer Extension Permit. The Town may need to obtain easements and property depending on where the proposed sewer system extension is located. Other potential permits include, the Massachusetts Historical Commission, the U.S. Army Corps of Engineers, MEPA, and other regulatory agencies.

The Massachusetts Environmental Policy Act (MEPA) 301 CMR 11.00 provides the opportunity for public review of the potential environmental impacts of a project. The MEPA review process has established specific thresholds, which identify categories of potential impacts. Review is required when one or more review thresholds are triggered. A review threshold that is triggered specifies whether MEPA review shall consist of an Environmental Notification Form (ENF) and potentially an Environmental Impact Report (EIR).

2.3.3 Advantages/Disadvantages

There are a number of advantages and disadvantages of connecting a needs area to the Town's existing wastewater collection system as listed in **Table 2-3**. Connection to the Town's existing collection system would provide a higher level of treatment of wastewater for the needs areas at the existing centralized WWTF. However, the economics and overall feasibility must be evaluated for each area as it would include the cost to construct new piping and pumping stations.

TABLE 2-3

ADVANTAGES/DISADVANTAGES OF COLLECTION SYSTEM EXTENSIONS

Collection System Alternative	Advantages	Disadvantages
Extending Town of Spencer's Collection System	• Allows the Town to have control over the Town's wastewater • Avoids maintenance issues with decentralized treatment systems • Less dependent on-site conditions • Costs associated with a decentralized system	• Could shift the water balance between watershed sub-basins • Additional sewers and possibly pump stations for the Town to maintain

2.4 COLLECTION SYSTEM ALTERNATIVES

A collection system is a network of pipes, pump stations, and appurtenances that convey wastewater from its point of origin to a point of treatment and disposal. The collection system also includes the pipe from the building to the public system in the street or easement, which is called the "service connection or service lateral". The service connection is usually the responsibility of the property owner.

The Town of Spencer's collection system dates back as far as the year 1891 and currently consists of 22 miles of pipeline. 40 percent of the current population in the Town is sewered. The collection system alternatives available to Spencer include all components from the wastewater source to a treatment facility. Some of the publicly-owned collection system alternatives include components which may be privately maintained. Collection system alternatives include conventional, low pressure (septic tank effluent pump or grinder pump), vacuum, and small diameter gravity systems. These types of systems are detailed in the following sections.

2.4.1 Conventional Collection and Pumping Systems

In traditional gravity systems, wastewater flows by gravity from the building through the service connection and through a piping network to a common collection point (typically a topographic low point). At this location, a central pumping station maybe used to pump the wastewater to another downstream stretch of gravity pipe or to transport the wastewater to its final destination, typically a WWTF, for treatment and disposal.

Gravity sewers are normally constructed of polyvinyl chloride (PVC), ductile iron, or concrete pipe materials. Extremely flat or hilly terrain and areas with high groundwater and/or ledge may pose problems to gravity sewer installation. These conditions often result in increasingly deep excavations, increased cost, or the need for intermediate pump stations.

Wastewater pump stations are typically located at low elevations in the collection system to collect and pump the wastewater to the next high point in the collection system or to a WWTF. Pump stations can be expensive and represent a considerable O&M expense for the community.

In general, conventional collection systems are relatively simple to maintain, reliable, and can be sized to provide for future capacity.

2.4.2 Low-Pressure Sewers

A low-pressure sewer system includes an individual pumping system, which conveys wastewater generated from a building into the low-pressure piping network where it is transported to a central location for re-pumping or treatment. Specifically, each building uses either an effluent pump in a septic tank (STEP) or a grinder pump to discharge to the sewer main. The piping network is comprised of small-diameter pipe, typically buried just below the frost line (generally 4-6 feet deep). Typical pipe diameters are 1.5 to 6 inches for the mains and 1.25 to 1.5 inches for individual building services. The pressure main and service pipe are generally manufactured from PVC or high-density polyethylene (HDPE).

Low-pressure systems have proven to be viable alternatives especially in low-lying areas with high groundwater, or shallow depth to bedrock. Low-pressure sewer systems have also proven reliable in extremely hilly areas or waterfront areas where deep excavations and extensive dewatering could be problematic.

Some problematic issues for this type of system is ownership of the components located on private property, the potential need for easements, limitations on future expansion, pumping system compatibility, operation during power outages, and delineation of O&M responsibilities. Typically, each user would own and operate the pumping system (schedule maintenance as needed).

2.4.2.1 Septic Tank and Effluent Pump (STEP) Type

STEP systems are a variation of the low-pressure collection system that includes septic tank pretreatment. On each property, there is a septic tank and septic tank effluent pump. Depending on the site layout, the septic tank can be the existing structure or it may be entirely new. The septic tank of a STEP system captures the solids, grit, grease, and stringy material that could cause problems in pumping and conveyance through the small diameter piping. STEP systems can be used to convey wastewater to a treatment facility or to a common subsurface leaching system.

Periodic removal of the sludge and grease collected within the septic tank by a licensed septage hauler is essential to the long-term performance of this type of system.

Standby power-property owners typically do not use water systems during a power outage, hence not requiring back-up power. Some property owners install their own backup power system to provide uninterrupted service during a power outage. Some municipalities use small portable generators that are transported through a neighborhood served by the STEP system.

2.4.2.2 Grinder Pump Type

A grinder pump system, as shown in **Figure 2-12**, is another variation of the low-pressure collection system which utilizes a grinder pump. The grinder pump macerates the solids present in the raw wastewater and discharges the wastewater to a low-pressure piping system. Although the grinder pumps can be installed indoors, they are generally located outside so that the service connection can be easily made with minimal alterations to the indoor plumbing. An advantage of these systems is that there is no need for pumping of a STEP tank for maintenance.

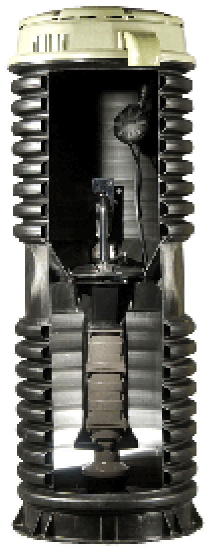
Grinder pumps which serve individual buildings are usually operated by 1 horsepower motors. While standby power is easily provided to a single common pumping station in a treatment system, it is more difficult to keep individual pumps operating during an extended power outage. In most cases, property owners are on their own to provide back-up power, or they can do as noted in the above STEP section.

For Spencer, there is currently one Low-Pressure Sewer System in operation. It services the homes on Roy Drive.

2.4.3 Vacuum Systems

Like the low-pressure system, a vacuum system can be used where conventional sewer systems are impractical and not economically feasible. Vacuum sewers are limited by available lift and are therefore, better suited to flat terrain. Although not prevalent in New England, vacuum systems are currently being used in Provincetown, areas of Barnstable and on Plum Island in Newbury/Newburyport.

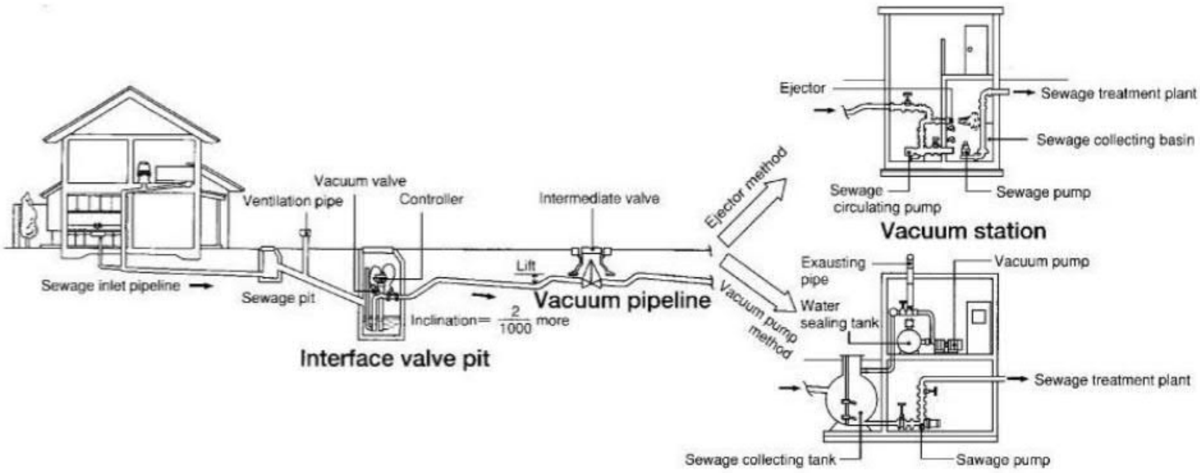
FIGURE 2-12
TYPICAL LOW-PRESSURE GRINDER PUMP SYSTEM (E-ONE DESIGN)



Vacuum sewers employ a central vacuum source. The collection mains are typically constructed of PVC or HDPE ranging in size from 4 to 10 inches in diameter. Vacuum systems can be buried at shallow depths (2 - 4 feet) as the high velocities (15 to 18 feet per second) attained by the system typically keep the lines from freezing. The collection mains can follow the profile of the ground provided that modest elevation changes are maintained.

The vacuum collection system as shown in **Figure 2-13** consists of three main components: (1) services, (2) wastewater collection mains, and (3) the vacuum station. After a preset time interval, the vacuum valve located on each property closes and a slug of wastewater is propelled into the collection main. Numerous cycles eventually propel the wastewater to a collection tank located at a central vacuum station. Buffer tanks are also used as holding tanks to collect and regulate large flows such as those flows from apartment buildings, schools and other large users.

FIGURE 2-13
TYPICAL VACUUM SYSTEM SCHEMATIC



This technology is not as widely used as the other low-pressure type systems noted. It may be subject to a greater number of problems than systems that have been in use for a longer period of time. Vacuum sewers have repeatedly been subject to increased operations and maintenance issues as compared to low pressure type systems and are not well-suited to cold climate applications.

2.4.4 Small Diameter Gravity Sewers

Small diameter gravity collection systems include a septic tank on the building service connection prior to discharge to the sewer main. The septic tank eliminates grit, grease and other troublesome solids which might cause obstructions allowing the collection system to be constructed with smaller pipe sizes. Other than pipe size, these systems are configured similar to conventional gravity systems requiring straight runs between manholes to convey wastewater directly to a WWTF or to a low point where a pump station is typically sited. Solids settlement is less of a concern as compared to a conventional gravity system, but periodic pumping of the individual septic tanks is required to remove sludge, scum and grease.

Small diameter gravity collection systems rely on gravity to transport the effluent, but they are often designed to be laid at variable grades throughout the system. The variable grade of the pipe creates low points in the system. The effluent backs up at these low points until pressure is created and the effluent is then forced through the pipe. This can be beneficial in extremely flat areas where the excavation would need to be particularly deep if the pipe was laid at a continuous downward slope. Therefore, construction costs are often reduced, because excavation can be minimized due to the fact that the sewer may be laid to follow the topography more closely than with conventional gravity sewers. Designers must still be cognizant of infiltration and inflow and ultimate growth in sizing these systems, since these systems are not amenable to future connections.

2.4.5 Collection System Advantages/Disadvantages

A summary of the advantages and disadvantages of the collection system alternatives including. conventional, low pressure (STEP and grinder pump), vacuum, and small diameter gravity systems are presented in **Table 2-4**. These collection system alternatives will be evaluated as part of the alternatives analysis.

2.5 EFFLUENT DISPOSAL ALTERNATIVES

Effluent from wastewater treatment facilities has been typically discharged to a surface water body, be it a river, or ocean, or into groundwater. Surface water and groundwater effluent disposal alternatives are both being presented in the following paragraphs to address the available disposal alternatives.

2.5.1 Surface Water Effluent Disposal

The Town of Spencer has an approved NPDES permit (#MA0100919) to discharge highly treated effluent from its WWTF to the Cranberry River. A draft permit was issued by EPA with more stringent phosphorous limits and a nitrogen target benchmark.

TABLE 2-4

ADVANTAGES/DISADVANTAGES OF COLLECTION SYSTEM ALTERNATIVES

Technology	Advantage	Disadvantage
Conventional Gravity Collection System	• Ease of long-term maintenance • Power outages handled with centralized backup power at pump station • Provides excess capacity for future connections • Centralized solids management • Lowest energy use • Limited need for service connection easements	• Deep excavations disrupt traffic and private property • Not all properties can easily be served by gravity connections (pumps needed for low-lying buildings) • Stream, road and railroad crossings more expensive • Less amenable to narrow streets • Flat areas require pump stations • Higher capital costs
Low Pressure Sewer System (Grinder and STEP)	• Potential for lower capital cost • Easier construction due to shallower excavation • Environmental disruption reduced • Suitable for challenging terrain • Reduces stream, road and railroad crossing effort • More amenable to narrow streets	• Increased service call effort • Pumps located on each property • Electrical costs paid by property owner • Ownership and O&M responsibility are shared by many entities • Easements/Access agreements may be required • Need to pump tank for STEP system • Power outage challenges
Vacuum Sewer System	• Lower O&M costs • Easier construction due to shallow excavation • Environmental disruption reduced • Duration of construction reduced	• Limited number of vendors and service providers • Limited to flat terrain • Maintenance concerns with valves and pipe plugging • Construction and design costs higher than low pressure systems • Modifications to interior plumbing is required
Small Diameter Gravity Sewers	• Lower O&M costs • Lower construction costs	• Septic tanks still need to be pumped out routinely • Not amendable to future growth • Pipe plugging Concerns

2.5.2 Groundwater Effluent Disposal Technologies

Groundwater effluent disposal systems typically discharge treated wastewater either at the ground surface or below the surface. The goal of both disposal systems is to get the effluent to percolate down through the soil to the groundwater below eventually being carried away by the regional groundwater flow. Surface disposal systems include spray irrigation and rapid infiltration basins. Subsurface disposal systems include leaching facilities (trenches, beds or chambers), wicks, and drip irrigation. Descriptions of each of these types of effluent disposal systems are presented in the following sections.

The relative weighting of advantages and disadvantages for a given disposal technology is best determined by considering the features of the specific site. Once potential effluent disposal sites are identified, the best pairing of sites and technologies can be addressed in the analysis of alternatives if necessary. The pairing depends on both the site and the disposal technology.

The physical characteristics of a site, which need to be evaluated to determine its suitability, include size, topography, permeability of the soils, and depth to groundwater. All effluent disposal sites require proper separation distance (setbacks) from buildings, property boundaries, water supplies and other sensitive environmental receptors. Technology attributes include the potential for additional nutrient removal and the effluent loading rate or the volume that can be applied per square foot of area.

2.5.2.1 Subsurface Leaching

A soil adsorption system typically includes a networking of rigid solid and perforated piping buried below grade, which distributes treated effluent into surrounding gravel trenches or beds that provide dispersal of effluent over an area at a specific dosing rate. If well operated and maintained, the leaching system can last for 20 years or longer. Land must be available for the active or "primary" disposal area as well as an equivalent area of land earmarked as "reserve", which can be developed as an effluent disposal leach field in the event of a failure to the primary disposal area.

These systems are designed to operate year-round and work best with regular dosing of treated effluent. The entire disposal system is buried, which eliminates the chance of human contact, and can be located under public parks, sports fields, or under parking lots with proper design and site conditions.

2.5.2.2 Drip Irrigation

Drip irrigation is a subsurface installation of flexible small-diameter plastic piping that provides pressure dosing of effluent to the soil. Loading rates are comparable to subsurface leaching fields because the concepts are similar. This technology that has been tested at the Massachusetts Alternative Septic System Test Center on Cape Cod and has received "general use" approval. Drip irrigation systems are designed to drain in between doses to allow for year-round operation. These systems require a pressurized application; usually a pump station is located near the disposal system and requires filtration of the effluent prior to disposal to avoid plugging.

These systems can be sited under parks, sports fields, or parking lots. The flexible hosing can follow surface contours and avoid horizontal obstructions like trees and landscaping and can be installed in some wooded settings. The drip tubing can be installed in the soil through narrow trenching or a single blade plow. It is possible to install a system in a matter of days and avoid tearing up turf. The low-cost materials and easy installation translate into a relatively low capital cost. Due to the lack of long-term experience with the technology, DEP may require 100 percent back-up with conventional subsurface leaching technology.

2.5.2.3 Rapid Infiltration

Rapid infiltration, also referred to as open sand beds or rapid infiltration basins (RIBs), can operate at high loading rates on sites with good permeability and significant depth to groundwater. Year-round application is routine. The reduced footprint compared with other technologies often outweighs the drawback that the site can only be used for RIBs. A smaller disposal footprint also broadens the number of parcels that could be used as effluent disposal sites. The reduced footprint sometimes allows a single site to provide both treatment and disposal, which is less likely for other systems. Locating the treatment and disposal processes on the same site minimizes the transport costs.

Rapid infiltration systems require fencing around the perimeter to keep out wildlife and humans. The maintenance of the system includes periodic solids removal from the application surface (scarifying) and infrequent weeding. Rapid infiltration beds are considered less aesthetically pleasing than other alternatives and may not be recommended in densely populated areas.

2.5.2.4 Spray Irrigation

Landscape spray irrigation is another example of technology that can be used on a site with another use. Effluent can be applied to parks, sports fields, golf courses, or landscaping. All of these activities are associated with human interaction and require meeting the effluent reuse guidelines (US EPA Reclaimed Water Guidelines), which usually adds to the cost of wastewater treatment. Irrigation is certainly restricted to seasonal operation which requires either winter storage or a complementary effluent disposal system. This technique uses moderate application rates.

2.5.2.5 Wicks

The fundamental goal of effluent disposal is to effectively introduce effluent into the groundwater. The type of soil and the depth to groundwater affect how fast surface applied effluent takes to reach the groundwater table. Wicks are the most space-efficient method of disposal because they disperse effluent both horizontally and vertically. A wick is a vertical cylinder of highly permeable material that provides an efficient path for effluent to travel from the surface point of discharge to the groundwater. This allows for very high loading rates on a very small footprint. Another advantage to wicks is the ability to bypass less permeable soil at the surface to more pervious soil below.

This technology has a relatively limited track record and, to date, DEP has taken a very conservative approach to permitting wick disposal systems. First, the design must include standby wicks to provide more than 100 percent disposal capacity, so that if a wick were to fail or be overloaded, another wick can be brought online immediately. Second, there must be another permitted disposal location that could be developed with a traditional system if the wicks fail prematurely. Extensive hydrogeologic evaluations are required to determine the suitability of the soil for wicks.

While other technologies need 3 to 5 acres to distribute 100,000 gpd of effluent for example, the same volume could perhaps be handled by wicks on a site as small as one tenth of an acre. Wicks are not very intrusive. Typically, the only above-grade components include an access vault and cover. This technology is best considered after an unsuccessful search for sites large enough for more traditional technologies. There have been varied results in the pilot testing for wick disposal; and there are some operations and maintenance concerns.

2.5.2.6 Combining Technologies

It is possible to combine technologies, such as year-round subsurface application below golf course fairways and seasonal spray irrigation of the remainder on the course. It is also possible to install wicks within rapid infiltration basins to maximize the application area.

2.5.3 Effluent Disposal as Part of the Treatment Process

Utilizing the disposal system as part of the treatment process is worth consideration. Specific rapid infiltration bed loading cycles can provide additional nutrient removal. Spray irrigation of effluent removes additional phosphorus, nitrogen, and most other parameters, providing effective effluent "polishing". While such polishing is well documented, DEP may not give credit for the additional pollutant removal because it is difficult to monitor and quantify.

2.5.4 Effluent Reuse

Effluent reuse is defined as reclaimed water that has been treated at a WWTF to an advanced degree and used again for various applications. Reuse of treated wastewater effluent typically is associated with the application and reuse of water for irrigation. Reuse also applies to discharging treated wastewater into the ground to recharge the aquifer used for supplying drinking water.

The MassDEP issued Interim Guidelines on Reclaimed Water (Reuse) on January 3, 2000 and revised the guidelines and combined such with the Groundwater Discharge Permit process in 2009. The DEP has initially limited the use of reclaimed water to spray irrigating golf courses, landscaping, artificially recharging aquifers and toilet flushing. The artificial recharging of aquifers is only permitted in watershed basins and sub-basins which are stressed water resource areas where it is necessary to replenish stream flow, enhance the productivity and capacity of an aquifer, and/or improve upon or mitigate water quality problems. The water quality criteria for the treated wastewater are extremely rigorous, requiring that reclaimed water be virtually pathogen and contaminant free. Effluent reuse is often not a viable alternative due to financial constraints associated with the enhanced treatment requirements.

2.5.5 Groundwater Effluent Disposal Advantages/Disadvantages

The alternatives for groundwater disposal are dependent on the conditions of the proposed discharge site. The recommended alternative should be based on the proposed wastewater effluent flows and the required site conditions of the effluent disposal technology. **Table 2-5** includes a summary of advantages and disadvantages of groundwater effluent disposal alternatives.

TABLE 2-5

ADVANTAGES/DISADVANTAGES OF GROUNDWATER EFFLUENT DISPOSAL SYSTEMS

Technology	Advantage	Disadvantage
Subsurface Leaching	• Minimal operation and maintenance when operated properly • Suitable for decentralized alternatives when small quantities of wastewater must be disposed	• Lowest application rates • Poorly draining soils not suitable
Drip Irrigation	• Suitable for installation under parks, sports fields, or parking lots • Relatively low capital cost • Can be routed around existing features (trees, etc.)	• Requires pumping system • Lower discharge rates • Freeze protection/measures necessary
Rapid Infiltration	• Good for large systems • Moderate application rates	• Well-drained soils required • Significant separation from groundwater required for mounding • Aesthetics and other "neighbor" concerns
Spray Irrigation	• Additional nutrient removal • Moderate application rates • Possibility of dual use	• Seasonal operation only • Dual-use applications often require meeting reuse standards
Wicks	• Most space efficient disposal technology • Bypass impervious soils to reach well drained soils	• Well-drained soils in disposal layer required • Loading test for permitting required • More redundancy required than other technologies • Regular monitoring of system operation • Varying results in pilot testing • Operations and maintenance concerns

2.6 WATERSHED-BASED MANAGEMENT TECHNIQUES

Wastewater management alternatives such as water conservation initiatives are available to the Town of Spencer. These techniques provide mechanisms for optimizing Spencer's current water system, wastewater collection and treatment system, and on-site systems. These alternatives may also provide effective management in the study areas that are determined to be well suited for on-site systems. These techniques are not always applicable in areas where the site conditions do not allow for proper on-site treatment.

2.6.1 Conservation Initiatives

Identifying techniques for wastewater flow and load reduction is an important part of a CWMP. The reduction in wastewater volume allows for minimized collection, pumping, treatment, and effluent disposal processes and infrastructure. Wastewater reduction starts at the source. Changing water use habits typically results in a decrease in actual wastewater flows. Water conservation may increase the strength of the wastewater and hence the amount of treatment required.

One of the ways to reduce wastewater generation is to implement water conservation measures to reduce water use. Water conservation for Spencer starts with comprehensive planning. A variety of water conservation alternatives have been presented by the Executive of Energy and Environmental Affairs (EOEEA) in its 2006 "Water Conservation Standards" (updated in June 2012). This manual covers key areas of water supply planning and management, and indoor and outdoor water use, including the following ten topics:

1. Comprehensive Planning and Drought Management Planning
2. Water Audits and Leak Detection
3. Metering
4. Pricing
5. Residential Use
6. Public Sector Use
7. Industrial, Commercial and Institutional Use
8. Agricultural Use

9. Lawn and Landscape
10. Public Education and Outreach

The goals of the standards and recommendations are to:

- Integrate water conservation and efficiency measures into all aspects of water supply planning and management;
- Maximize the efficiency of public water supply system operations by conducting regular water audits, performing regular leak detection as recommended through audits, promptly repairing leaks, metering all users of water supply systems, and practicing full-cost pricing;
- Reduce indoor/outdoor water use by setting efficiency standards that are specific and measurable, and recommending options to meet or exceed those standards;
- Emphasize and implement water conservation in government buildings and facilities to accurately account for water use and to demonstrate water-saving techniques and concepts to the public;
- Maximize efficient outdoor water use so that outdoor use of potable water comprises only a small portion of total water use, with a long-term goal of further reducing demand through reliance on alternative irrigation sources (e.g., rainwater harvesting and reclaimed wastewater) and water-wise landscaping techniques; and
- Promote public awareness of the long-term economic and environmental benefits of conserving water to build public support for all aspects of water conservation and efficiency, and to influence behavior to maximize conservation by individuals and institutions.

Several of the standards will directly reduce wastewater flows, such as pricing, replacement fixtures and public education. While others, such as outdoor water use, would impact water use only. **Table 2-6** summarizes the ten topics outlined by the EOEEA for water conservation.

TABLE 2-6

SUMMARY OF WATER CONSERVATION STANDARDS

Category	Standard	Recommendations
Comprehensive Planning and Drought Management Planning	(1) Create Drought Management Plan. (2) Create Emergency Management Plan. (3) Develop a written program to comply with these Standards.	(1) For Integrated Infrastructure Planning focus on stormwater, wastewater, I/I, and water supply. (2) Improve communication with other local officials so that they are aware of the water consumption and supply availability. (3) Establish a water bank to reduce the existing demand on the water resources.
Water Audits and Leak Detection	(1) A full leak detection survey of the distribution system should be completed every two years. (2) Meet or demonstrate progress towards meeting the state standard of less than 10 % unaccounted-for-water (UAW). (3) Conduct an Annual Statistical Report Water Audit. (4) Repair all leaks quickly.	(1) Use MassDEP Guidance manuals on leak repair. (2) There should be consideration given to assuring the penalty for water theft. (3) Conduct a comprehensive water audit every 5 to 10 years.
Metering	(1) Each public water supplier should develop a program to implement 100% metering of all public sector and private users with meters. (2) The metering program should include regular meter maintenance. (3) Meter reading and billing for domestic accounts should be done quarterly. (4) Master meters should be calibrated annually.	(1) Meter reading and billing for the largest users should be done more frequently than domestic accounts. (2) Water and sewer rates, where applicable, should be billed so as to inform customers of their actual use and cost of each. (3) Seek Commonwealth funding for meter replacement and automatic meter reading equipment. (4) Consider purchasing remote reading equipment.
Pricing	(1) Water pricing structure should include the full-cost of operating the water supply system. (2) Water supply system operations should be fully funded by water supply system revenues.	(1) Each water supplier should establish an enterprise account for water. (2) Water suppliers should consider adopting rate structures that promote the reduction of nonessential water use.

Category	Standard	Recommendations
	(3) Prohibit decreasing block rates which are illegal in MA.	
Residential Water Use	(1) Install water efficient plumbing fixtures. (2) Use residential water efficiently - meet or demonstrate progress towards meeting residential use of 65 gpcd as soon as possible. (3) Implement a comprehensive residential water conservation program.	(1) Promote water efficient household appliances. (2) Water audits should be made available to residential customers. (3) Promote efficient Non-landscape outdoor water use - pools, car washing, sweeping driveways. (4) Promote waterless plumbing fixtures. (5) Facilitate Leak Repair - provide a list of plumbers who will fix leaks for a reasonable rate.
Public Sector Water Use	(1) Government facilities, including school departments and hospitals should account their full use of water, based on full metering of public buildings, parks and other facilities. (2) Public building should be built or retrofitted with equipment that reduces water use. (3) Water used by contractor using fire hydrants for pipe flushing and construction should be metered and they should be charged, including service fees. (5) Strictly apply plumbing codes and incorporate other conservation measure in new and renovated buildings.	(1) Adopt outdoor water use strategies (See Lawn and Landscape below). (2) Create Demonstration Sites for Innovative water conservation techniques.
Industrial, Commercial, and Institutional Water Use	(1) All industrial, commercial, and institutional water users should develop and implement a written water policy. (2) All industrial, commercial, and institutional water users should carry out a water audit. (3) Practice good lawn and landscape water use techniques.	(1) All industrial, commercial, and institutional users should install/ retrofit water saving sanitary devices. (2) Industrial and commercial users should work with code officials, standards committees, state programs, manufacturers, and legislators to promote water conservation.
Agricultural Water Use	(1) Adopt a water conservation approach.	(1) Develop and promote industry specific best management practices. (2) Irrigation system efficiency should be evaluated on a regular basis.

Category	Standard	Recommendations
Lawn and Landscape	(1) Minimize water lawns and landscapes. (2) Adopt and implement a water use restriction bylaw, ordinance or regulation for municipal and private wells.	(1) Minimize use of potable water for lawn irrigation. (2) Irrigate efficiently. (3) Maximize water conservation of automatic irrigation systems. (4) Mow high, often and sharp.
Public Education & Outreach	(1) Develop and implement an education plan.	(1) Municipalities should hire a water conservation coordinator. (2) Use social marketing to build public support for water conservation.

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3

SECTION 3

ALTERNATIVES ANALYSIS

3.1 INTRODUCTION

The Phase 1 CWMP identified nine study areas with need for further evaluation. Study Areas 11, 12, 13, 15, 16, 18, 20, 28 and 30 have high priority needs. These areas will be further evaluated in this section to determine if additional wastewater management, beyond conventional on-site systems, is recommended. The potential wastewater management alternatives for treatment, collection and disposal include Innovative and Alternative (I/A) systems, shared/decentralized systems, municipal sewer system extensions, treatment and disposal facilities, and continued use of conventional septic systems.

3.2 TREATMENT TECHNOLOGY ASSESSMENT

As part of this phase of the CWMP, a similar ranking and scoring system approach as utilized in Phase 1, was used to evaluate the alternative wastewater treatment systems. Each of the treatment systems was scored based on primary and secondary conditions for the needs areas. The primary criteria conditions were based on technical components, including the system's ability to provide a certain level of treatment and nutrient removal (i.e. nitrogen and phosphorus). The secondary criteria conditions were less technical in nature and included more evaluative components, such as public and regulatory acceptance of the treatment systems, capital, operation and maintenance costs, and other environmental factors.

Each type of treatment system received a score based on the evaluation criteria for both primary and secondary criteria. The lowest scores for each of the identified treatment systems were then short-listed, which will be further reviewed in Phase 3 - Detailed Evaluation of Alternatives and Recommended Plan for the CWMP.

The specific evaluative criteria established for this ranking system for the primary and secondary criteria are summarized below.

Primary Criteria (Ranking 0 to 10)

- Level of Treatment
- Nutrient Treatment
- Land / Size Requirements
- Capital / Construction Costs
- Ease of Operation

Secondary Criteria (Ranking 0 to 5)

- Public Acceptance
- Regulatory
- Legal
- Operation and Maintenance Costs (includes energy costs)
- Environmental

Each of the above listed primary criteria were ranked from 0 to 10. A score of "0" is associated with a well-suited treatment technology, while a score of "10" means that the treatment technology is not well-suited for that Needs Area. To differentiate the importance of primary criteria from secondary criteria, the scoring for the secondary criteria ranged only from 0 to 5 points. The lower the total score the better the treatment technology is suited for that Needs Area. A maximum number that a treatment technology could receive is 75 points.

The following sections provide a detailed discussion for each of the primary and secondary evaluative criteria and its scoring system.

3.2.1 Primary Criteria

There are five primary criteria conditions, which were considered to determine if a given treatment technology will be a viable option for wastewater treatment over the 20-year planning period. A brief discussion of each of the evaluative criteria is presented below.

3.2.1.1 Level of Treatment

This criterion evaluated the ability for the alternative treatment technology to produce a high quality of effluent under the specific site conditions. A high-quality effluent is considered to have low concentrations of biological oxygen demand (BOD), total suspended solids (TSS), and pathogens. Under this ranking system, a connection to an existing municipal wastewater collection system was considered to have the highest level of treatment of all the alternatives, because the wastewater is treated at an existing WWTF; therefore, it scored the lowest points. WWTFs typically have stringent effluent limits based on their National Pollution Discharge Elimination System (NPDES) or Ground Water Discharge (GWD) Permits.

A “small” WWTF is governed either by Title 5 when the flows are less than 10,000 gpd or by Massachusetts Department of Environmental Protection (MA DEP) "Guidelines for Design, Construction, Operation and Maintenance of Small Wastewater Treatment Facilities and Land Disposal" when the flows are greater than 10,000 gpd.

Conventional septic and I/A systems can provide some level of wastewater treatment; however, the effluent quality is limited by site and subsurface conditions. The ranking system took this into account as part of the evaluation.

3.2.1.2 Nutrient Treatment

Each of the treatment technologies was analyzed based on their ability to treat nitrogen and phosphorus in wastewater. A connection to an existing sewer collection and wastewater treatment system was considered to have the highest level of treatment since the Spencer WWTF is required to meet strict total nitrogen and phosphorus effluent limits. Therefore, they scored the lowest points under this ranking system.

Small wastewater treatment plants typically provide an average level of nutrient removal; however, it can be difficult to achieve consistent results.

A conventional septic system essentially provides no nutrient removal, so they score the highest number of points. I/A systems can be designed to provide a minimum level of nutrient removal as compared to septic systems.

3.2.1.3 Land/Site Requirements

This primary criterion evaluates the amount of land that may be required to treat and dispose of wastewater for each of the treatment technologies. Since the majority of Spencer is not already sewered, a municipal wastewater collection system extension would require a lot of land. In most cases, the sewer mains are located within a municipality's right of way and if necessary, in 20-25-foot-wide easements. If a pump station(s) is required for a sewer extension, land may need to be purchased if it cannot be located on municipally owned land or an easement. Similarly, in regard to a small WWTF, land may also have to be purchased in order to construct the facility.

I/A systems have less stringent disposal setbacks and can be easier to site than conventional septic systems. If a conventional septic system needs to be mounded due to the subsurface conditions, the soil absorption system may require even more land. In general, the parcel size and subsurface conditions have a significant impact on whether the treatment system can be sited and function properly. Each of these potential site condition issues was analyzed and scored appropriately for this evaluation.

3.2.1.4 Capital and Construction Costs

The capital and construction cost of a particular technology were evaluated. On-site systems received a low score as these systems are paid for by the individual property owner and are generally affordable, unless conditions require a more complex system (i.e. mounded system). Depending on their complexity, shared septic and I/A system can be more expensive than individual on-site systems. Sewer system extensions may also be more expensive than on-site systems based on the length of new pipe required for properties to connect and pump stations to reach the existing municipal collection system. Decentralized WWTFs are usually not cost-effective to build due to the required complexity (legal fees, permitting, land purchasing).

3.2.1.5 Ease of Operation

In general, a treatment technology, which requires a minimal amount of operation and maintenance, received a lower score as part of this evaluation. A conventional septic system would also score low as it typically requires a minimal amount of maintenance if it is properly sited and installed correctly. The homeowner typically needs to pump out the septic tank every 1 to 3 years to remove accumulated solids. I/A systems require additional attention, because these systems typically have pumps and/or blowers that need to be routinely maintained. Depending on its complexity, shared septic and/ or I/A systems may have to be operated and maintained through a subcontract with an outside vendor.

A small WWTF received the highest overall score in this evaluation as it is composed if unit processes which require daily operation and maintenance from a licensed operations company.

3.2.2 Secondary Criteria

The secondary criteria conditions are less technical in nature and include more institutional and economic components as described below.

3.2.2.1 Public Acceptance

Communities tend to support technologies that have a proven track record, are aesthetically appealing, do not produce odors, and offer a cost-effective solution to solving their wastewater management needs. The implementation of any wastewater solution will be made easier with public support. Conventional septic systems and I/A systems are publicly accepted practices, so these ranked lower in the scoring system. Construction of a small WWTF would have the most public obstacles to overcome so it received the highest score.

3.2.2.2 Regulatory Compliance

Title 5 of the State Environmental Code, 310 CMR 15.000, is the regulation that provides detailed guidelines for on-site wastewater septic systems. These regulations are easily met by parcels that have conditions well-suited for on-site Title 5 septic systems. Therefore, on-site Title 5 septic systems achieved a low regulatory score in the evaluation. Title 5 does not take in account potential nutrient loading issues from areas proximate to surface waters. There are stringent requirements for decentralized treatment facilities including the groundwater or surface water discharge permitting requirements. Based on this knowledge, construction of a small WWTF received a high score.

3.2.2.3 Legal Issues

Depending on the treatment and effluent disposal system, there are a number of potential legal issues that could come into play for the needs areas. In general, the property owner is responsible for all issues pertaining to an on-site wastewater treatment system. Conventional individual septic and individual I/A systems typically have minimal legal issues; hence, they scored low in the ranking system. Shared systems and small WWTF's ranked higher in the system as these types of systems tend to have additional legal issues that may need to be resolved. This may include agreements to purchase land, and maintain and operate the shared system.

3.2.2.4 Operation and Maintenance Costs (Including Energy Costs)

It is preferable for a viable technical solution to also have low O&M costs. A well sited conventional septic system typically has minimal operation and maintenance (O&M) requirements; therefore, it achieved a low score in the ranking system. In addition, a municipal wastewater collection system extension has low O&M costs; and if required, any pumps would be sized to handle a relative small amount of flow.

Decentralized WWTFs typically require an operator to spend a few hours daily at the plant to ensure that it is operating properly. The required energy to operate a decentralized WWTF would be substantially greater than the other alternative treatment solution; so it scored higher in the evaluation.

3.2.2.5 Environmental

The various treatment options were examined for their potential impact to the environment including groundwater, surface water, and habitats for rare and endangered species. In general, if the wastewater treatment system is properly operated and sited in the right conditions, it should not result in significant environmental issues. Most of the identified treatment technologies will recharge the local watershed sub-basin; however, a malfunctioning system could contaminate the groundwater and/or the nearby surface waters.

3.3 WASTEWATER FLOW ESTIMATES

As shown below in **Table 3-1**, the wastewater flow rates were estimated for each of the needs areas. The total average flows were estimated based on TR-16 Guidelines at 70 gpd/capita and Spencer census data, which estimates 2.36 capita/home. This calculates to an average flow of 165 gpd/home. Existing wastewater flows were calculated based on the number of developed parcels with a building in each area. Future build-out flows were calculated based on the number of undeveloped parcels, taking the parcel area and the Town's zoning restrictions to calculate the approximate number of homes that could be developed, and flow rate (gpd/home). For future buildout flows, the existing sewered area was also analyzed for parcels that are not currently connected to the Town sewer (based on billing accounts).

The flows will be used for planning purposes as Phase 3 further evaluates the alternative solutions for wastewater management.

The total future estimated flow also includes an estimate of the amount of infiltration and inflow (I/I) which would be collected by the potential new sewer system. The quantity of I/I was estimated from TR-16 Guidelines based on 375 gpd/inch diameter/mile of new sewer piping. It was assumed that 8-inch diameter piping would be required for all needs areas. The pipe length was estimated based on street lengths. These estimates will be further refined as each alternative for wastewater management is further developed in Phase 3 of the CWMP.

A capacity analysis for the existing collection system for Spencer was not analyzed for the potential need to increasing pipe size or pump station capacity at this time. This will be analyzed in Phase 3, once a recommended plan has been developed. The WWTF capacity will also be part of this analysis.

Study Area 11 consists of a total of 179 parcels (134 developed, 30 undevelopable, and 15 undeveloped). Based on parcel size and zoning restriction, 56 homes could be developed on the undeveloped land. This area would require approximately 8.2 miles of 8-inch diameter pipe, resulting in an estimate of 24,600 gpd of I/I.

Study Area 12 consists of a total of 250 parcels (205 developed, 34 undevelopable, and 11 undeveloped). Based on parcel size and zoning restriction, 11 homes could be developed on the undeveloped land. This area would require approximately 1.2 miles of 8-inch diameter pipe resulting in an estimate of 3,600 gpd of I/I.

Study Area 13 consists of a total of 73 parcels (62 developed, 2 undevelopable, and 9 undeveloped). Based on parcel size and zoning restriction, 22 homes could be developed on the undeveloped land. This area would require approximately 2.6 miles of 8-inch diameter pipe resulting in an estimate of 7,800 gpd of I/I.

Study Area 15 consists of a total of 31 parcels (23 developed, 1 undevelopable, and 7 undeveloped). Based on parcel size and zoning restriction, 105 homes could be developed on the undeveloped land. This area would require approximately 1.2 miles of 8-inch diameter pipe, resulting in an estimate of 3,600 gpd of I/I.

Study Area 16 consists of a total of 144 parcels (125 developed, 7 undevelopable, and 12 undeveloped). Based on parcel size and zoning restriction, 55 homes could be developed on the undeveloped land. This area would require approximately 2.4 miles of 8-inch diameter pipe, resulting in an estimate of 7,200 gpd of I/I.

Study Area 18 consists of a total of 75 parcels (71 developed, 0 undevelopable, and 4 undeveloped). Based on parcel size and zoning restriction, 49 homes could be developed on the undeveloped land. This area would require approximately 1.5 miles of 8-inch diameter pipe, resulting in an estimate of 4,500 gpd of I/I.

Study Area 20 consists of a total of 88 parcels (71 developed, 4 undevelopable, and 14 undeveloped). Based on parcel size and zoning restriction, 120 homes could be developed on the undeveloped land. This area would require approximately 3.4 miles of 8-inch diameter pipe, resulting in an estimate of 10,200 gpd of I/I.

Study Area 28 consists of a total of 377 parcels (203 developed, 161 undevelopable, and 13 undeveloped). Based on parcel size and zoning restriction, 55 homes could be developed on the undeveloped land. This area would require approximately 3.5 miles of 8-inch diameter pipe, resulting in an estimate of 10,500 gpd of I/I estimated.

Study Area 30 consists of a total of 177 parcels (156 developed, 1 undevelopable, and 20 undeveloped). Based on parcel size and zoning restriction, 110 homes could be developed on the undeveloped land. This area would require approximately 2.8 miles of 8-inch diameter pipe, resulting in an estimate of 8,400 gpd of I/I.

The roads (pipes) not within a study area, but necessary to connect a study area to the existing collection system totaled approximately 7 miles of 8-inch diameter pipe, resulting in 21,000 gpd for the I/I estimate.

For the existing collection system, average daily flow data was used from the WWTF in 2017. This flow data includes I/I, therefore only the buildout flow had to be estimated. The existing sewered area consists of a total of 313 parcels not connected to the existing collection system. Based on the type of building, single family homes, apartments, or commercial businesses, a flow estimate was developed. This was increased by 50 percent for a safety factor to account for underestimating in commercial flows.

TABLE 3-1

AVERAGE WASTEWATER FLOW ESTIMATES FOR STUDY AREAS

Area	Potential Existing Flow[1]		Estimated Build-out Flow[2]		Estimated Flow from I/I[3]		Total Future Flow Estimate
Existing Sewer[4]	770,000	+	145,400	+	-	=	915,400
11	22,100	+	9,250	+	24,600	=	55,950
12	33,850	+	1,800	+	3,600	=	39,250
13	10,250	+	3,600	+	7,800	=	21,650
15	3,800	+	17,300	+	3,600	=	24,700
16	20,650	+	9,100	+	7,200	=	36,950
18	11,700	+	8,100	+	4,500	=	24,300
20	11,550	+	19,800	+	10,200	=	41,550
28	33,550	+	9,100	+	10,500	=	53,150
30	25,750	+	18,200	+	8,400	=	52,350
Roads not in a needs area[5]	-	+	-	+	21,000	=	21,000
Total	**943,200**	**+**	**241,650**	**+**	**101,400**	**=**	**1,286,250**

Notes:

1. Estimated sanitary flow was calculated based on the TR-16 Guideline of 70 gpd/capita, the United States Census Bureau (USCB) reported in 2012-2016 the Town of Spencer averages 2.36 capita/household, and GIS record that the parcel had an existing building on it. (70 gpd/capita * 2.36 capita/home * # of parcels with a building)
2. Estimated build-out sanitary flow is calculated from buildable undeveloped parcel size and zoning restrictions. (Parcel allows only 1-acre lots by zoning and is 5 acres big, then parcel can fit 5 homes. Calculation becomes 70 gpd/capita * 2.36 capita/home * # of homes possible)
3. I/I estimate is based on TR-16 Guidelines at 375 gpd/inch-diameter/mile, road lengths where sewer pipes would be constructed, and 8-inch diameter pipe (i.e [375 gpd/inch-diameter/mile]*[miles of sewer]*[8-inch diameter pipe]).
4. Flow to WWTF in 2017, I/I is included in this flow.
5. Roads (pipes) used to connect high needs areas to existing collection system. Needed for I/I estimate.

3.4 TREATMENT TECHNOLOGY ANALYSIS BY STUDY AREA

3.4.1 Study Area 11 – Wire Village Road & Sugden Reservoir, North & West

3.4.1.1 Area Description

As shown in **Figure 3-1**, Study Area 11 is located in the northeast central part of Spencer and is bordered by Chapter 61 lands to the north, Study Areas 9 and 13 to the west, Study Areas 10 and 12 to the east, and Chapter 61 lands to the south. This study area encompasses approximately 423 acres and is comprised of 179 parcels.

3.4.1.2 Needs Description

This area scored 28 points in the Phase 1 CWMP and was identified as an area with high wastewater needs. The area has portions of very poor soils, mainly surrounding the water bodies, and some areas with very good soils. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most areas. There is no bedrock impact in this area and the majority of the lots, outside of the Reservoir, are greater than one acre. However, some lots on Wire Village Road are smaller than one acre and many along the water's edge are less than 1/2 acre and densely populated. There are no drinking water protection areas. There are many Title 5 setbacks around Sugden Reservoir. The surface waters have high flooding chances and cover a medium portion of the area. There are several potential vernal pools but no certified locations and no estimated habitat areas. Area 11 also does not contain any historical districts.

3.4.1.3 Short-Listed Alternatives

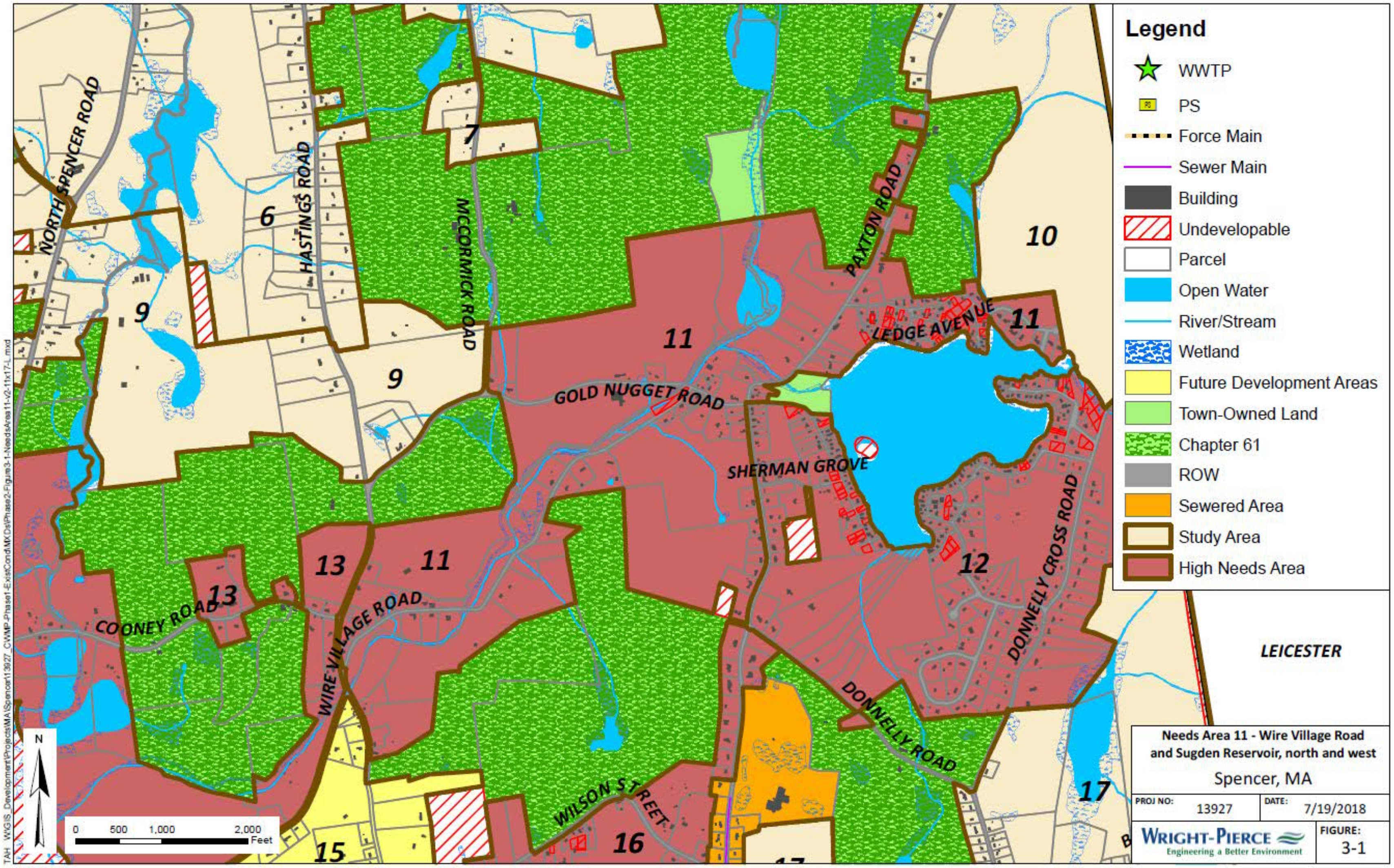
As previously discussed, all of the treatment technologies were ranked based on the primary and secondary criteria as shown in **Table 3-2**. Based on the results of this ranking system, the following wastewater treatment alternatives have been short-listed for this study area:

- Septic Systems;
- I/A Systems; and
- Collection System Extension

Conventional septic systems are currently used in Study Area 11 and appear to be performing reasonably well as there are minimal failures listed in the Health Department records for the last twenty years of Title 5 inspections. I/A systems would improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic systems.

Extending the municipal collection system also scored low in the evaluation for this area. Directing the wastewater to the WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

The wastewater alternatives that did not get short-listed were the decentralized treatment technologies. Constructing a small WWTF for Study Area 11 would be expensive and costly to operate and maintain, and require additional Town staffing. Shared septic and I/A systems would have similar concerns as land would have to be purchased, systems are harder to operate depending on their complexity, and are costly to construct. The decentralized alternative scored the highest in the scoring/ranking system used.


Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
NORTH SPENCER ROAD
HASTINGS ROAD
MCCORMICK ROAD
PAXTON ROAD
LEDGE AVENUE
GOLD NUGGET ROAD
SHERMAN GROVE
DONNELLY CROSS ROAD
DONNELLY ROAD
WIRE VILLAGE ROAD
COONEY ROAD
WILSON STREET
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13
13
15
16
17
0 500 1,000 2,000 Feet
N
Needs Area 11 - Wire Village Road and Sugden Reservoir, north and west
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-1

TABLE 3-2

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 11 – WIRE VILLAGE ROAD & SUGDEN RESERVOIR, NORTH & WEST

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	6	9	6	2	2	25	1	1	1	1	5	9	34*
I/A Systems	6	6	6	4	4	26	2	2	2	2	4	12	38*
Decentralized													
Shared Septic Systems	6	9	8	3	4	30	3	3	4	4	4	18	48
Shared I/A Systems	5	6	8	5	6	30	3	3	4	4	4	18	48
Small WWTF	2	2	7	8	9	28	5	5	5	5	3	23	51
Collection System Extensions													
Town of Spencer	0	0	5	7	1	13	5	3	5	5	1	19	32*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.2 Study Area 12 – Sugden Reservoir, South & East

3.4.2.1 Area Description

Study Area 12 is in the central east part of Spencer as shown in **Figure 3-2**. It is bordered by Study Area 10 to the north, Study Area 11 to the west, the Town of Leicester to the east, and Chapter 61 lands and Study Area 17 to the south. This study area encompasses approximately 280 acres and is comprised of 250 parcels.

3.4.2.2 Needs Description

The area predominantly has very good soils. The depth to groundwater is greater than 10 feet in most areas. There is bedrock impact in about half of this area. The majority of the lots are less than one acre, especially around the Sugden Reservoir, which is densely developed. There are no drinking water protection areas. There are Title 5 setbacks around the reservoir and minimal flooding chance in the area. There are no potential or certified vernal pool locations and no estimated habitat areas. Area 12 also does not contain any historical districts.

Based on our evaluation, Study Area 12 received a total score of 28 points in the phase 1 CWMP and was categorized as a High needs category area.

3.4.2.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 12 are summarized in **Table 3-3**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short listed:

- Septic Systems,
- I/A Systems; and
- Collection System Extension

Conventional septic systems ranked lowest on the evaluation and may continue to be an appropriate technology for Study Area 12. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system also scored low in the evaluation for this area. Directing the wastewater to the WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal. If both Study Area 11 and 12 were sewered, they could share in some of the piping costs to connect to the existing collection system.

3.4.3 Study Area 13 – Cooney Road

3.4.3.1 Area Description

As shown in **Figure 3-3**, Study Area 13 is located in the central part of Spencer, just north of the downtown sewered area. It is bordered by Study Area 9 and Chapter 61 lands to the north, Study Area 14 and Chapter 61 lands to the west, Chapter 61 lands and Study Areas 11 and 15 to the east, and Study Areas 14 and 15 to the south. This study area encompasses approximately 325 acres and is comprised of 73 parcels.

3.4.3.2 Needs Description

The area has predominantly very poor soils and high groundwater. There are many wetlands and surface waters in this area, including Meadow Brook. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There is a large Zone II drinking water protection area and a community groundwater source. There are moderate Title 5 setbacks. The surface waters have high flooding chances and cover a moderate portion of the area. There are two potential vernal pool but no certified locations and there is a large estimated habitat area. Area 13 also does not contain any historical districts.

Based on our evaluation, Study Area 13 received a total score of 36 points in phase 1 CWMP, the highest score of any Study Area, and was categorized as a High needs area.

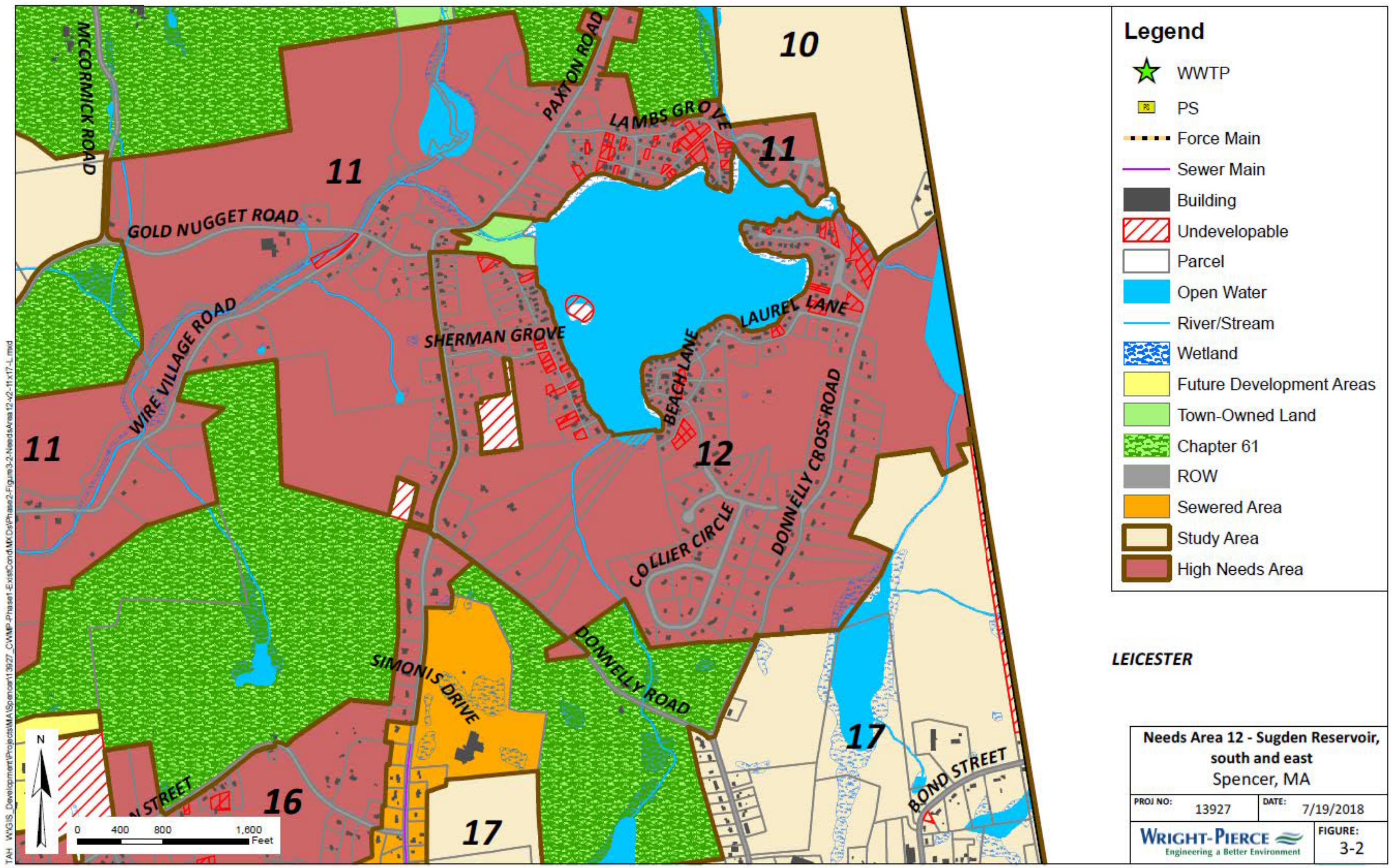

MCCORMICK ROAD
GOLD NUGGET ROAD
WIRE VILLAGE ROAD
PAXTON ROAD
LAMBS GROVE
SHERMAN GROVE
LAUREL LANE
BEACH LANE
COLLIER CIRCLE
DONNELLY CROSS ROAD
DONNELLY ROAD
SIMONIS DRIVE
BOND STREET
STREET
10
11
11
11
12
16
17
17
LEICESTER
Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
0 400 800 1,600 Feet
N
Needs Area 12 - Sugden Reservoir, south and east
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-2

TABLE 3-3

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 12 – SUGDEN RESERVOIR, SOUTH & EAST

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	6	9	6	2	2	25	1	1	1	1	4	8	33*
I/A Systems	6	6	6	4	4	26	2	2	2	2	3	11	37
Decentralized													
Shared Septic Systems	6	9	7	3	4	29	3	3	4	2	4	16	45
Shared I/A Systems	5	6	7	5	6	29	3	3	4	3	3	16	45
Small WWTF	2	2	8	8	9	29	5	5	5	5	2	22	51
Collection System Extensions													
Town of Spencer	0	0	6	7	2	15	5	3	4	5	1	18	33*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.3.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 13 are summarized in **Table 3-4**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short-listed:

- Septic Systems,
- I/A Systems; and
- Collection System Extension

Conventional septic systems ranked second lowest on the evaluation and may continue to be an appropriate technology for Study Area 13. I/A systems could improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system also scored the lowest in the evaluation for this area. Directing the wastewater to the WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

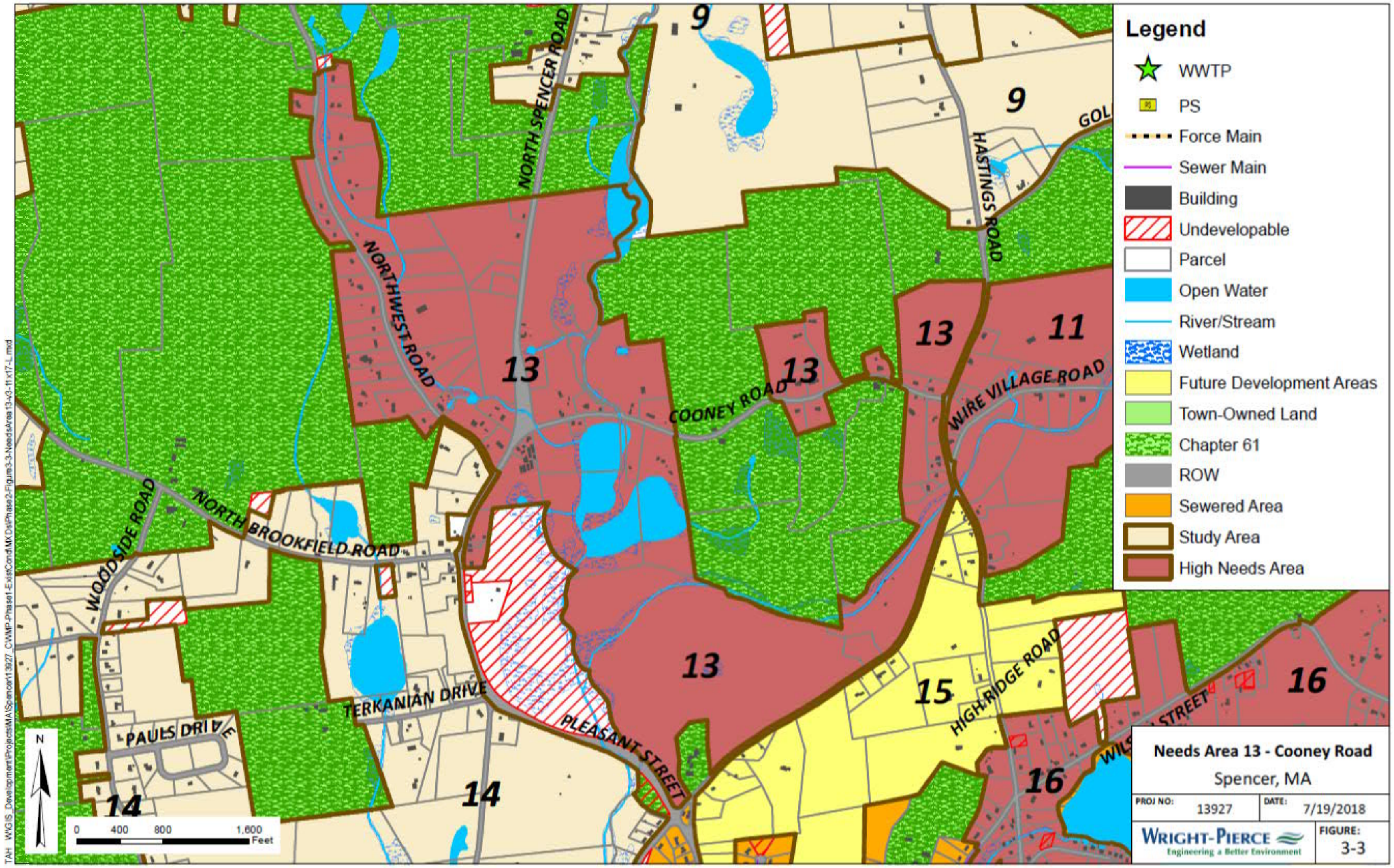

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
9
9
11
13
13
13
13
14
14
15
16
16
NORTH SPENCER ROAD
HASTINGS ROAD
NORTHWEST ROAD
COONEY ROAD
WIRE VILLAGE ROAD
NORTH BROOKFIELD ROAD
WOODSIDE ROAD
TERKANIAN DRIVE
PAULS DRIVE
PLEASANT STREET
HIGH RIDGE ROAD
N
0 400 800 1,600 Feet
Needs Area 13 - Cooney Road
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-3
TAH WGIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase2-Figure3-3-NeedsArea13-v3-11x17-L.mxd

TABLE 3-4

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 13 – COONEY ROAD

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	8	9	5	2	2	26	1	1	1	1	4	8	34*
I/A Systems	7	6	5	4	4	26	2	2	2	2	4	12	38*
Decentralized													
Shared Septic Systems	8	9	7	3	3	30	3	3	4	2	4	16	46
Shared I/A Systems	6	6	7	5	5	29	3	3	4	3	4	17	46
Small WWTF	2	2	8	8	8	28	5	5	5	5	2	22	50
Collection System Extensions													
Town of Spencer	0	0	3	4	1	8	5	3	4	4	1	17	25*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.4 Study Area 15 - High Ridge Road (Future Development Area)

3.4.4.1 Area Description

Study Area 15 is located in the central part of Spencer close to downtown as shown in **Figure 3-4**. It is bordered by Study Area 13 and 11 to the north, Study Area 13 to the west, Study Area 16 to the east, and existing sewered area to the south. This study area encompasses approximately 135 acres and is comprised of 31 parcels.

3.4.4.2 Needs Description

This area predominantly has good soils and no areas with high groundwater levels. There is no bedrock impact in this area and the majority of the lots are greater than one acre. There are no drinking water protection areas and minimal Title 5 setbacks. There is minimal flood risk in the area. There are few potential and no certified vernal pool locations and no estimated habitat areas. Area 15 also does not contain any historical districts.

Based on our evaluation, Study Area 15 received a total score of 9 points in the phase 1 CWMP and was categorized as a Very Low needs area. Conventional septic systems appear to be a viable long-term wastewater disposal solution for this study area. However, in discussion with the Spencer Sewer Commission, this area was identified as having a high potential for future development and connection to the existing collection system.

3.4.4.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 15 are summarized in **Table 3-5**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short-listed:

- Septic Systems,
- I/A Systems; and
- Collection System Extension

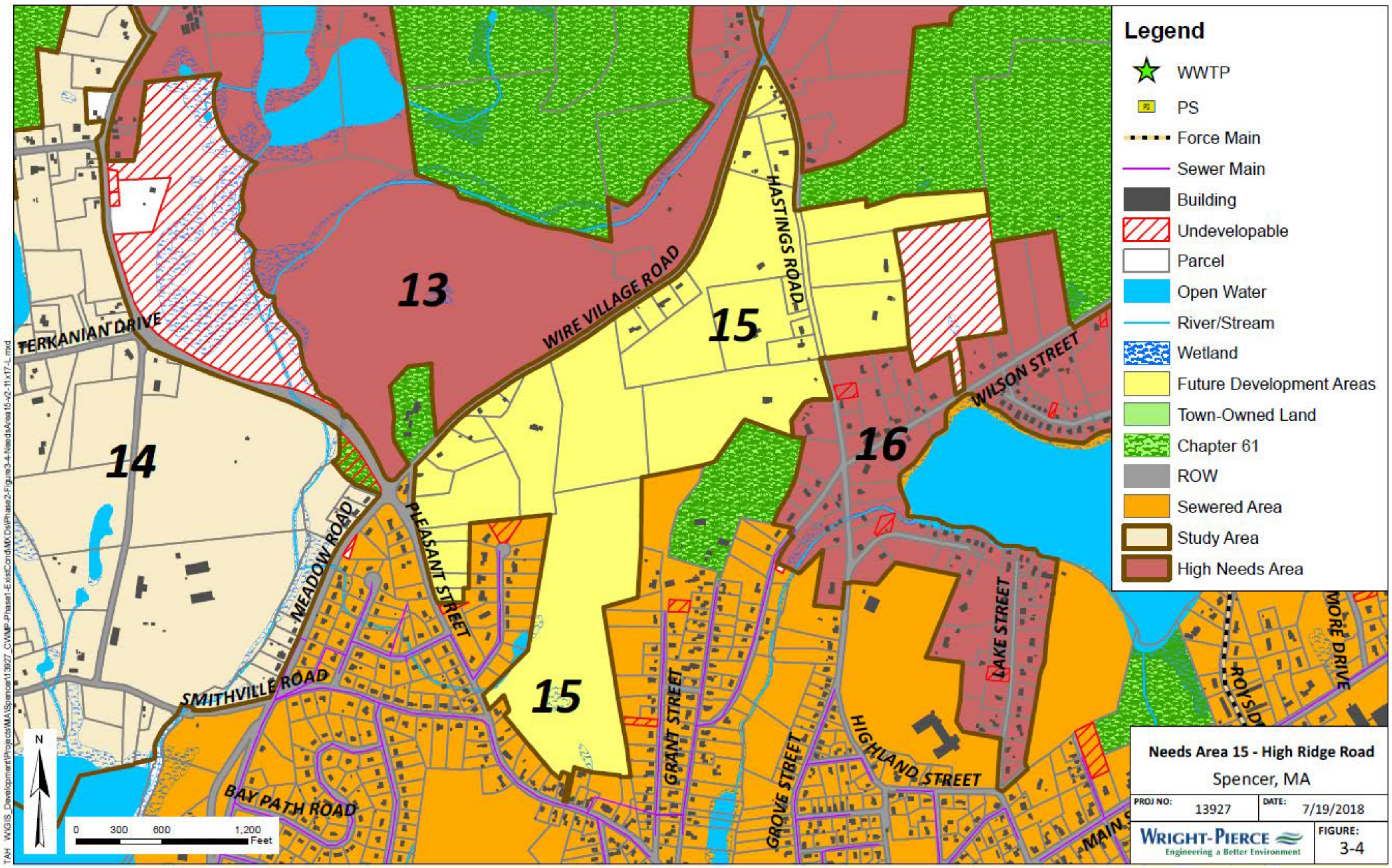

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
13
14
15
15
16
TERKANIAN DRIVE
WIRE VILLAGE ROAD
HASTINGS ROAD
WILSON STREET
MEADOW ROAD
PLEASANT STREET
SMITHVILLE ROAD
BAY PATH ROAD
GRANT STREET
GROVE STREET
HIGHLAND STREET
LAKE STREET
MORE DRIVE
N
0 300 600 1,200 Feet
Needs Area 15 - High Ridge Road
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-4

TABLE 3-5

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 15 – HIGH RIDGE ROAD (FUTURE DEVELOPMENT AREA)

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	5	9	5	1	2	22	1	1	1	1	4	8	30*
I/A Systems	4	6	5	3	4	22	2	2	2	2	3	11	33*
Decentralized													
Shared Septic Systems	5	9	7	2	3	26	3	3	3	2	3	14	40
Shared I/A Systems	3	6	7	4	5	25	3	3	3	3	3	15	40
Small WWTF	1	2	7	7	8	25	5	5	4	5	2	21	46
Collection System Extensions													
Town of Spencer	0	0	2	4	1	7	5	3	4	4	1	17	24*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

Conventional septic systems continue to be an appropriate technology for Study Area 15. I/A systems may improve the level of treatment and could provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system also scored low in the evaluation for this area. Directing the wastewater to the WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

3.4.5 Study Area 16 - Lake Whittemore

3.4.5.1 Area Description

As shown in **Figure 3-5**, Study Area 16 is located in the central part of Spencer, north of the existing sewered area. It is bordered by Study Area 15 and Chapter 61 lands to the north, Study Area 15 and Chapter 61 lands to the west, Study Area 17 to the east, and existing sewered area to the south. This study area encompasses approximately 138 acres and is comprised of 144 parcels.

3.4.5.2 Needs Description

This area has predominantly good soils and the depth to groundwater is greater than 10 feet. There is moderate bedrock impact in this area. The majority of the lots away from Lake Whittemore are greater than one acre, except for a number of lots around the lake which are a half acre or smaller and densely populated. There are no drinking water protection areas. There are many Title 5 setbacks around Lake Whittemore and minimal flooding chance in the area. There are no potential or certified vernal pool locations and no estimated habitat areas. Area 16 also has the only historical district present in unsewered areas of Spencer.

Based on our evaluation, Study Area 16 received a total score of 28 points in the phase 1 CWMP and was categorized as a High needs area.

3.4.5.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 16 are summarized in **Table 3-6**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short listed:

- Septic Systems,
- I/A Systems; and
- Collection System Extension

Conventional septic systems ranked second lowest on the evaluation and may continue to be an appropriate technology for Study Area 16. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system scored the lowest in the evaluation for this area. Directing the wastewater to the Spencer WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

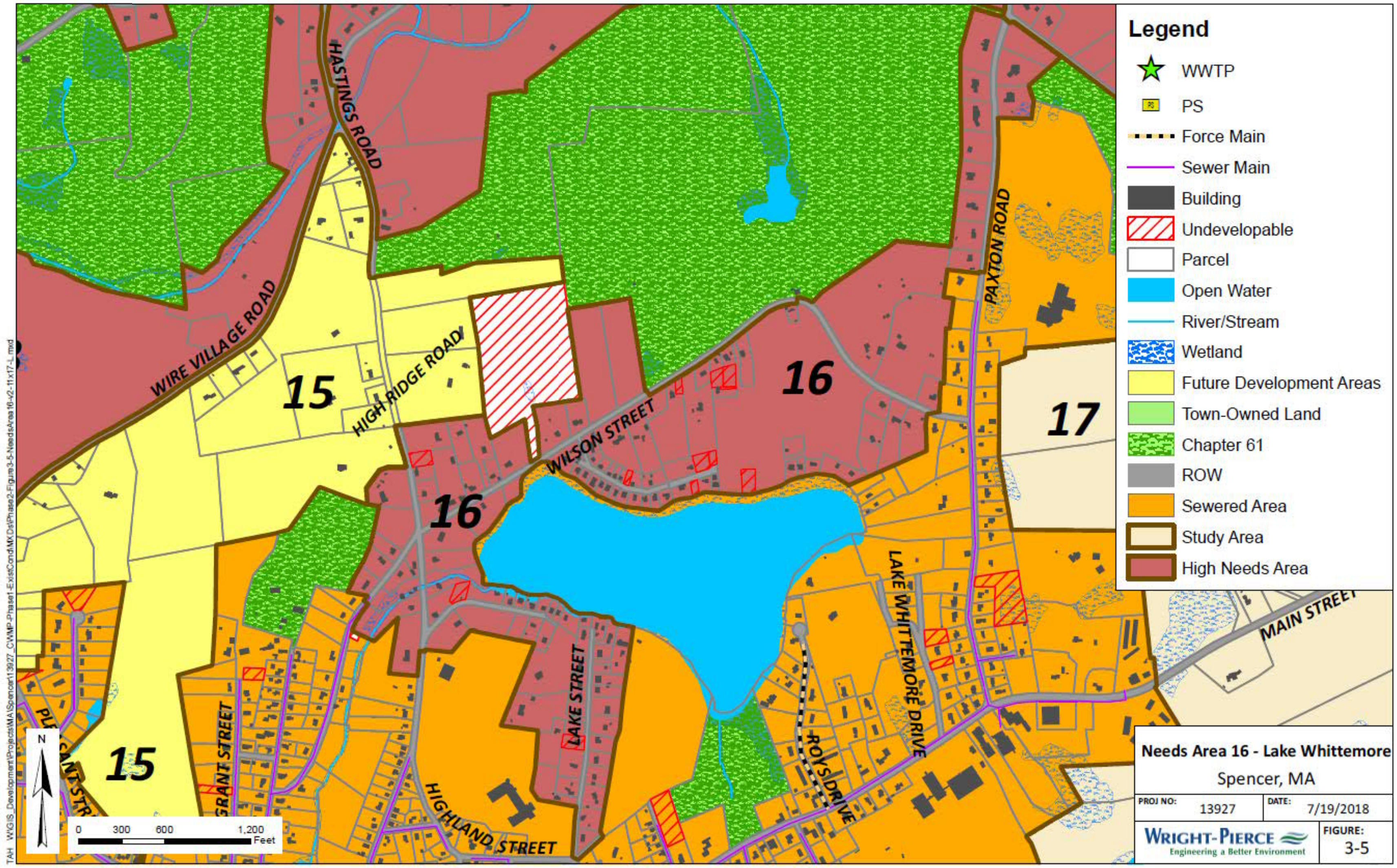

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
HASTINGS ROAD
WIRE VILLAGE ROAD
HIGH RIDGE ROAD
WILSON STREET
PAXTON ROAD
LAKE WHITTEMORE DRIVE
ROYS DRIVE
MAIN STREET
LAKE STREET
HIGHLAND STREET
GRANT STREET
15
16
16
17
15
N
0 300 600 1,200 Feet
Needs Area 16 - Lake Whittemore
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-5

TABLE 3-6

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 16 – LAKE WHITTEMORE

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	6	9	6	2	2	25	1	1	1	1	5	9	34*
I/A Systems	5	6	6	4	4	25	2	2	2	2	4	12	37*
Decentralized													
Shared Septic Systems	6	9	8	3	3	29	3	3	3	2	4	15	44
Shared I/A Systems	4	6	8	5	5	28	3	3	3	3	4	16	44
Small WWTF	1	2	8	8	8	27	5	5	4	5	2	21	48
Collection System Extensions													
Town of Spencer	0	0	2	4	1	7	5	3	4	4	1	17	24*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.6 Study Area 18 - Route 9 and 49, North

3.4.6.1 Area Description

As shown in **Figure 3-6**, Study Area 18 is located in the west central part of Spencer and is bordered by Chapter 61 Lands to the north, the Town of East Brookfield to the west, Chapter 61 Lands and the existing sewered area to the east, and Study Area 20 to the south. This study area encompasses approximately 362 acres and is comprised of 75 parcels.

3.4.6.2 Needs Description

The area has portions of very poor soils and very good soils. The poor soils are contained to the areas near the surface waters, including the Seven Mile River. Some parts of the area, near wetlands and surface waters, have high groundwater. However, the depth to groundwater is greater than 10 feet in most areas. There is no bedrock impact in this area. The majority of the lots are greater than one acre except along Smithville Lane there is development with half acre to one acre lots. There is one wellhead protection area and non-community ground water source in the northeast part of the area and a DEP approved Zone II area in the southeast. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks, but with the Zone II area this Study Area has many setback requirements. The surface waters have high flooding chances and cover a significant portion of the area. There is one potential vernal pool location, but no certified pools, and there is an estimated habitat area along the Seven Mile River. Area 18 also does not contain any historical districts.

Based on our evaluation, Study Area 18 received a total score of 28 points in the Phase 1 CWMP and was categorized as a High needs area.

3.4.6.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 18 are summarized in **Table 3-7**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short-listed:

- Septic Systems,

- I/A Systems; and
- Collection System Extension

Conventional septic systems ranked second lowest on the evaluation and may continue to be an appropriate technology for Study Area 18. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system scored lowest in the evaluation for this area. Directing the wastewater to the Spencer WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

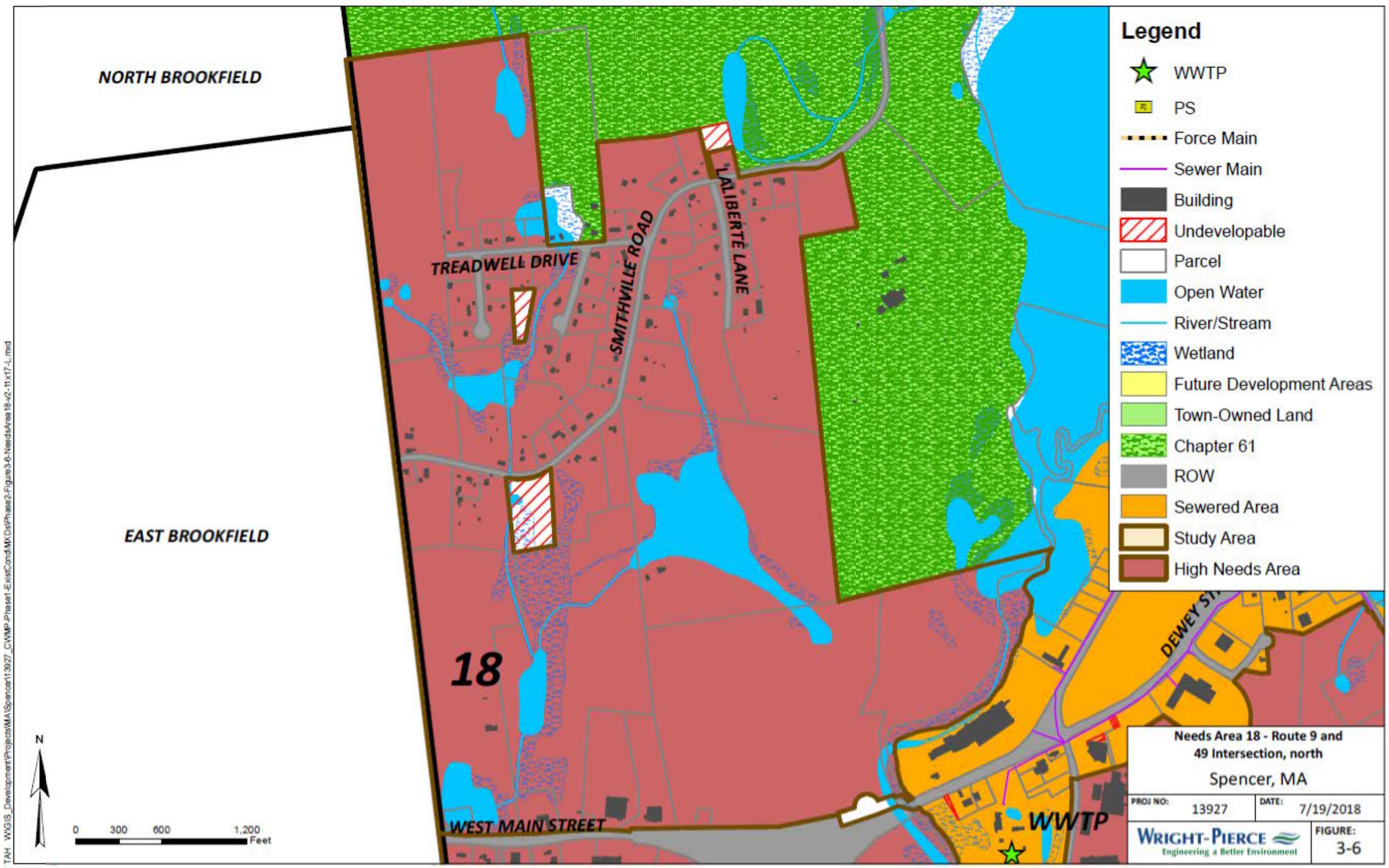
3.4.7 Study Area 20 - Route 49

3.4.7.1 Area Description

As shown in **Figure 3-7**, Study Area 20 is located in the west central part of Spencer and is bordered by Study Area 18 and downtown Spencer to the north, Town of East Brookfield to the west, Chapter 61 lands to the east, and Chapter 61 lands and Study Areas 24 and 25 to the south. This study area encompasses approximately 480 acres and is comprised of 85 parcels.

3.4.7.2 Needs Description

The area has very poor soils, as it is predominantly surface waters and wetlands, including the Seven Mile River and its tributaries. Approximately half of the area, near wetlands and surface waters, has high groundwater. Approximately a third of the area has bedrock impacts. The majority of the lots are greater than one acre, except for a few half acre lots and smaller lots located along Condor Drive. There is a large Zone II drinking water protection zone. Outside of the surface waters and groundwater source, there are minimal Title 5 setbacks. The surface waters have low flooding chances. There is one potential vernal pool location but no certified pools, and there is a large estimated habitat area along the Seven Mile River. Area 20 also does not contain any historical districts. Based on our evaluation, Study Area 20 received a total score of 34 points in and was categorized as a High needs area.



NORTH BROOKFIELD
EAST BROOKFIELD
TREADWELL DRIVE
SMITHVILLE ROAD
LALIBERTE LANE
WEST MAIN STREET
DEWEY ST
WWTP
18
N
0 300 600 1,200 Feet
Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
Needs Area 18 - Route 9 and 49 Intersection, north
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-6

TABLE 3-7

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 18 – ROUTE 9 AND 49, NORTH

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	7	9	5	1	2	24	1	1	1	1	5	9	33*
I/A Systems	6	6	5	3	4	24	2	2	2	2	4	12	36*
Decentralized													
Shared Septic Systems	7	9	8	2	3	29	3	3	3	2	4	15	44
Shared I/A Systems	5	6	8	4	5	28	3	3	3	3	4	16	44
Small WWTF	1	2	7	7	8	25	5	5	4	5	3	22	47
Collection System Extensions													
Town of Spencer	0	0	4	6	1	11	5	3	5	4	1	18	29*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.7.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 20 are summarized in **Table 3-8**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short-listed:

- Septic Systems,
- I/A Systems; and
- Collection System Extension

Conventional septic systems ranked second lowest on the evaluation and may continue to be an appropriate technology for Study Area 20. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system scored lowest in the evaluation for this area. Directing the wastewater to the Spencer WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal.

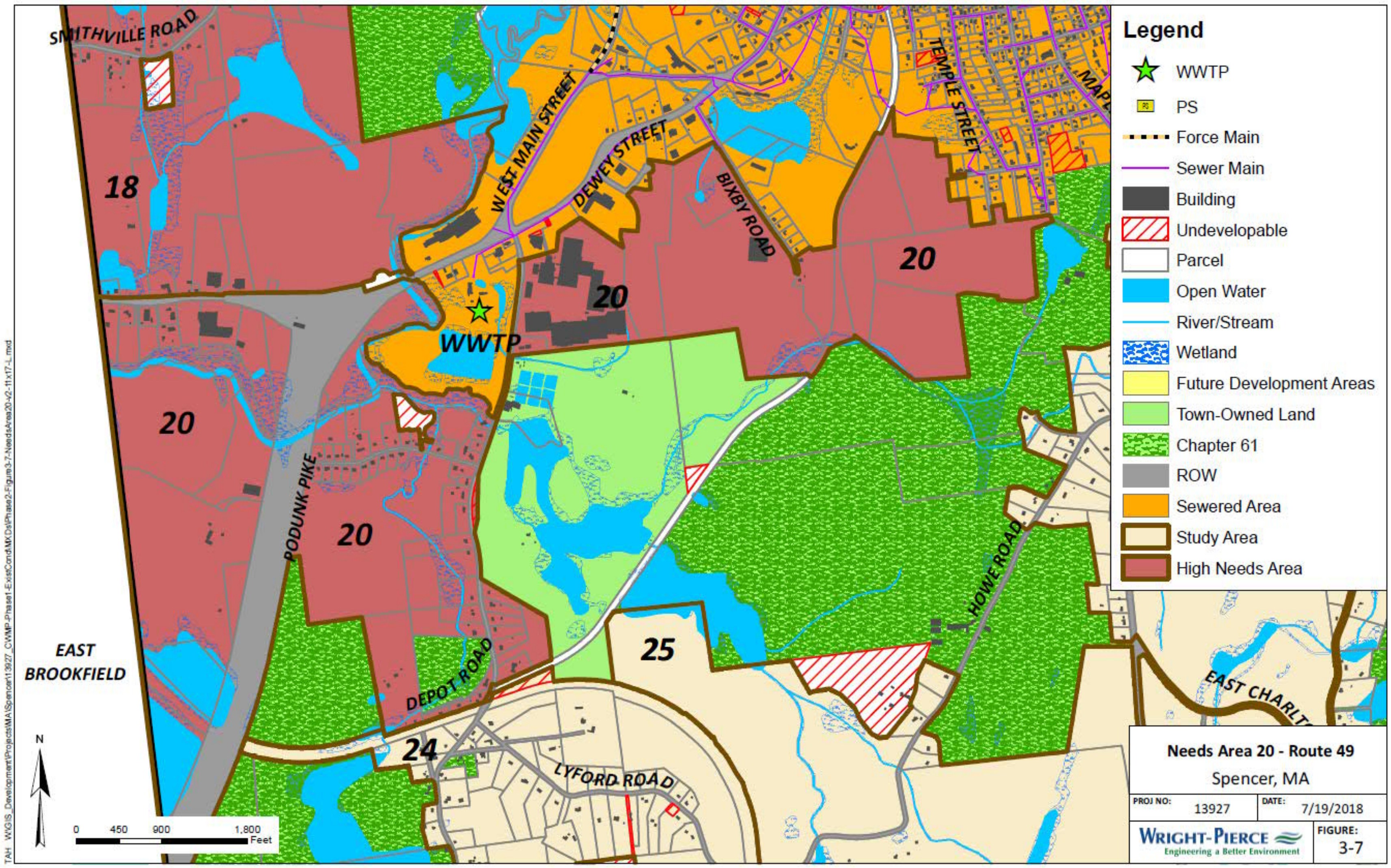

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
SMITHVILLE ROAD
WEST MAIN STREET
DEWEY STREET
BIXBY ROAD
TEMPLE STREET
PODUNK PIKE
DEPOT ROAD
LYFORD ROAD
HOWE ROAD
WWTP
18
20
20
20
20
20
24
25
EAST BROOKFIELD
N
0 450 900 1,800 Feet
Needs Area 20 - Route 49
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-7

TABLE 3-8

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 20 – ROUTE 49

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	7	9	5	2	2	25	1	1	1	1	4	8	33*
I/A Systems	6	6	5	4	4	25	2	2	2	2	4	12	37*
Decentralized													
Shared Septic Systems	7	9	7	3	3	29	3	3	3	2	4	15	44
Shared I/A Systems	5	6	7	5	5	28	3	3	3	3	4	16	44
Small WWTF	3	2	8	8	8	29	5	5	4	5	3	22	51
Collection System Extensions													
Town of Spencer	0	0	4	6	1	11	5	3	4	4	1	17	28*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.8 Study Area 28 - Stiles Reservoir, West

3.4.8.1 Area Description

As shown in **Figure 3-8**, Study Area 28 is located in the southeast part of Spencer and is bordered by Study Area 23 to the north, Study Area 27 and Chapter 61 Lands to the west, the Town of Leicester to the east, and Study Area 33 to the south. This study area encompasses approximately 217 acres and is comprised of 377 parcels.

3.4.8.2 Needs Description

The area predominantly has very good soils. A small portion of the area has high groundwater but mostly has a depth over ten feet to groundwater. A large part of the area has bedrock impacts. The area is split approximately 50/50 between large and small lots. The small lots are around the Reservoir, are less than a half-acre and very densely populated. There are no drinking water protection zones. There are Title 5 setbacks around the Reservoir. The Reservoir has flooding issues and impacts many of the small surrounding lots. There is one potential vernal pool location but no certified pools or estimated habitat areas. Area 28 also does not contain any historical districts.

Based on our evaluation, Study Area 28 received a total score of 35 points in the phase 1 CWMP and was categorized as a High needs area.

3.4.8.3 Short-Listed Alternatives

The specific results for the evaluation for Study Area 28 are summarized in **Table 3-9**. Based on the results of the ranking system, the following wastewater treatment alternatives have been short listed:

- Septic Systems and
- I/A Systems

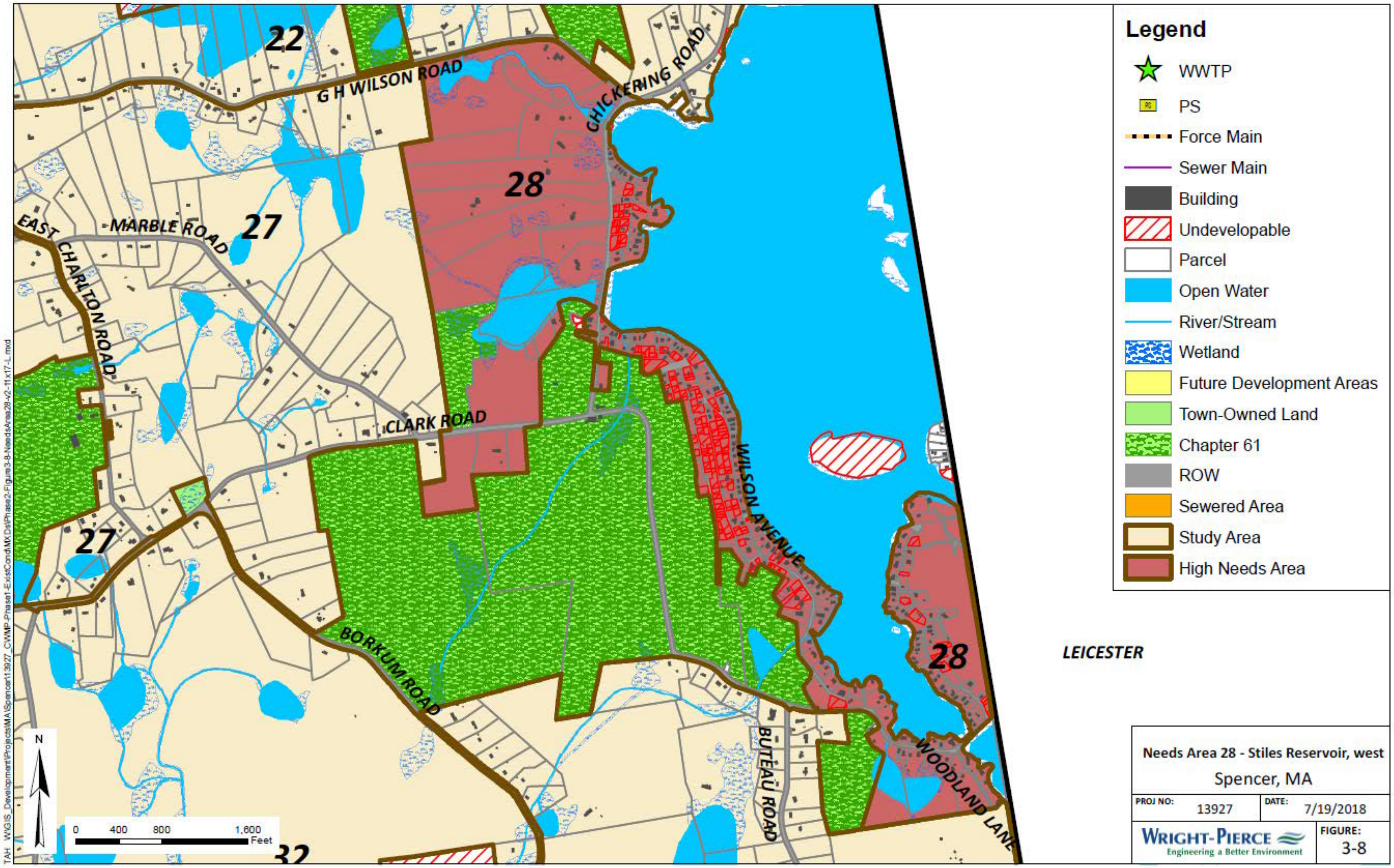

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
G H WILSON ROAD
CHICKERING ROAD
MARBLE ROAD
EAST CHARLTON ROAD
CLARK ROAD
WILSON AVENUE
BORKUM ROAD
BUTEAU ROAD
WOODLAND LANE
LEICESTER
22
27
28
27
28
N
0 400 800 1,600 Feet
Needs Area 28 - Stiles Reservoir, west
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-8

TABLE 3-9

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 28 – STILES RESERVOIR, WEST

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	6	9	6	2	2	25	1	1	1	1	4	8	33*
I/A Systems	5	6	6	4	4	25	2	2	2	2	3	11	36*
Decentralized													
Shared Septic Systems	6	9	8	3	3	29	3	3	4	2	4	16	45
Shared I/A Systems	4	6	8	4	5	27	3	3	4	3	4	17	44
Small WWTF	1	2	7	8	8	26	5	5	4	5	2	21	47
Collection System Extensions													
Town of Spencer	0	0	10	10	2	22	5	3	5	5	1	19	41*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

Conventional septic systems ranked lowest on the evaluation and may continue to be an appropriate technology for Study Area 28. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system also scored low in the evaluation for this area. Directing the wastewater to the Spencer WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal. However, Study Area 28 is located far away from the sewer collection system and elevation changes would likely result in many pump stations to get the flow to the existing collection system. The capital cost is too large to recommend this as an alternative.

3.4.9 Study Area 30 - Cranberry Meadow Pond

3.4.9.1 Area Description

Study Area 30 is located in the southwest part of Spencer as shown in **Figure 3-9** and is bordered by Study Area 24 and 25 to the north, Study Area 29 and Chapter 61 Lands to the west, Study Area 31 to the east, and the Town of Charlton to the south. This study area encompasses approximately 485 acres and is comprised of 177 parcels.

3.4.9.2 Needs Description

The area is evenly split between poor and very good soils, with the poor soils surrounding the surface waters. About half of the area has high groundwater concerns and there are no bedrock impacts. The area includes approximately 60 percent of the lots being less than one acre in size. The small lots are around Cranberry Meadow Pond and some on Jolicoeur Road. There are no drinking water protection zones. There are Title 5 setbacks around Cranberry Meadow Pond and it has flooding issues that impacts many of the small surrounding lots. There are five potential vernal pool locations but no certified pools or estimated habitat areas. Area 30 also does not contain any historical districts.

Based on our evaluation, Study Area 30 received a total score of 31 points in the phase 1 CWMP and was categorized as a High needs area. The specific results for the evaluation for Study Area 30 are summarized in **Table 3-10**.

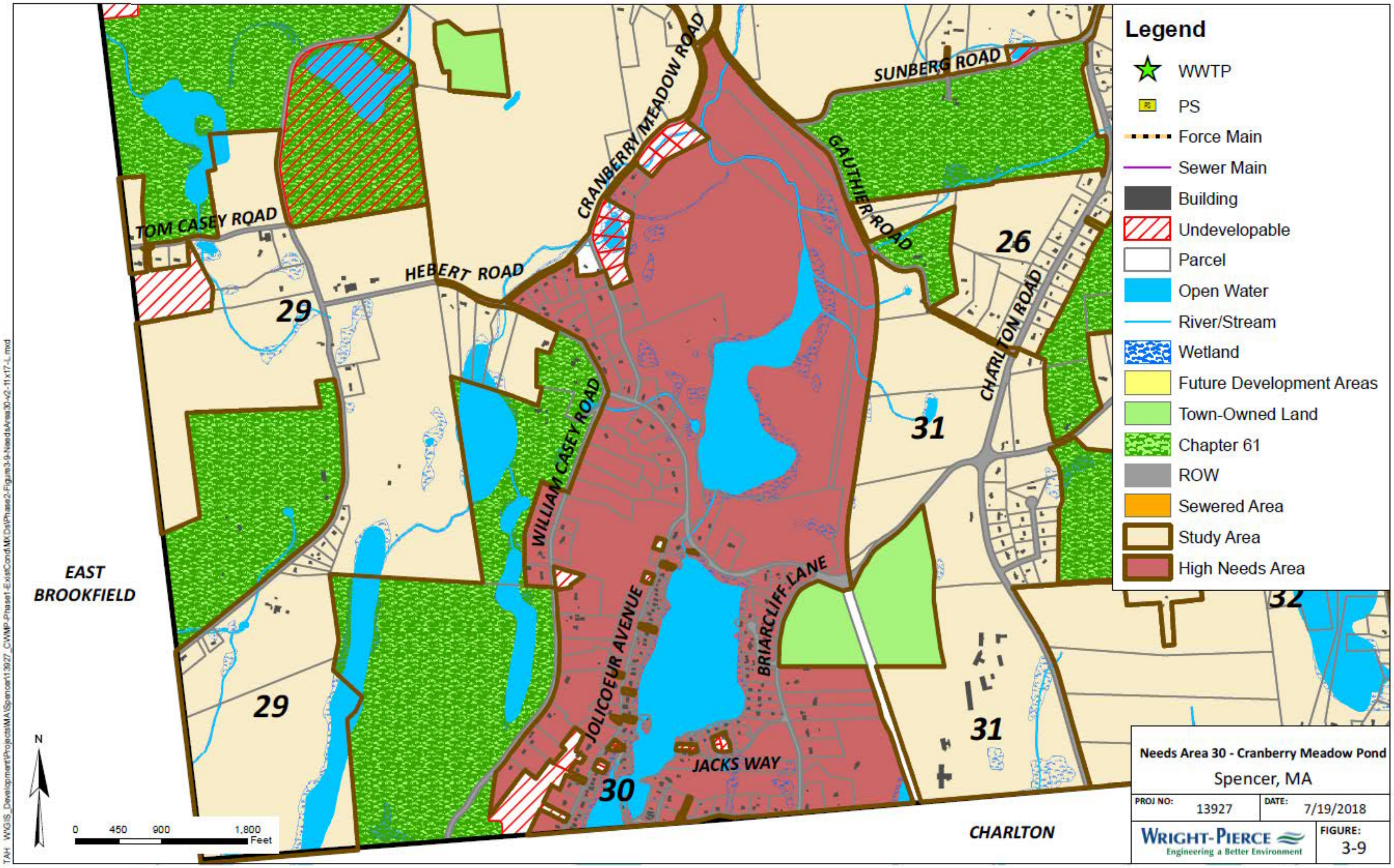

Legend
WWTP
PS
Force Main
Sewer Main
Building
Undevelopable
Parcel
Open Water
River/Stream
Wetland
Future Development Areas
Town-Owned Land
Chapter 61
ROW
Sewered Area
Study Area
High Needs Area
SUNBERG ROAD
CRANBERRY MEADOW ROAD
GAUTHIER ROAD
CHARLTON ROAD
TOM CASEY ROAD
HEBERT ROAD
WILLIAM CASEY ROAD
JOLICOEUR AVENUE
BRIARCLIFF LANE
JACKS WAY
26
29
29
30
31
31
32
EAST BROOKFIELD
CHARLTON
N
0 450 900 1,800 Feet
Needs Area 30 - Cranberry Meadow Pond
Spencer, MA
PROJ NO: 13927
DATE: 7/19/2018
WRIGHT-PIERCE
Engineering a Better Environment
FIGURE: 3-9

TABLE 3-10

TREATMENT TECHNOLOGIES RANKING RESULTS FOR STUDY AREA 30 – CRANBERRY MEADOW POND

Treatment Alternative	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						Total Score
	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs (incl. energy costs)	Environmental	Secondary Criteria Subtotal	
On-site													
Conventional Septic Systems	7	9	6	2	2	26	1	1	1	1	4	8	34*
I/A Systems	6	6	6	5	4	27	2	2	2	2	4	12	39*
Decentralized													
Shared Septic Systems	7	9	8	3	3	30	3	3	4	2	4	16	46
Shared I/A Systems	5	6	8	5	5	29	3	3	4	3	4	17	46
Small WWTF	1	2	7	8	8	26	5	5	5	5	2	22	48
Collection System Extensions													
Town of Spencer	0	0	9	10	1	20	5	3	5	5	1	19	39*

Notes:

1. 0 = most well suited for both primary and secondary criteria
2. 5 = least well suited for secondary criteria
3. 10 = least well suited for primary criteria
4. * = short listed alternative

3.4.9.3 Short-Listed Alternatives

Based on the results of the ranking system, the following wastewater treatment alternatives have been short-listed:

- Septic Systems and
- I/A Systems

Conventional septic systems ranked lowest on the evaluation and may continue to be an appropriate technology for Study Area 30. I/A systems may improve the level of treatment and could also provide for nutrient removal as compared to existing conventional septic system.

Extending the municipal collection system also scored low in the evaluation for this area. Directing the wastewater to the WWTF would provide for a reliable and enhanced level of treatment, including nutrient removal. However, Study Area 30 is located far away from the municipal sewer collection system and elevation changes would likely result in many pump stations needed to get the flow to the existing collection system. The capital cost is too large to recommend this as an alternative.

3.4.10 Summary of Short-Listed Wastewater Treatment Alternatives

Phase 3 will further evaluate the short-listed alternatives for each of the needs areas as summarized below in **Table 3-11**. As part of the conceptual design, each viable short-listed treatment alternative will be analyzed for its environmental impacts, treatment efficiency, and a present worth cost analysis comparing the capital and O&M costs for each type of system.

TABLE 3-11
SHORT LIST OF TREATMENT ALTERNATIVES FOR NEEDS AREAS

Treatment Technology	Study Area 11 Wire Village Road & Sugden Reservoir, North & West	Study Area 12 Sugden Reservoir, South & East	Study Area 13 Cooney Road	Study Area 15 High Ridge Road	Study Area 16 Lake Whittemore	Study Area 18 Route 9 and 49, north	Study Area 20 Route 49	Study Area 28 Stiles Reservoir, west	Study Area 30 Cranberry Meadow Pond
Conventional Septic Systems	X	X	X	X	X	X	X	X	X
I/A Systems	X	X	X	X	X	X	X	X	X
Decentralized Systems (Shared System or small WWTF)									
Collection System Extension	X	X	X	X	X	X	X		

3.5 COLLECTION SYSTEM ALTERNATIVES

The collection system alternatives were described in detail in Chapter 2 of this report. These alternatives were evaluated based on a number of conditions, including technical, operation, maintenance, and economic factors. The result of this analysis is a short-list of viable alternatives to be further evaluated in Phase 3 including the following:

- Conventional gravity collection system
- Low pressure grinder pump systems
- Increasing pipe size if necessary to accept new flow
- Increasing pump station capacity if necessary to accept new flow
- Increasing WWTF capacity if necessary to accept new flow

Conventional systems typically have lower energy cost as compared to low pressure systems (LPS) and can handle power outages with backup power generators at the pump stations. They are also typically sized with excess working capacity to allow for future connections.

Low pressure grinder pump systems are sometimes better suited for challenging terrain, crossings of streams, flat, low lying areas, roads, railroads, and narrow streets. These types of systems can often have lower capital cost and be easier to construct due to shallower excavations.

Vacuum and small diameter gravity sewer systems have been discontinued from further study due to several factors including appropriateness for Town's topography, cold weather and higher level of operation and maintenance.

3.6 EFFLUENT DISPOSAL ALTERNATIVES

Based on this evaluation and results summarized in **Table 3-11**, there are only two different alternatives for wastewater treatment being considered for Phase 3, which include the use of conventional onsite septic or I/A types of systems or connection to the existing municipal collection system for treatment at the WWTF. Other disposal technologies have been discontinued from further study due to lack of applicability to the short-listed treatment technologies.

A

APPENDIX A

SUMMARY OF INNOVATIVE/ALTERNATIVE TECHNOLOGIES APPROVED FOR USE IN MASSACHUSETTS AND UNDER REVIEW

TABLE 1
CERTIFIED FOR GENERAL USE

See approval letters and O&M checklists for all technologies certified for general use.

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Composting Toilets	Compliant with Title 5	Generic	Composting Toilet	Composting toilets as described in Title 5 (310 CMR 15.289(3))
Recirculating Sand Filter	Compliant with Title 5	Generic	Sand Filter	BOD5 and TSS removal; Nitrogen reduction
ADS GEO-flow Pipe Leaching System	GeoFlow Pipe Leaching System	Advanced Drainage System, Inc. 4640 Trueman Boulevard Hilliard, OH 43026 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS *Bed Only	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
Advantex Treatment System	Advantex AX20, AX100	Orenco Systems, Inc. 814 Airways Avenue Sutherlin, OR 97479 Contact the manufacturer for schematics of I/A technologies.	Textile filter	Equivalent to conventional Title 5 system Approval: August 30, 2012
Amphidrome	Amphidrome Process	F.R. Mahony & Associates, Inc. 131 Weymouth Street Rockland, MA 02370 Contact the manufacturer for schematics of I/A technologies.	Submerged Attached-Growth Sequencing Bioreactor	Equivalent to conventional Title 5 system Approval: February 19, 2013
Bioclere	16, 22, 24, 30, and 36 series	Aquapoint.3 LLC 39 Tarkiln Place New Bedford, MA 02745 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to conventional Title 5 system Approval: February 12, 2013

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
BioDiffuser and ARC Chambers	BioDiffuser 11" Standard, BioDiffuser 14" High Capacity, BioDiffuser 16" High Capacity, BioDiffuser 15" Narrow (Bio 2), BioDiffuser 22" Narrow (Bio 3), ARC 36, ARC 36HC, ARC 50, ARC 18, ARC 24, ARC 36 LP (3.8 inch-invert), and ARC 36 LP (8 inch-invert)	Infiltrator Systems, Inc. P.O. Box 768 4 Business Park Road Old Saybrook, CT 06475 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: May 22, 2014
Bio-Microbics MicroFAST	MicroFAST, High Strength FAST, and NitriFAST	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to conventional Title 5 system Approval: February 12, 2013
Bio-Microbics MicroFAST	MicroFAST, High Strength FAST, and NitriFAST for Systems less than 2,000 GPD	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227 Contact the manufacturer for schematics of I/A technologies.	Aerobic with Nitrogen Reduction Treatment Unit	Nitrogen Reduction-Equivalent to conventional Title 5 system Approved: December 29, 2010
BUSSE-MF System	Models B-220, 440, 660, 880, 1000, 1500, 2000	Busse Green Technologies Inc. 1101 South Euclid Ave. Oak Park, IL 60304 Contact the manufacturer for schematics of I/A technologies.	Activated sludge process and a membrane process (biological-filtration)	Equivalent to conventional Title 5 system Approval: February 19, 2013
Clean Solution Treatment System	250, 250 Integral, 250PT, 250ST3, 250ST4, 600, 1000, 1750, 2500, 3100 and 10000	Wastewater Alternatives, Inc. 2 Whitney Road, Suite 10 Concord, NH 03301 Contact the manufacturer for schematics of I/A technologies.	Biological Treatment Unit	Equivalent to conventional Title 5 system Approval: March 9, 2010

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Cultec Chambers	EZ-24; Contactor C4; Recharger 180, 280 and 330XL	Cultec, Inc. PO Box 280, 878 Federal Road Brookfield, CT 06804 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: May 22, 2014
Dominator Septic Tanks	1001010W, 1001411W, 1001511W	Snyder Industries, Inc. 4700 Fremont St., PO Box 4583 Lincoln, NE 68504 Contact the manufacturer for schematics of I/A technologies.	Polyethylene septic tanks	Equivalent to conventional septic tank. Approval: September 2, 2009
Eljen In-Drain Systems	Type B43 and A42	Eljen Corporation 125 McKee Street East Hartford, CT 06108 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
EZ Flow Polystyrene Aggregate System	EZ1202V, EZ1203T, EZ1203H, EZ1402V, EZ1203 Bed, EZ1203 Mound	Infiltrator Systems, Inc. P.O. Box 768 4 Business Park Road Old Saybrook, CT 06475 Contact the manufacturer for schematics of I/A technologies.	Alternative Aggregate	Alternative Aggregate in trench, bed, or gallery configurations Approval: November 9, 2011
Geoflow Subsurface Drip Wastewater Disposal System	Classic WF 16 and WF Special Order and WFPC 16 and WFPC Special Order series	Geoflow Inc. 506 Tamal Plaza Corte Madera, CA 94250 Contact the manufacturer for schematics of I/A technologies.	Pressure Distribution System (Subsurface)	Dispersal Unit Approval: March 19, 2013
Hoots Aerobic Systems	Hoots Aerobic H-Series H-500A, H-600A, H-750A and H-1000A	Hoots Aerobic Systems Inc. 2885 Highway 14 East Lake Charles, LA 70607 Contact the manufacturer for schematics of I/A technologies.	Aeration device with indigenous bacteria	Equivalent to conventional Title 5 system Approval: February 19, 2013

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Infiltrator Chambers	High Capacity chamber, Quick4 High Capacity chamber, Standard chamber, Quick4 Standard chamber, Quick4 Plus Standard, Quick4 Plus Standard LP (Low Profile), Infiltrator 3050 (Storm Tech SC-740), Equalizer 24 chamber, Quick4 Equalizer 24 chamber, Equalizer 36 chamber, Quick4 Equalizer 36 chamber, and Quick4 Equalizer 24 LP (Low Profile)	Infiltrator Systems, Inc. P.O. Box 768 4 Business Park Road Old Saybrook, CT 06475 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: May 22, 2014
JET Aerobic Wastewater Treatment	JET-500, JET-750, JET-1250, JET-1500	Clearwater Recovery 175 Spring Street Rockland, MA 02370 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to conventional Title 5 system Approval: February 19, 2013
Mantis M5 System	Mantis 5.1 and 5.2	Eljen Corporation 125 McKee Street East Hartford, CT 06108 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS Disposal-Only Approval: May 22, 2014
Perc-Rite Drip System	ASD 15, 25, and 40	American Manufacturing Co, Inc. PO Box 549 Manassas, VA 20108 Contact the manufacturer for schematics of I/A technologies.	Pressure Distribution System (Subsurface)	Dispersal Unit Approval: May 23, 2012
Pirana System [formerly Aquaworx Remediator]	Pirana System	SepTech/Pirana System 1875 Joy Road Occidental, CA 95465 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	Enhance and maintain performance of properly functioning SAS. Approval: September 22, 2011

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Polyethylene Septic Tanks	TW-1050, TW-1250, and TW-1500	Infiltrator Systems, Inc. P.O. Box 768 6 Business Park Road Old Saybrook, CT 06475 Contact the manufacturer for schematics of I/A technologies.	Polyethylene septic tanks	Equivalent to conventional Title 5 system Approval: March 30, 2011
Polyethylene Septic Tanks	41759, 41780, 41819, 42396	Norwesco, Inc. PO Box 439 St Bonifacius, MN 55375-0439 Contact the manufacturer for schematics of I/A technologies.	Polyethylene septic tanks	Equivalent to conventional septic tank. Approval: February 8, 2008
Presby Enviro-Septic Wastewater Treatment System	Enviro-Septic	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS * * Bed only Treatment with Disposal	Alternative SAS with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
Presby Advanced Enviro-Septic (Alternative SAS) Wastewater Treatment System	Advanced Enviro-Septic	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	* Patented Sand Filter - Secondary Treatment with Disposal * Bed installations only * Alternative SAS	Alternative SAS with Secondary Treatment for 40% size reduction with the effluent loading rates specified in Title 5(310 CMR 15.242). Approval: August 12, 2013
Presby Advanced Enviro-Septic (Alternative SAS with Treatment) Wastewater Treatment System	Advanced Enviro-Septic	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	* Patented Sand Filter - Secondary Treatment with Disposal * Bed installations only * Alternative SAS	Alternative SAS with Secondary Treatment for 50% size reduction with the effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: December 17, 2013

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Roth Global SEPTECH** ** this replaces FRALO SEPTEC poly tanks	ST 1060, 1250, and 1500	Roth Global Plastics, Inc. PO Box 2451 One General Motors Drive Syracuse, NY 13206 Contact the manufacturer for schematics of I/A technologies.	Polyethylene Septic Tanks	Equivalent to conventional septic tank Approval: March 2, 2011
RUCK	Systems less than 2000 gpd	Innovative RUCK Systems, Inc.362 Gifford Street Falmouth, MA 02540 Contact the manufacturer for schematics of I/A technologies.	Filter	Nitrogen Reduction Equivalent to conventional Title 5 system Approval: May 31, 2013
SeptiTech Treatment Systems by Bio-Microbics of Maine, Inc.	400, 550, 750, 1200, 1500 and 3000	SeptiTech, Inc. 70 Commercial Street, Suite 3 Lewiston, ME 04240 Contact the manufacturer for schematics of I/A technologies.	Textile filter Trickling Filter	Equivalent to conventional Title 5 system Approval: February 19, 2013
Singulair	Singulair 960 and 960 DN	Siegmund Environmental Services, Inc. 49 Pavilion Avenue Providence, RI 02905 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to conventional Title 5 system Approval: January 3, 2008
Sludgehammer	Sludgehammer Alternative Treatment System	Sludgehammer Group Ltd 336 Division Road Petoskey, MI 49770 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	To enhance and maintain performance of properly functioning SAS. Approval: May 22, 2014
Smith & Loveless FAST System	Modular FAST	Smith & Loveless, Inc. 14040 Santa Fe Trail Drive Lenexa, KS 66215 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to conventional Title 5 system Approval: April 4, 2006

Technology	Model(s)	Company	Technology Description	Approved Use & Approval Date[1]
Waterloo Biofilter	Biofilter	Waterloo Biofilter System, Inc. 143 Dennis Street Rockwood, NT, N0B 2K0 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to conventional Title 5 system Approval: November 1, 2012

Notes:
[1] Approval Use as of June 2014.

TABLE 2
CERTIFIED FOR PROVISIONAL USE

See approval letters and O&M checklists for all technologies certified for Provisional Use.

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Advantex	Advantex AX20	Orenco Systems, Inc. 814 Airways Ave. Sutherlin, OR 97479 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit with UV protected fiberglass reinforced plastic module	Equivalent to conventional Title 5 System Approval: May 22, 2014
Amphidrome	Amphidrome Process	F.R. Mahony & Associates, Inc. 273 Weymouth Street Rockland, MA 02370 Contact the manufacturer for schematics of I/A technologies.	Submerged Attached-Growth Sequencing Bioreactor	BOD, TSS, and Nitrogen Reduction Approval: May 22, 2014
Bioclere	16 Series designed for less than 2,000 gpd	Aquapoint.3 LLC 39 Tarkiln Place New Bedford, MA 02745 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to Conventional Title 5 system Approval: May 22, 2014
Bioclere	24, 30, and 36 series designed for flows between 2,000 gpd to 10,000 gpd	Aquapoint.3 LLC 39 Tarkiln Place New Bedford, MA 02745 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to Conventional Title 5 system Approval: May 22, 2014
FAST for residential > 2,000 gpd and non-residential 0 to 10,000 gpd by Bio-Microbics, Inc.	MicroFAST, High Strength FAST, and NitriFAST models 3.0, 4, 5, and 9.0. For flows between 2,000 to 10,000gpd	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	BOD5, TSS, and Nitrogen reduction Approval: May 22, 2014
Nitrex	Nitrex Filters	Lombardo Associates, Inc 49 Edge Hill Road Newton, MA 02467 Contact the manufacturer for schematics of I/A technologies.	Filter with nitrate reactive media	BOD5, TSS, Nitrogen Reduction Approval: May 22, 2014

Technology	Model(s)	Company	Technology Description	Approved Use[1]
SeptiTech Treatment Systems by Bio-Microbics of Maine, Inc.	400N, 550N, 750N, 1200N, 1500N, 3000N	SeptiTech, Inc 220 Lewiston Road Gray, ME 04039 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	SeptiTech Treatment System Approval: May 22, 2014
Singulair	Singulair 960 DN 500, 750, 1000, 1250, 1500 and Green 600	Siegmund Environmental Services, Inc. 49 Pavilion Avenue Providence, RI 02905 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to conventional Title 5 system Approval: May 22, 2014
Smith & Loveless Modular FAST	Modular FAST 2,000 to 10,000 gpd	Smith & Loveless, Inc 14040 Santa Fe Trail Drive Lenexa, KS 66215 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	Equivalent to Conventional Title 5 system Approval: May 22, 2014
Waterloo Biofilter	Biofilter < 2,000 gpd	Waterloo Biofilter System, Inc 143 Dennis Street Rockwood, ON N0B 2K0 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to conventional Title 5 system Approval: May 22, 2014
Waterloo Biofilter	Biofilter Between 2,000 and 10,000 gpd	Waterloo Biofilter System, Inc 143 Dennis Street Rockwood, ON N0B 2K0 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	Equivalent to conventional Title 5 system Approval: May 22, 2014

Notes:
[1] Approval Use as of June 2014.

TABLE 3
APPROVED FOR PILOTING

See approval letters and O&M checklists for all technologies approved for piloting use.

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Bio Barrier MBR WWT System	Bio Barrier MBR	Biomicrobics Inc. 8450 Cole Parkway Shawnee, KS 66227 Contact the manufacturer for schematics of I/A technologies.	Aerobic and anaerobic	BOD, TSS, and Nitrogen Reduction Approval: July 18, 2012
Hydro-Kinetic Wastewater Treatment System	Model 600 FEU	NORWECO, Inc. 220 Republic Street Norwalk, OH 44857 Contact the manufacturer for schematics of I/A technologies.	Extended aeration and attached growth processes with anoxic tank	BOD, TSS, and Nitrogen Reduction Approval: August 23, 2013
PhosRID	PhosRID Phosphorus Removal System	Lombardo Associates, Inc. 49 Edge Hill Road Newton, MA 02467-1170 Contact the manufacturer for schematics of I/A technologies.	Upflow filter	Phosphorus removal Approval: February 24, 2014
RUCK	CFT System	North Coast Technologies, LLC 200 Main Street, Suite 201 Falmouth, MA 02540 Contact the manufacturer for schematics of I/A technologies.	Aerobic RUCK filter	Nitrogen Removal Approval: December 11, 2012
Waterloo EC-P	Waterloo EC-P	Waterloo Biofilter System, Inc 143 Dennis Street, P.O. Box 400 Rockwood, ON N0B 2K0 Contact the manufacturer for schematics of the I/A technology.	Oxidation process with settling	Phosphorus reduction Approval: March 19, 2014

Notes:
[1] Approval Use as of June 2014.

TABLE 4
APPROVED FOR REMEDIAL USE

See approval letters and O&M checklists for all technologies approved for remedial use.

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Composting Toilets	Compliant with Title 5	Generic	Composting Toilet	Composting toilets as described in Title 5 (310 CMR 15.289(3))
Bottomless Sand Filters	Compliant with Title 5	Generic	Sand Filter	BOD5 and TSS removal Approval: June 26, 2012
Recirculating Sand Filters	Compliant with Title 5	Generic	Sand Filter	BOD5 and TSS removal
AdvanTex Treatment Systems	AX-15, AX-20 and AX-100	Orenco Systems, Inc. 814 Airways Avenue Sutherlin, OR 97479 Contact the manufacturer for schematics of I/A technologies.	Textile media aerobic treatment	BOD5 and TSS removal Approval: November 5, 2012
Aerobic Recovery System(TM) Septic Restoration Process (formerly Aero-Stream)	Models 101, 102, 103 and 104	Aero-Stream LLC On-Site Treatment Systems(TM) W300 N7706 Christine Lane Hartland, WI 53029 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	Restoration of failed SAS Approval: May 12, 2011

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Amphidrome	Amphidrome Process	F.R. Mahony & Associates, Inc. 131 Weymouth Street Rockland, MA 02370 Contact the manufacturer for schematics of I/A technologies.	Submerged Attached-Growth Sequencing Bioreactor	BOD5 and TSS removal Approval: November 5, 2012
Bioclere	16, 22, 24, and 30 series	Aquapoint.3 LLC 39 Tarkiln Place New Bedford, MA 02745 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	BOD5 and TSS removal Approval: November 5, 2012
BUSSE-MF System	Models B-220, 440, 660, 880, 1000, 1500, 2000	Busse Green Technologies Inc. 1101 South Euclid Ave. Oak Park, IL 60304 Contact the manufacturer for schematics of I/A technologies.	Activated sludge process and a membrane process (biological-filtration)	Equivalent to conventional Title 5 system Approval: November 5, 2012
The Clean Solution Treatment System	250, 250 PT, 250ST3, 250ST4, 600, 1000, 1750, 2500, 3100 and 10000	Wastewater Alternatives of New England, LLC 2 Whitney Road, Suite 10 Concord, NH 03301 Contact the manufacturer for schematics of I/A technologies.	Submerged media attached-growth biological treatment unit	BOD5 and TSS removal Approval: November 5, 2012

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Enviro-Septic Wastewater Treatment System	Enviro-Septic System	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS * * Bed only Treatment with Disposal	Alternative SAS with BOD/TSS reduction and 40% reduction in size with the effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
Presby Advanced Enviro-Septic (Alternative SAS) Wastewater Treatment System	Advanced Enviro-Septic System	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	* Patented Sand Filter – Secondary Treatment with Disposal * Bed installations only * Alternative SAS	Alternative SAS with Secondary Treatment for 40% size reduction with the effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: August 12, 2013
Presby Advanced Enviro-Septic (Alternative SAS with Treatment) Wastewater Treatment System	Advanced Enviro-Septic System	Presby Environmental Inc. 143 Airport Road Whitefield, NH 03598 Contact the manufacturer for schematics of I/A technologies.	* Patented Sand Filter – Secondary Treatment with Disposal * Bed installations only * Alternative SAS	Alternative SAS with Secondary Treatment for 50% size reduction with the effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: December 17, 2013

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Eljen In-Drain Systems	Type B43 and A42	Eljen Corporation 125 McKee Street East Hartford, CT 06108 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
GEO-flow Pipe Leaching System	GeoFlow Pipe Leaching System	Advanced Drainage Systems, Inc. (ADS) 4640 Trueman Boulevard Hilliard, OH 43026 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS* * Bed only	Alternative SAS in trench, bed, or gallery configurations with 40% reduction in size with effluent loading rates specified in Title 5 (310 CMR 15.242). Approval: March 19, 2013
Hoot Aerobic Systems	Hoots Aerobic H-Series H-500A, H-600A, H-750A and H-1000A	Hoots Aerobic Systems Inc. 2885 Highway 14 East Lake Charles, LA 70607 Contact the manufacturer for schematics of I/A technologies.	Aeration device with indigenous bacteria	Equivalent to conventional Title 5 system Approval: November 5, 2012
Jet BAT Media Wastewater Treatment Plants	J-500, J-750, J-1000, J-1250 and J-1500	JET Inc. 750 Alpha Drive Cleveland, OH 44143 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	BOD5 and TSS removal Approval: November 5, 2012

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Low-Rate Intermittent Sand Filter	Orenco Low-Rate Filter	Saneco, Inc. Box 9B 65 Eastern Avenue Essex, MA 01929 Contact the manufacturer for schematics of I/A technologies.	Sand Filter	BOD5 and TSS removal Approval: November 5, 2012
MicroFAST	MicroFAST, High Strength FAST, and NitriFAST	Bio-Microbics, Inc. 8450 Cole Parkway Shawnee, KS 66227 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	BOD5 and TSS removal Approval: November 5, 2012
ModularFAST	Modular FAST	Smith & Loveless, Inc. 14040 Santa Fe Trail Drive Lenexa, KS 66215 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment Unit	BOD5 and TSS removal Approval: November 5, 2012
Perc-Rite Subsurface Drip Wastewater Disposal System	Drip Disposal System	American Manufacturing Co. Inc. 22011 Greenhouse Rd Elkwood, VA 22718 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS trench-drip irrigation Approval: March 4, 2011

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Pirana System	Pirana System	SepTech/Pirana System 1875 Joy Road Occidental, CA 95465 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	Restoration of failed SAS Approval: September 22, 2011
Puraflo	Puraflo Peat Fiber Biofilter	Bord na Mona Environmental Products U.S. Inc. 4106 Bernau Avenue Greensboro, NC 27407 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment unit	Equivalent to conventional Title 5 system Approval: November 5, 2012
SeptiTech Treatment Systems by Bio-Microbics of Maine, Inc.	SeptiTech 300, 400, 550, 750, 1200 3000, and SeptiTech Engineered Systems	SeptiTech, Inc. 220 Lewiston Road Gray, ME 04039 Contact the manufacturer for schematics of I/A technologies.	Aerobic Treatment unit	BOD5 and TSS removal Approval: November 5, 2012
Singulair Bio-Kinetic Wastewater Treatment System	Singulair and Singulair Green models	NORWECO, Inc. 220 Republic Street Norwalk, OH 44857 Contact the manufacturer for schematics of I/A technologies.	Aerobic treatment	BOD5 and TSS removal Approval: November 5, 2012

Technology	Model(s)	Company	Technology Description	Approved Use[1]
Sludgehammer Alternative Treatment System	Sludgehammer	Sludgehammer Group Ltd 336 Division Road Petoskey, MI 49770 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	Restoration of failed SAS Approval: December 22, 2010
Soilair	RF-3952TB, 3952MP, 5264MP, 5295MP, 9858MP, 15652MP, 21650MP, 29450MP	Geomatrix, LLC 114 Mill Rock Road East Old Saybrook, CT 06475 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration	SAS restoration Approval: November 2, 2010
Subsurface Drip Wastewater Disposal System	Drip Disposal System	Geoflow Inc. 500 Tamal Plaza, Suite 506 Corte Madera, CA 94925 Contact the manufacturer for schematics of I/A technologies.	Alternative SAS	Alternative SAS trench-drip irrigation Approval: June 22, 2011
Waterloo Biofilter	Biofilter	Waterloo Biofilter System, Inc. 143 Dennis Street Rockwood, ONT, N0B 2K0 Contact the manufacturer for schematics of I/A technologies.	Trickling Filter	BOD5 and TSS removal Approval: November 5, 2012

Technology	Model(s)	Company	Technology Description	Approved Use[1]
White Knight Inoculator / Generator Alternative Treatment System	White Knight System	Knight Treatment Systems 281 County Route 51A Oswego, NY 13126 Contact the manufacturer for schematics of I/A technologies.	SAS Aeration with Bacterial Augmentation	Restoration of failed SAS Approval: December 22, 2010

Notes:
[1] Approval Use as of June 2014

I/A Technologies with Nitrogen Reduction Credit

A number of the technologies listed above have received nitrogen reduction credit as part of their technology approvals:

General Use Certification

Recirculating Sand Filters - Generic (25 mg/L TN) up to 10,000 GPD
Ruck (19 mg/L TN) up to 2,000 GPD
MicroFAST (19 or 25 mg/L TN) up to 2,000 GPD - residential flows only

Provisional Use Approvals

Advantex
Amphidrome
Bioclere *
FAST
Mod FAST
SeptiTech
Singulair
Waterloo Biofilter
Nitrex

* Bioclere has reached limit for installed systems.

Piloting Use Approvals

Bio Barrier MBR WWT System
Nitrex Plus
OMNI-Cycle System
OMNI Recirculating Sand Filter System
RID Phosphorus Removal System
RUCK CFT

[1]Certifications and Approvals as of June 2014.

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SPENCER, MASSACHUSETTS

MAY 2019

Comprehensive Wastewater Management Plan

13927A

Phase 3 – Detailed Evaluation of Alternatives & Recommended Wastewater Management Plan

WRIGHT-PIERCE

Engineering a Better Environment

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN

PHASE 3 – DETAILED EVALUATION OF ALTERNATIVES AND RECOMMENDED WASTEWATER MANAGEMENT PLAN

FOR THE

TOWN OF SPENCER

MAY 2019

PREPARED BY:

WRIGHT-PIERCE

600 Federal Street, Suite 2151
Andover, MA 01810
Phone: 978.416.8000 | Fax: 978.470.3558

TOWN OF SPENCER

COMPREHENSIVE WASTEWATER MANAGEMENT PLAN (CWMP)

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SECTION 1

INTRODUCTION

1.1 BACKGROUND INFORMATION

The Town of Spencer continues to analyze its current wastewater treatment and disposal needs through this Comprehensive Wastewater Management Plan (CWMP). Approximately 40 percent of the residents of Spencer rely upon the Town's existing collection system to collect, transport, treat, and dispose of their wastewater at the Wastewater Treatment Facility (WWTF). The remaining residents, which reside outside of the sewer service area, rely upon individual onsite Title 5 wastewater disposal systems (septic systems). The intent of the CWMP is to provide a wastewater management planning tool to guide the Town moving forward.

The CWMP *Phase 1 - Existing Conditions, Problem Identification and Needs Assessment* report and the *Phase 2 - Alternatives Identification and Screening* report were completed and submitted to the Massachusetts Department of Environmental Protection (MA DEP) on May 16, 2018 and October 8, 2018, respectively. This report, entitled *Phase 3 - Detailed Evaluation of Alternatives and Recommended Wastewater Management Plan* report, presents the results of the three-phase study undertaken by the Town of Spencer to determine the viability of current wastewater disposal practices in non-sewered areas and the needs within the existing sewer system. In general, the intent of the final phase of the CWMP is to evaluate shortlisted wastewater management alternatives previously identified in Phase 2 and recommend a wastewater management plan for the 20-year planning period.

The Town of Spencer continues its efforts to evaluate, update, and improve its wastewater collection system and treatment facilities to remain in compliance with its regulatory requirements. The Town was issued a draft National Pollutant Discharge Elimination System (NPDES) permit by EPA in February 2018. The final permit was issued in February 2019. A copy is included in **Appendix A**. The new permit contains limits to reduce phosphorus loadings from its effluent discharge to the Cranberry River.

1.2 PURPOSE AND SCOPE OF SERVICES

In October 2017, the Town retained Wright-Pierce to provide this CWMP. This document satisfies the Phase 3 requirements of the three phase CWMP process and is prepared in accordance with DEP's 1996 Guide to Comprehensive Wastewater Management Planning as outlined below:

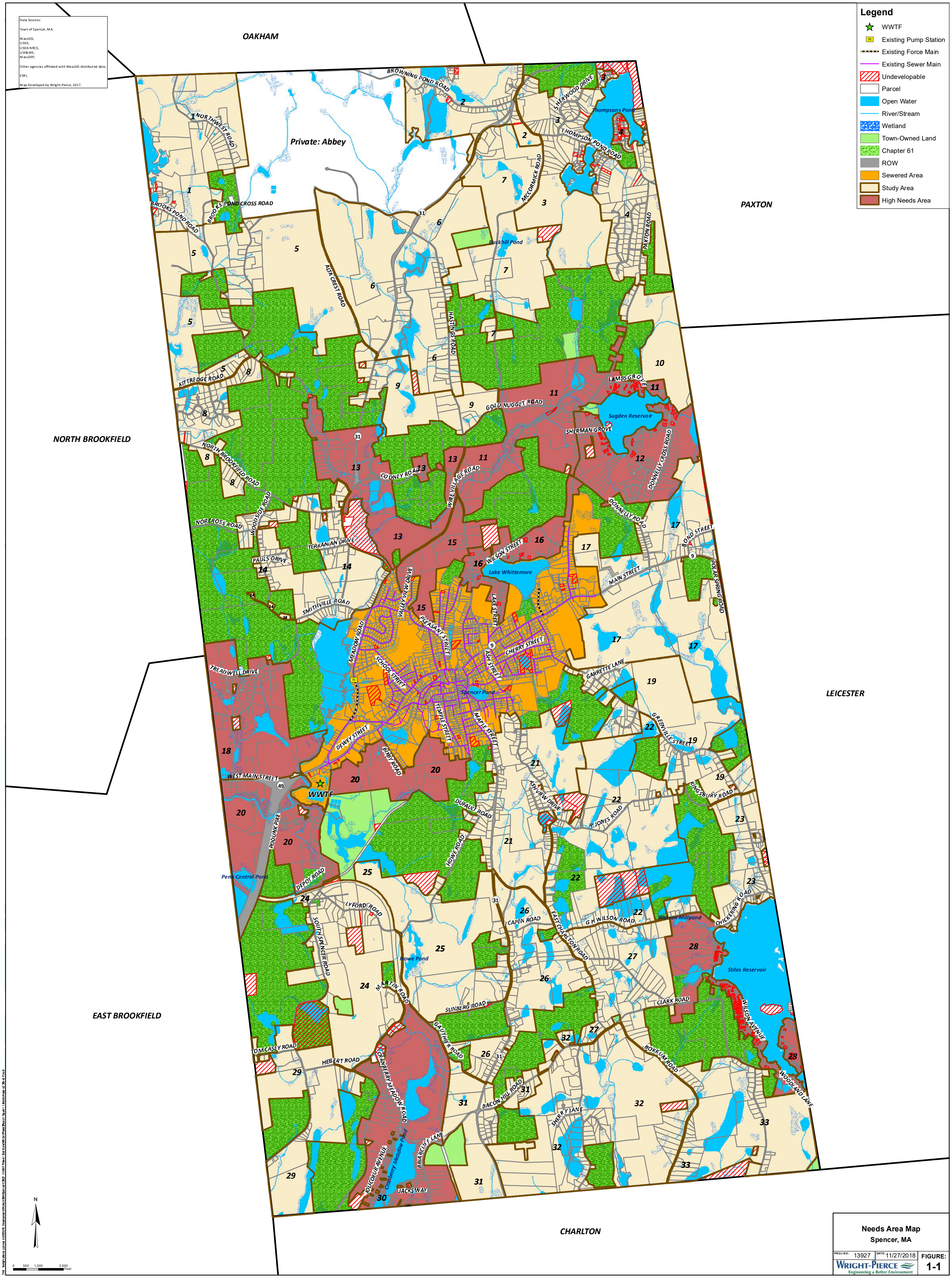
Phase 1: Assessed existing conditions, problem identification and needs assessment for the Town. The completed needs assessment determined areas with a "need for further study" in Phase 2;

Phase 2: Alternatives Identification and Screening. Identify and short-list appropriate means of wastewater management alternatives to address any "needs areas" identified in Phase 1. The analysis includes a review of technical, environmental, institutional, and economic factors; and

Phase 3: Provide a detailed evaluation of alternatives short-listed in Phase 2 and development of recommended wastewater management plan.

1.3 SUMMARY OF PHASE 1 - EXISTING CONDITIONS, PROBLEM IDENTIFICATION AND NEEDS ASSESSMENT REPORT

Twenty-four of the thirty-three study areas evaluated in Phase 1 were determined to be well suited for the continued use of on-site Title 5 septic systems. Those 24 study areas were categorized as having Average, Low or Very Low wastewater disposal needs and were removed from further analysis. The Phase 1 analysis also determined that the Town has eight "needs areas" (Study Areas 11, 12, 13, 16, 18, 20, 28, and 30) and one future development area (15) as shown in **Table 1-1** and **Figure 1-1**. These nine areas were the focus of the CWMP Phase 2 report and continue to be the focus of this Phase 3 report.



Needs Area Map
Spencer, MA

PROJ NO: 13927 DATE: 11/27/2018 FIGURE: 1-1

WRIGHT-PIERCE Engineering a Better Environment

TABLE 1-1

AREAS WITH NEED FOR FURTHER STUDY

Needs Area	Location Name	Priority Ranking
11	Wire Village Road and Sugden Reservoir, north and west	High Needs Area
12	Sugden Reservoir, south and east	High Needs Area
13	Cooney Road	High Needs Area
15	High Ridge Road	Future Development Area
16	Lake Whittemore	High Needs Area
18	Route 9 and 49 Intersection, north	High Needs Area
20	Route 49	High Needs Area
28	Stiles Reservoir, west	High Needs Area
30	Cranberry Meadow Pond	High Needs Area

1.4 SUMMARY OF PHASE 2 – ALTERNATIVES IDENTIFICATION AND SCREENING REPORT

The intent of the Phase 2 analysis was to determine if an identified "needs area" requires additional wastewater management beyond conventional Title 5 systems. The potential wastewater management alternatives include an evaluation of Innovative/Alternative (I/A) shared/decentralized systems, sewer extensions, treatment and disposal facilities, management techniques, and the continued use of Title 5 systems.

1.4.1 Treatment Alternatives

Wastewater treatment, collection and disposal techniques were evaluated for the nine needs areas. A similar ranking and scoring system approach that was utilized in Phase 1 was used to evaluate the alternative wastewater treatment systems. Each of the treatment systems was scored based on primary (i.e., technical components) and secondary (i.e., evaluative, and environmental components) conditions for each study area. Based on the analysis, a shortlist of wastewater treatment alternatives was provided for each study area as shown in **Table 1-2** and is the focus of Phase 3.

TABLE 1-2

SHORTLIST OF TREATMENT ALTERNATIVES FOR NEEDS AREAS

Treatment Technology	Study Area 11	Study Area 12	Study Area 13	Study Area 15	Study Area 16	Study Area 18	Study Area 20	Study Area 28	Study Area 30
Conventional Title 5 Systems	X	X	X	X	X	X	X	X	X
I/A Systems	X	X	X	X	X	X	X	X	X
Decentralized Systems									
Shared Title 5 Systems									
Shared I/A Systems									
Small WWTF									
Collection System Extension	X	X	X	X	X	X	X		

1.5 PUBLIC PARTICIPATION

The report for each phase of the CWMP will be available for review and comment by all interested stakeholders. The public hearing will be held on August 20, 2019 at 6:30 PM at the Spencer Town Hall. The public notice for this hearing will be published in the July 05, 2019 edition of the *SPENCER NEW LEADER*. The presentation and discussion included the final recommended wastewater management and implementation plan. A copy of the presentation and meeting minutes, including questions and answers, is included in **Appendix B**.

2

SECTION 2

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 11 – WIRE VILLAGE ROAD & SUGDEN RESERVOIR

2.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 11 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

2.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

2.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 11 is 134. If we assume each building has a septic system, then that means there are 134 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 56, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 134 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $4,415,000, as shown in **Table 2-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 2-4**.

TABLE 2-1

PRESENT WORTH COST - SEPTIC SYSTEMS

Cost Estimate	Septic System
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 3,930,000
Present Worth O&M Costs	$ 485,000
Total Present Worth	$ 4,415,000

2.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 67 retrofitted I/A systems would be installed and 67 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 134 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 134 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.12 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $7,028,000 as shown in **Table 2-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 2-4.

TABLE 2-2

PRESENT WORTH COST - I/A SYSTEMS

Cost Estimate	Innovative/Alternative System
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 3,390,000
Present Worth O&M Costs	$ 3,638,000
Total Present Worth	$ 7,028,000

2.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension routes to reach the existing wastewater collection system are near the intersection of Wilson Street and Paxton Road at the Wire Village School, which is approximately 1 mile from the study area, and slightly north of the intersection of Smithville Road and Meadow Road, which is approximately 1.5 miles from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, manholes approximately 300 feet apart and at each intersection, low-pressure sewer, and grinder pump stations (homes near the lake), 4-inch diameter force mains, and two pump stations. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. The pump stations would be equipped with an emergency generator in order to pump wastewater during periods when there is no power. All the sewers and manholes would be located within the Town's right-of-way (ROW). During design, the location of the pump station would be determined, and will either be located on land the Town currently owns, land the Town purchases, or within the Town's right-of-way. The proposed sewer route is shown in **Figure 2-1**.

The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $24,993,000 as shown below in **Table 2-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. O&M costs attributed to running the pump stations were assumed. The revenue that the Town would receive from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 2-4**.

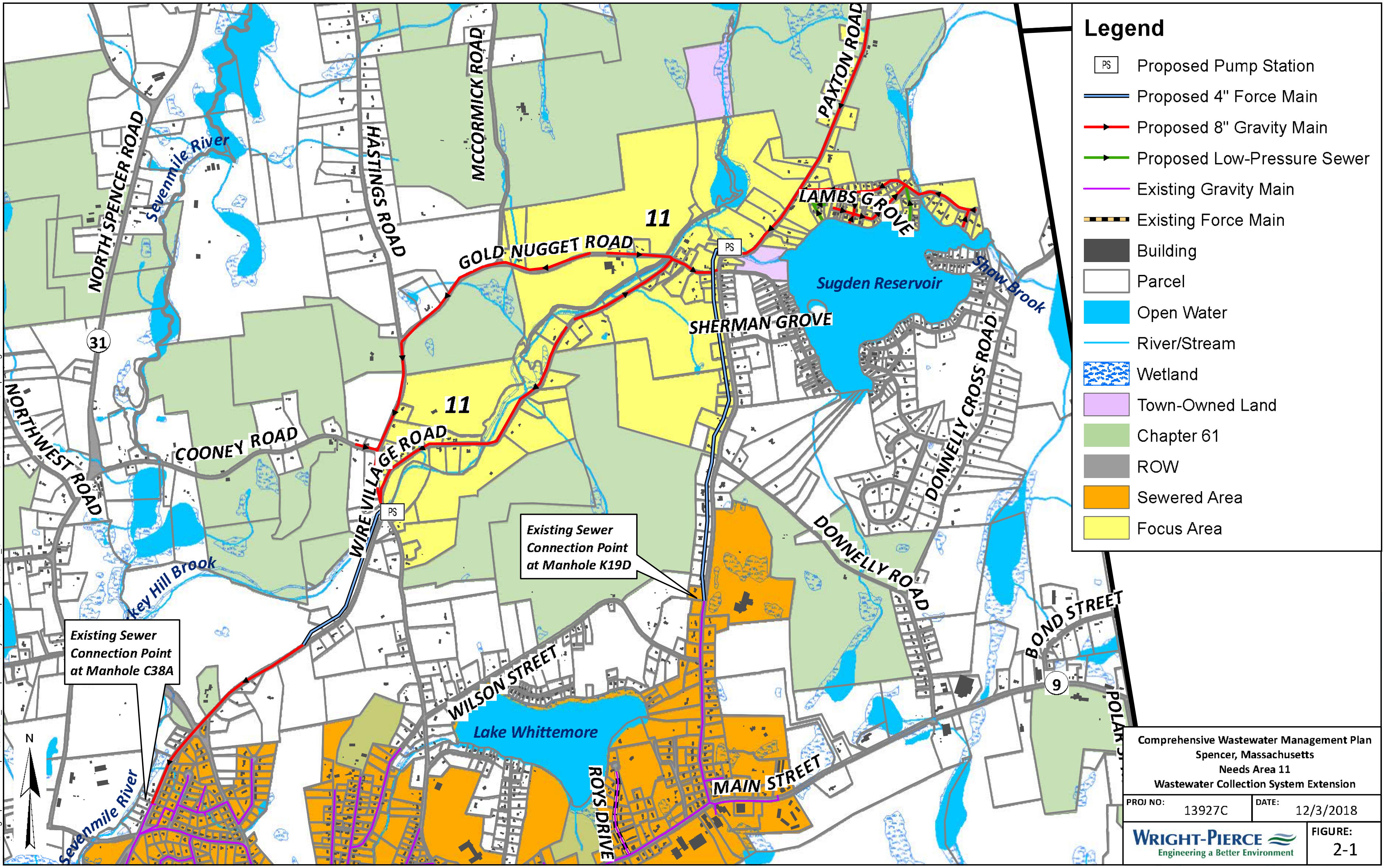
TABLE 2-3

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

Cost Estimate	Wastewater Collection Extension
Initial Capital Cost	$24,160,000
Present Worth O&M Costs	$ 833,000
Total Present Worth	$ 24,993,000

2.2.4 Summary of Cost Estimates

As shown in Table 2-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 11. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point and the necessity to own and operate two pump stations. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 11 and not the whole Area, as well as combining parts of Needs Area 12. This is discussed later in Section 12.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 11
Wastewater Collection System Extension

PROJ NO: 13927C | DATE: 12/3/2018

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FIGURE: 2-1

TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure2-1-WWExtension-NeedsArea11-v2-11x17-L.mxd

TABLE 2-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 11

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/ Alternative System	Wastewater Extension
Initial Capital Cost	-	-	$24,160,000
Present Worth of Future Capital Costs	$ 3,930,000	$ 3,390,000	-
Present Worth O&M Costs	$ 485,000	$ 3,638,000	$ 833,000
Total Present Worth	$ 4,415,000	$ 7,028,000	$ 24,993,000

2.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 11 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 2-5**.

2.3.1 Direct Impacts

2.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 11. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

2.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be several stream crossings associated with the sewer extension option, which could be accomplished by open cut, directional drilling, or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

2.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

2.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

2.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

2.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

2.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

2.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 2-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 11 - WIRE VILLAGE ROAD & SUGDEN RESERVOIR, NORTH & WEST

Treatment Alternatives	Environmental Impacts							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

2.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system and the pump stations.

2.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer could consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

2.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

2.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension. The pump station would be located on a parcel that the Town currently owns, or will purchase, or within the Town's ROW along the roadside.

2.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the estimated wastewater flow. Refer to the Phase 1 report or Section 10 of this report for additional information regarding the WWTF.

2.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

2.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

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SECTION 3

EVALUATION OF SHORTLISTED ALTERNATIVES FOR STUDY AREA 12 – SUGDEN RESERVOIR, SOUTH, AND EAST

3.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 12 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

3.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

3.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 12 is 205. If we assume each building has a septic system, then that means there are 205 septic systems that will need replacement during the 20-year planning period. The number of “build-out” homes is estimated to be 11, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 205 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $6,756,000, as shown in **Table 3-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 3-4**.

TABLE 3-1

PRESENT WORTH COST - SEPTIC SYSTEMS

Cost Estimate	Septic System
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 6,014,000
Present Worth O&M Costs	$ 742,000
Total Present Worth	$ 6,756,000

3.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 102 retrofitted I/A systems would be installed and 103 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was approximately $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 205 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 205 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.12 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for replacing I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $10,745,000 as shown in **Table 3-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 3-4.

TABLE 3-2
PRESENT WORTH COST - I/A SYSTEMS

Cost Estimate	**Innovative/Alternative System**
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 5,189,000
Present Worth O&M Costs	$ 5,556,000
Total Present Worth	$ 10,745,000

3.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension routes to reach the existing wastewater collection system are near the intersection of Wilson Street and Paxton Road, which is approximately 1 mile from the study area, and near the intersection of Main Street and Woodchuck Lane, which is approximately 1.25 miles from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, manholes approximately 300 feet apart and at each intersection, 4-inch diameter force mains, and three pump stations. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. The pump stations would be equipped with an emergency generator in order to pump wastewater during periods when there is no power. All the sewers and manholes would be located within the Town's right-of-way (ROW). During design, the location of the pump station would be determined, and will either be located on land the Town

currently owns, land the Town purchases, or within the Town's right-of-way. The proposed sewer route is shown in **Figure 3-1**.

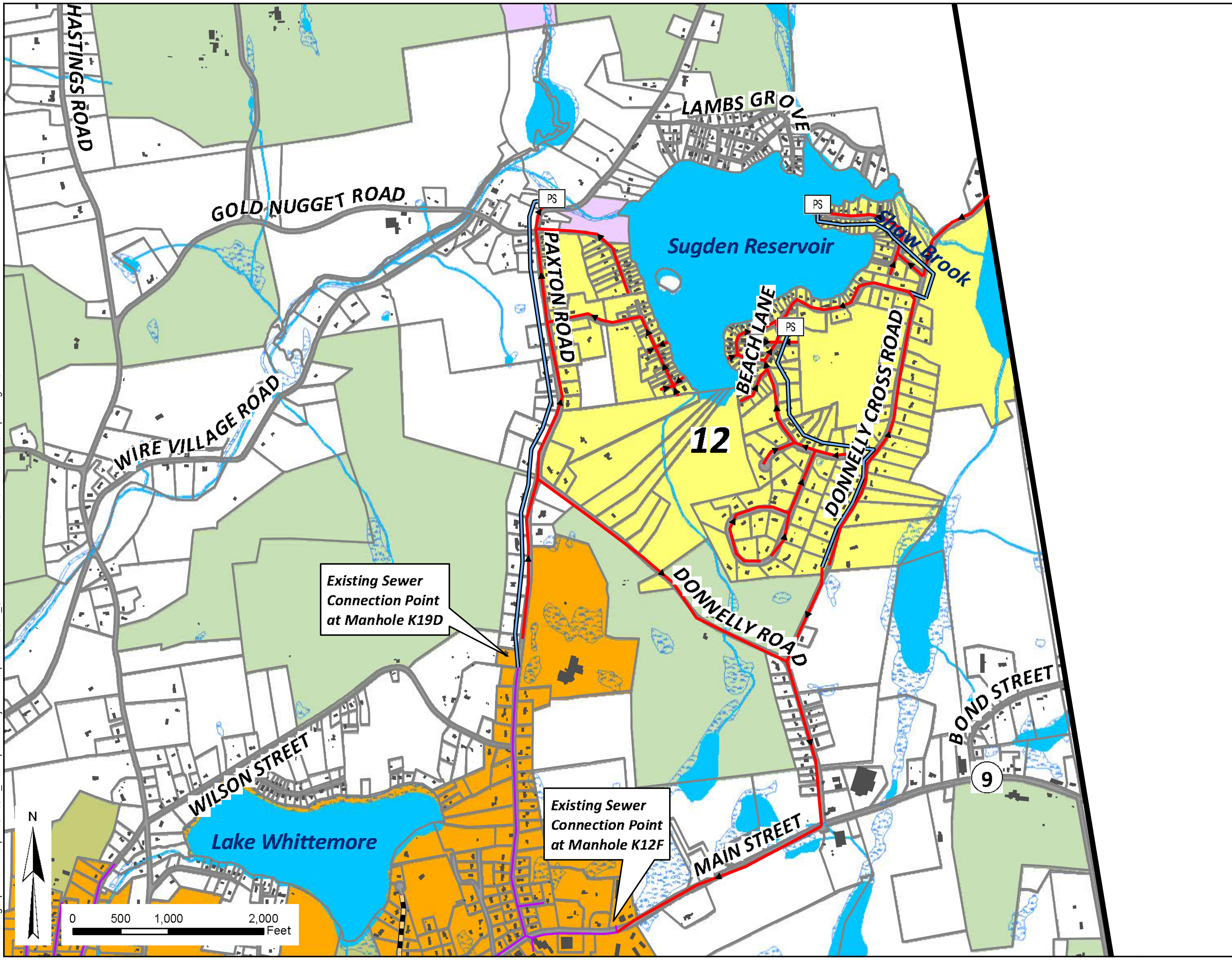
The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $31,189,000 as shown below in **Table 3-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. O&M costs attributed to running the pump stations were assumed. The revenue that the Town would receive from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 3-4**.

TABLE 3-3
PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

Cost Estimate	Wastewater Collection Extension
Initial Capital Cost	$30,190,000
Present Worth O&M Costs	$ 999,000
Total Present Worth	$ 31,189,000

3.2.4 Summary of Cost Estimates

As shown in Table 3-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 12. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point and the necessity to own and operate three pump stations. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 12 and not the whole Area, as well as combining parts of Needs Area 11. This is discussed later in Section 12.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 12
Wastewater Collection System Extension

PROJ NO: 13927	DATE: 12/3/2018
WRIGHT-PIERCE Engineering a Better Environment	FIGURE: 3-1

TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure3-1-WWExtension-NeedsArea12-v2-11x17-L.mxd

TABLE 3-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 12

Cost Estimate	Treatment Alternatives		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$30,190,000
Present Worth of Future Capital Costs	$ 6,014,000	$ 5,189,000	$0
Present Worth O&M Costs	$ 742,000	$ 5,556,000	$ 999,000
Total Present Worth	$ 6,756,000	$ 10,745,000	$ 31,189,000

3.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 12 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 3-5**.

3.3.1 Direct Impacts

3.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 12. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

3.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas. During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be several stream crossings associated with the sewer extension option, which could be accomplished by open cut, directional drilling, or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

3.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

3.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

3.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

3.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

3.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

3.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 3-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 12 - SUGDEN RESERVOIR, SOUTH, AND EAST

Treatment Alternatives	Environmental Impacts							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

3.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system and the pump stations.

3.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

3.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

3.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension. The three pump stations would be located on a parcel that the Town currently owns, or will purchase, or within the Town's ROW along the roadside.

3.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the estimated wastewater flow. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

3.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

3.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

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SECTION 4

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 13 – COONEY ROAD

4.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 13 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

4.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

4.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 13 is 62. If we assume each building has a septic system, then that means there are 62 septic systems that will need replacement during the 20-year planning period. The number of “build-out” homes is estimated to be 22, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 62 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $2,043,000, as shown in **Table 4-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later on in **Table 4-4**.

TABLE 4-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 1,819,000
Present Worth O&M Costs	$ 224,000
Total Present Worth	$ 2,043,000

4.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 31 retrofitted I/A systems would be installed and 31 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 134 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 62 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, the majority of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). In regard to the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.13 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $3,252,000 as shown in **Table 4-2**. A summary comparing all of the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 4-4.

TABLE 4-2

PRESENT WORTH COST - I/A SYSTEMS

COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 1,569,000
Present Worth O&M Costs	$ 1,683,000
Total Present Worth	$ 3,252,000

4.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension route to reach the existing wastewater collection system is slightly north of the intersection of Smithville Road and Meadow Road, which is approximately 1 mile from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, manholes approximately 300 feet apart and at each intersection, 4-inch diameter force mains, and one pump stations. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. The pump stations would be equipped with an emergency generator in order to pump wastewater during periods when there is no power. All of the sewers and manholes would be located within the Town's right-of-way (ROW). During design, the location of the pump station would be determined, and will either be located on land the Town

currently owns, land the Town purchases, or within the Town's right-of-way. The proposed sewer route is shown in **Figure 4-1**.

The total present worth cost for installing the proposed sewer, including trenching and paving, was estimated at approximately $18,083,000 as shown below in **Table 4-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. O&M costs attributed to running the pump stations were assumed. The revenue that the Town would recover from charging a user connection fee was not included in the analysis. A summary comparing all of the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 4-4**.

TABLE 4-3

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$17,750,000
Present Worth O&M Costs	$ 333,000
Total Present Worth	$ 18,083,000

4.2.4 Summary of Cost Estimates

As shown in Table 4-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 13. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point and the necessity to own and operate one pump station. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 13 and not the whole Area, as well as combining parts of Needs Area 11. This is discussed later in Section 12.

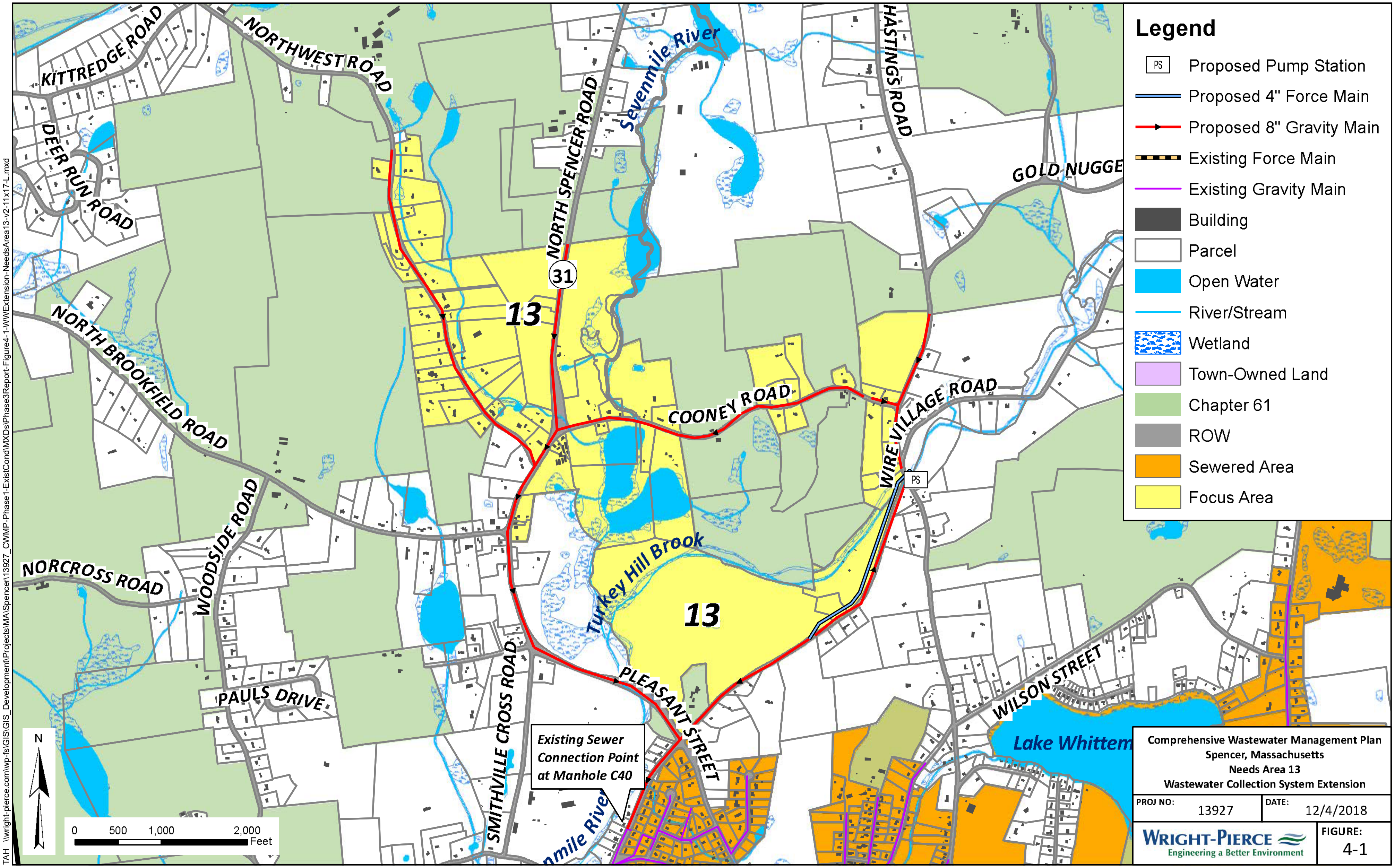
Legend
Proposed Pump Station
Proposed 4" Force Main
Proposed 8" Gravity Main
Existing Force Main
Existing Gravity Main
Building
Parcel
Open Water
River/Stream
Wetland
Town-Owned Land
Chapter 61
ROW
Sewered Area
Focus Area
PS
KITTREDGE ROAD
NORTHWEST ROAD
DEER RUN ROAD
NORTH SPENCER ROAD
31
Sevenmile River
HASTINGS ROAD
GOLD NUGGE
13
NORTH BROOKFIELD ROAD
COONEY ROAD
WIRE VILLAGE ROAD
WOODSIDE ROAD
NORCROSS ROAD
Turkey Hill Brook
PAULS DRIVE
SMITHVILLE CROSS ROAD
PLEASANT STREET
WILSON STREET
Lake Whittem
Existing Sewer Connection Point at Manhole C40
mile River
N
0 500 1,000 2,000 Feet
Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 13
Wastewater Collection System Extension
PROJ NO: 13927
DATE: 12/4/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: 4-1
TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure4-1-WWExtension-NeedsArea13-v2-11x17-L.mxd

TABLE 4-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 13

COST ESTIMATE	TREATMENT ALTERNATIVES		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$17,750,000
Present Worth of Future Capital Costs	$ 1,819,000	$ 1,569,000	$0
Present Worth O&M Costs	$ 224,000	$ 1,683,000	$ 333,000
Total Present Worth	$ 2,043,000	$ 3,253,000	$ 18,083,000

4.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 13 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 4-5**.

4.3.1 Direct Impacts

4.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 13. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

4.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be several stream crossings associated with the sewer extension option, which could be accomplished by open cut, directional drilling or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

4.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The needs area contains a DEP Approved Zone II area and a groundwater source. Therefore, none of the three treatment options would negatively impact any public or private drinking water sources. The collection system connection option would improve the water in this Area because less wastewater would leach into the groundwater.

4.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

4.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

4.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

4.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All of the alternatives would be designed, constructed and operated in accordance with all federal, state and local environmental and land-use statutes, regulations and plans.

4.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 4-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 13 – COONEY ROAD

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

4.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system and the pump stations.

4.5 FLOW AND WASTE REDUCTION

A number of various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community as a whole and should be taken on as a Town-wide initiative.

In regard to a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

4.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP septage approved treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

4.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension. The pump station would be located on a parcel that the Town currently owns, or will purchase, or within the Town's ROW along the roadside.

4.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the amount of wastewater flow estimated. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

4.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested and approved to accept wastewater.

4.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

5

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SECTION 5

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 15 – HIGH RIDGE ROAD

5.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 15 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

5.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

5.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 15 is 23. If we assume each building has a septic system, then that means there are 23 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 105, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 23 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $758,000, as shown in **Table 5-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 5-4**.

TABLE 5-1

PRESENT WORTH COST - SEPTIC SYSTEM

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 674,000
Present Worth O&M Costs	$ 83,000
Total Present Worth	$ 758,000

5.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 11 retrofitted I/A systems would be installed and 12 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 23 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 23 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.15 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $1,201,000 as shown in **Table 5-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 5-4.

TABLE 5-2
PRESENT WORTH COST - I/A SYSTEMS

COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 586,000
Present Worth O&M Costs	$ 615,000
Total Present Worth	$ 1,201,000

5.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension route to reach the existing wastewater collection system is slightly north of the intersection of Smithville Road and Meadow Road, which is approximately 1 mile from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, manholes approximately 300 feet apart and at each intersection, 4-inch diameter force mains, and one pump station. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. The pump stations would be equipped with an emergency generator in order to pump wastewater during periods when there is no power. All the sewers and manholes would be located within the Town's right-of-way (ROW). During design, the location of the pump station would be determined, and will either be located on land the Town

currently owns, land the Town purchases, or within the Town's right-of-way. The proposed sewer route is shown in **Figure 5-1**.

The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $8,223,000 as shown below in **Table 5-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. O&M costs attributed to running the pump stations were assumed. The revenue that the Town would recover from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 5-4**.

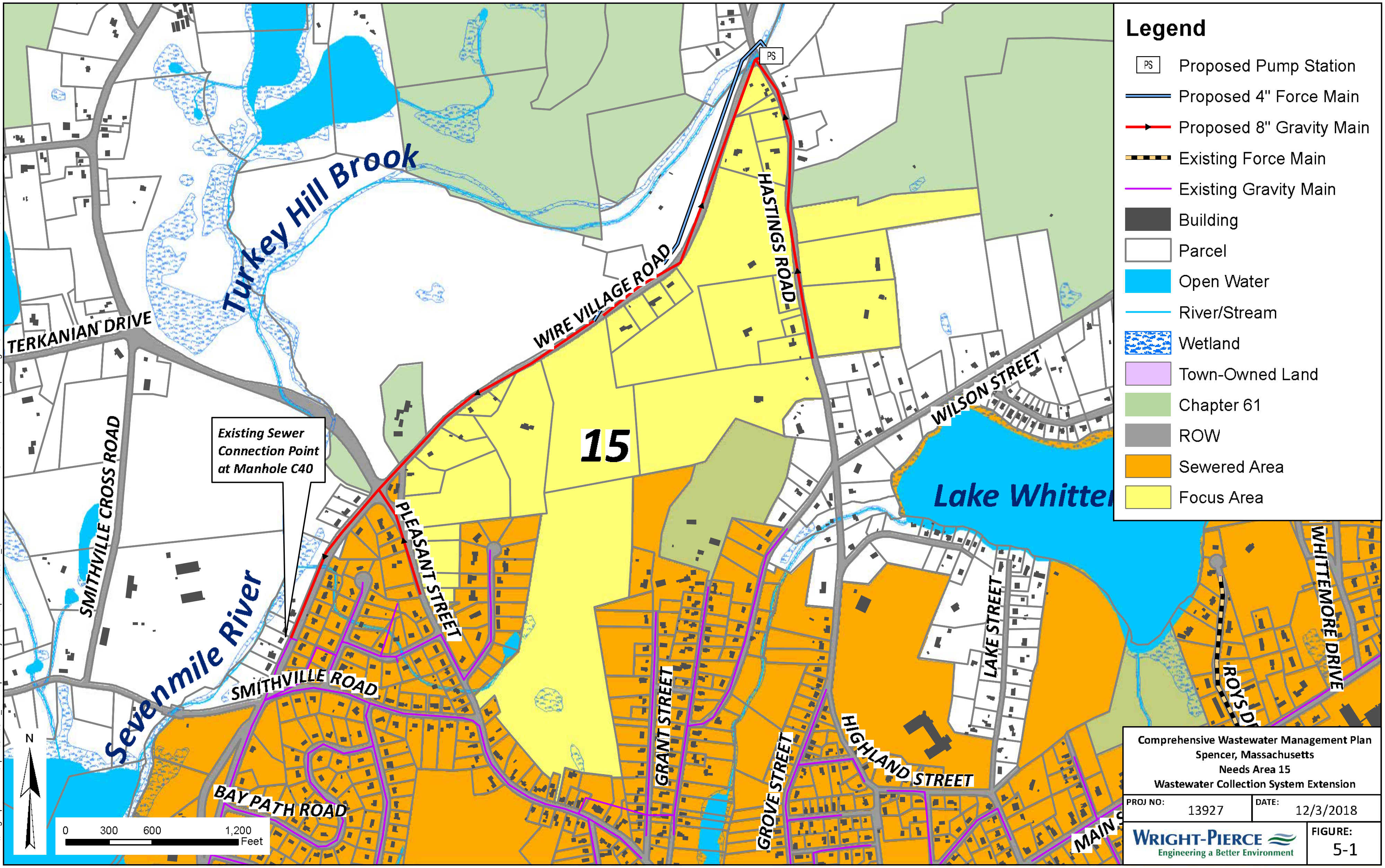
TABLE 5-3

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$7,890,000
Present Worth O&M Costs	$ 333,000
Total Present Worth	$ 8,223,000

5.2.4 Summary of Cost Estimates

As shown in Table 5-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 15. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point and the necessity to own and operate one pump station. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 15 and not the whole Area, as well as combining parts of Needs Area 13. This is discussed later in Section 12**.**



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 15
Wastewater Collection System Extension

PROJ NO:	DATE:
13927	12/3/2018

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FIGURE: 5-1

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TABLE 5-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 15

COST ESTIMATE	TREATMENT ALTERNATIVES		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$7,890,000
Present Worth of Future Capital Costs	$ 674,000	$ 586,000	$0
Present Worth O&M Costs	$ 83,000	$ 615,000	$ 333,000
Total Present Worth	$ 758,000	$ 1,201,000	$ 8,223,000

5.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 15 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 5-5**.

5.3.1 Direct Impacts

5.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 15. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

5.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

5.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

5.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

5.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

5.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

5.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

5.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 5-5
ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES
FOR STUDY AREA 15 – HIGH RIDGE ROAD

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

5.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town's WWTF personnel to maintain the collection system and the pump stations.

5.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

5.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

5.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension. The pump station would be located on a parcel that the Town currently owns, or will purchase, or within the Town's ROW along the roadside.

5.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the estimated wastewater flow. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

5.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

5.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

6

SECTION 6

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 16 – LAKE WHITTEMORE

6.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 16 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

6.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

6.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 16 is 125. If we assume each building has a septic system, then that means there are 125 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 55, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 125 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $4,118,000, as shown in **Table 6-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 6-4**.

TABLE 6-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 3,666,000
Present Worth O&M Costs	$ 452,000
Total Present Worth	$ 4,119,000

6.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 62 retrofitted I/A systems would be installed and 63 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 125 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 125 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.16 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $6,554,000 as shown in **Table 6-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 6-4.

TABLE 6-2

PRESENT WORTH COST - I/A SYSTEMS

COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 3,170,000
Present Worth O&M Costs	$ 3,384,000
Total Present Worth	$ 6,554,000

6.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension route to reach the existing wastewater collection system at the intersection of Hastings Road and Highland Street, which is approximately a 1/2 mile from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, manholes approximately 300 feet apart and at each intersection, 4-inch diameter force mains, and no pump stations. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. All the sewers and manholes would be located within the Town's right-of-way (ROW). The proposed sewer route is shown in **Figure 6-1**.

The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $13,493,000 as shown below in **Table 6-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. O&M costs attributed to running the pump stations were assumed. The revenue that the Town would recover from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 6-4**.

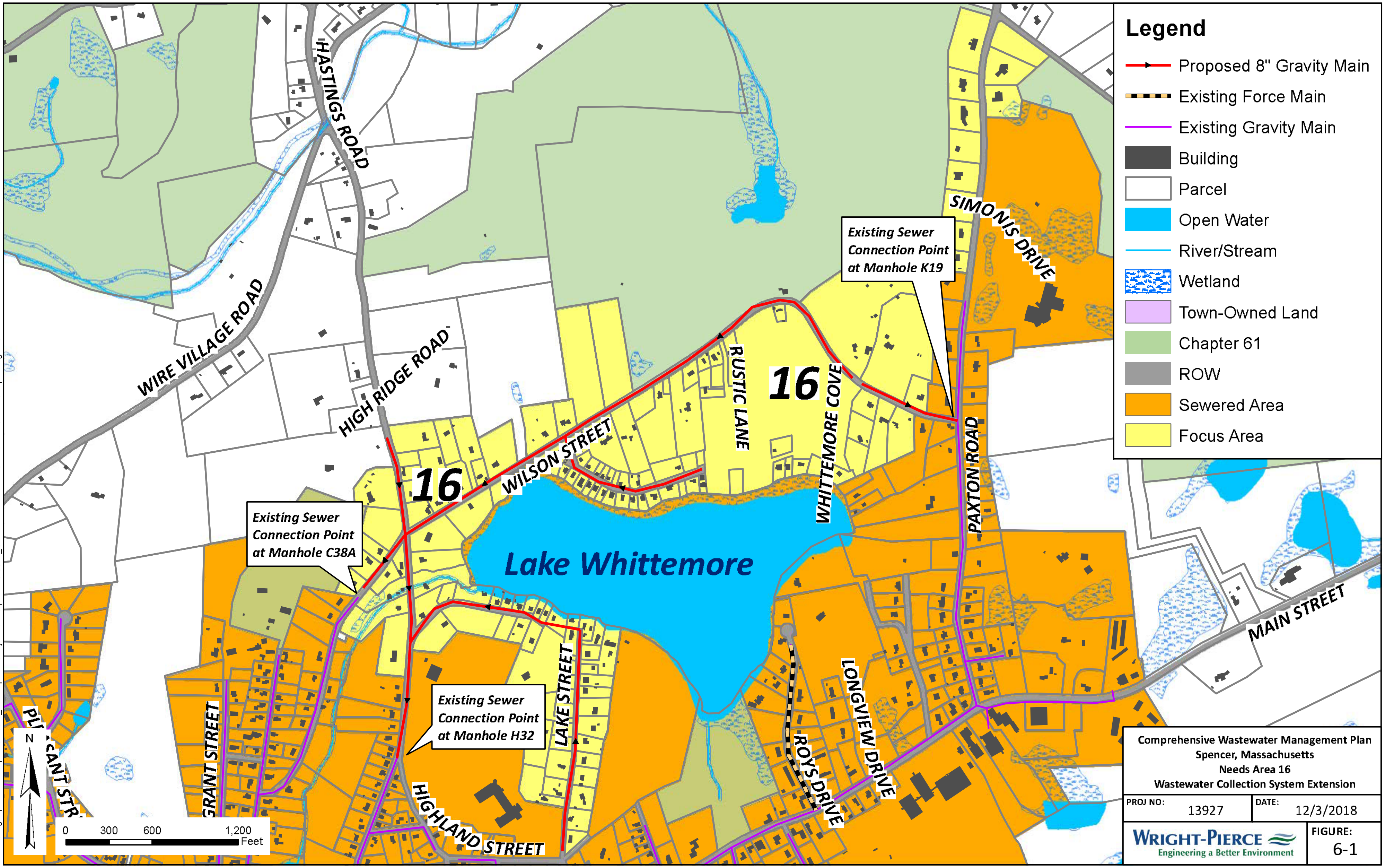
TABLE 6-3

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$13,160,000
Present Worth O&M Costs	$ 333,000
Total Present Worth	$ 13,493,000

6.2.4 Summary of Cost Estimates

As shown in Table 6-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 16. The wastewater collection system extension option does not appear to be economically feasible. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 16 and not the whole Area, as well as combining parts of Needs Area 11. This is discussed later in Section 12.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 16
Wastewater Collection System Extension

PROJ NO: 13927	DATE: 12/3/2018

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FIGURE: 6-1

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TABLE 6-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 16

COST ESTIMATE	TREATMENT ALTERNATIVES		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$13,160,000
Present Worth of Future Capital Costs	$ 3,666,000	$ 3,170,000	$ 0
Present Worth O&M Costs	$ 452,000	$ 3,384,000	$ 333,000
Total Present Worth	$ 4,118,000	$ 6,554,000	$ 13,493,000

6.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 16 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 6-5**.

6.3.1 Direct Impacts

6.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there is one known historical place and only a few inventoried areas within Study Area 16. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed sewer route.

6.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be one stream crossing associated with the sewer extension option, which could be accomplished by open cut, directional drilling, or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

6.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

6.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

6.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

6.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

6.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

6.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 6-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 16 – LAKE WHITTEMORE

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

6.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system and the pump stations.

6.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

6.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

6.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension. The pump station would be located on a parcel that the Town currently owns, or will purchase, or within the Town's ROW along the roadside.

6.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the estimated wastewater flow. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

6.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

6.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

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SECTION 7

EVALUATION OF SHORTLISTED ALTERNATIVES FOR STUDY AREA 18 – ROUTE 9 and 49 INTERSECTION, NORTH

7.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 18 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

7.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

7.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 18 is 71. If we assume each building has a septic system, then that means there are 71 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 49, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 71 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $2,340,000, as shown in **Table 7-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 7-4**.

TABLE 7-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 2,083,000
Present Worth O&M Costs	$ 257,000
Total Present Worth	$ 2,340,000

7.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 35 retrofitted I/A systems would be installed and 36 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 71 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 134 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.18 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $3,728,000 as shown in **Table 7-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 7-4.

TABLE 7-2
PRESENT WORTH COST - I/A SYSTEMS

COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 1,810,000
Present Worth O&M Costs	$ 1,918,000
Total Present Worth	$ 3,728,000

7.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension routes to reach the existing wastewater collection system are at the WWTF on West Main Street, which is approximately 1/4 mile from the study area, and slightly north of the intersection of Smithville Road and Meadow Road, which is approximately 2 miles from the study area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, and manholes approximately 300 feet apart and at each intersection. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. The pump stations would be equipped with an emergency generator in order to pump wastewater during periods when there is no power. All the sewers and manholes would be located within the Town's right-of-way (ROW). The proposed sewer route is shown in **Figure 7-1**.

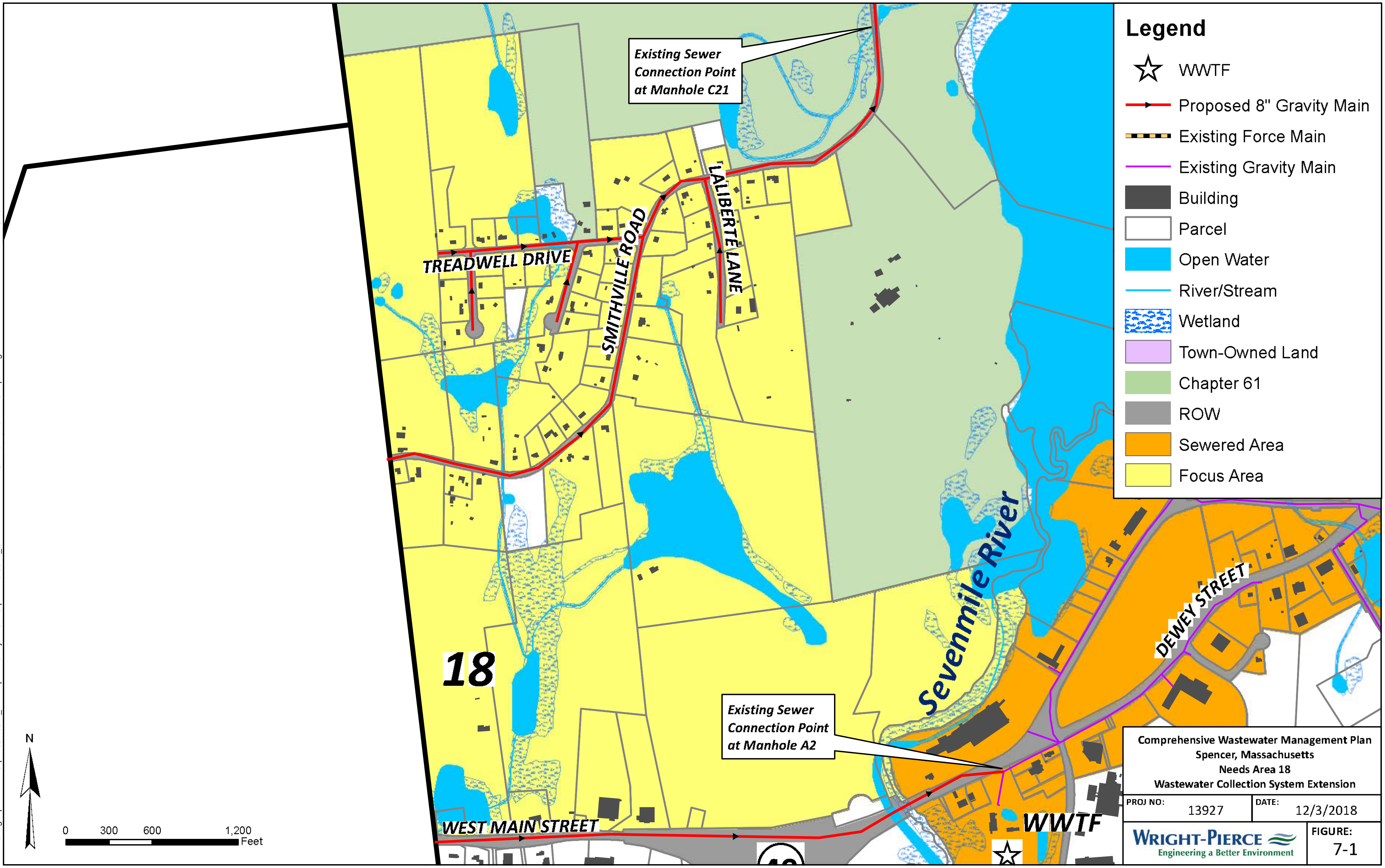
The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $14,820,000 as shown below in **Table 7-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. The revenue that the Town would recover from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 7-4**.

TABLE 7-3
PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$14,820,000
Present Worth O&M Costs	$ 0
Total Present Worth	$ 14,820,000

7.2.4 Summary of Cost Estimates

As shown in Table 7-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 18. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 18 and not the whole Area, as well as combining parts of Needs Area 20. This is discussed later in Section 12.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 18
Wastewater Collection System Extension

PROJ NO:	DATE:
13927	12/3/2018

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FIGURE: 7-1

TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure7-1-WWExtension-NeedsArea18-v3-11x17-L.mxd

TABLE 7-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 18

COST ESTIMATE	TREATMENT ALTERNATIVES		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$14,820,000
Present Worth of Future Capital Costs	$ 2,083,000	$ 1,810,000	$0
Present Worth O&M Costs	$ 257,000	$ 1,918,000	$ 0
Total Present Worth	$ 2,341,000	$ 3,728,000	$ 14,820,000

7.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 18 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 7-5**.

7.3.1 Direct Impacts

7.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 18. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

7.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas. During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be several stream crossings associated with the sewer extension option, which could be accomplished by open cut, directional drilling, or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

7.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

Some of study area is outside within Surface Water Protection Zones. Minimal impact is expected from any of the options. Connecting to the existing collection system would provide a benefit to the groundwater as the wastewater would be removed from the area and treated at the WWTF to a higher degree than septic or I/A systems.

7.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

7.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

7.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

7.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

7.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 7-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES FOR STUDY AREA 18 – ROUTE 9 AND 49 INTERSECTION, NORTH

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

7.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system.

7.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

7.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

7.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension.

7.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for wastewater flow estimated. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

7.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

7.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Work*s.

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SECTION 8

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 20 – ROUTE 49

8.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 20 had three wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems
- Wastewater collection system extension

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

8.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

8.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 20 is 70. If we assume each building has a septic system, then that means there are 70 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 120, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 70 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $2,310,000, as shown in **Table 8-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 8-4**.

TABLE 8-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 2,057,000
Present Worth O&M Costs	$ 253,000
Total Present Worth	$ 2,310,000

8.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 35 retrofitted I/A systems would be installed and 35 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 70 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 134 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.20 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $3,663,000 as shown in **Table 8-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 8-4.

TABLE 8-2
PRESENT WORTH COST - I/A SYSTEMS

COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 1,763,000
Present Worth O&M Costs	$ 1,900,000
Total Present Worth	$ 3,663,000

8.2.3 Wastewater Collection System Extension

The last type of treatment alternative evaluated for this area is extending the existing wastewater collection system. The wastewater would be treated at the Town of Spencer's wastewater treatment facility (WWTF).

The proposed sewer extension route to reach the existing wastewater collection system is at the WWTF, which is approximately ¼ mile from the needs area. The proposed wastewater collection system would consist of 8-inch diameter gravity sewer pipes, 6-inch diameter service laterals, and manholes approximately 300 feet apart and at each intersection. It appears no pump stations would be required. During the final design process, the results from surveys and soil borings would provide more information on the site's topography and the amount of ledge present. All the sewers and manholes would be located within the Town's right-of-way (ROW). The proposed sewer route is shown in **Figure 8-1**.

The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $12,700,000 as shown below in **Table 8-3**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any household interior plumbing rearrangements. The revenue that the Town would recover from charging a user connection fee was not included in the analysis. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented in **Table 8-4**.

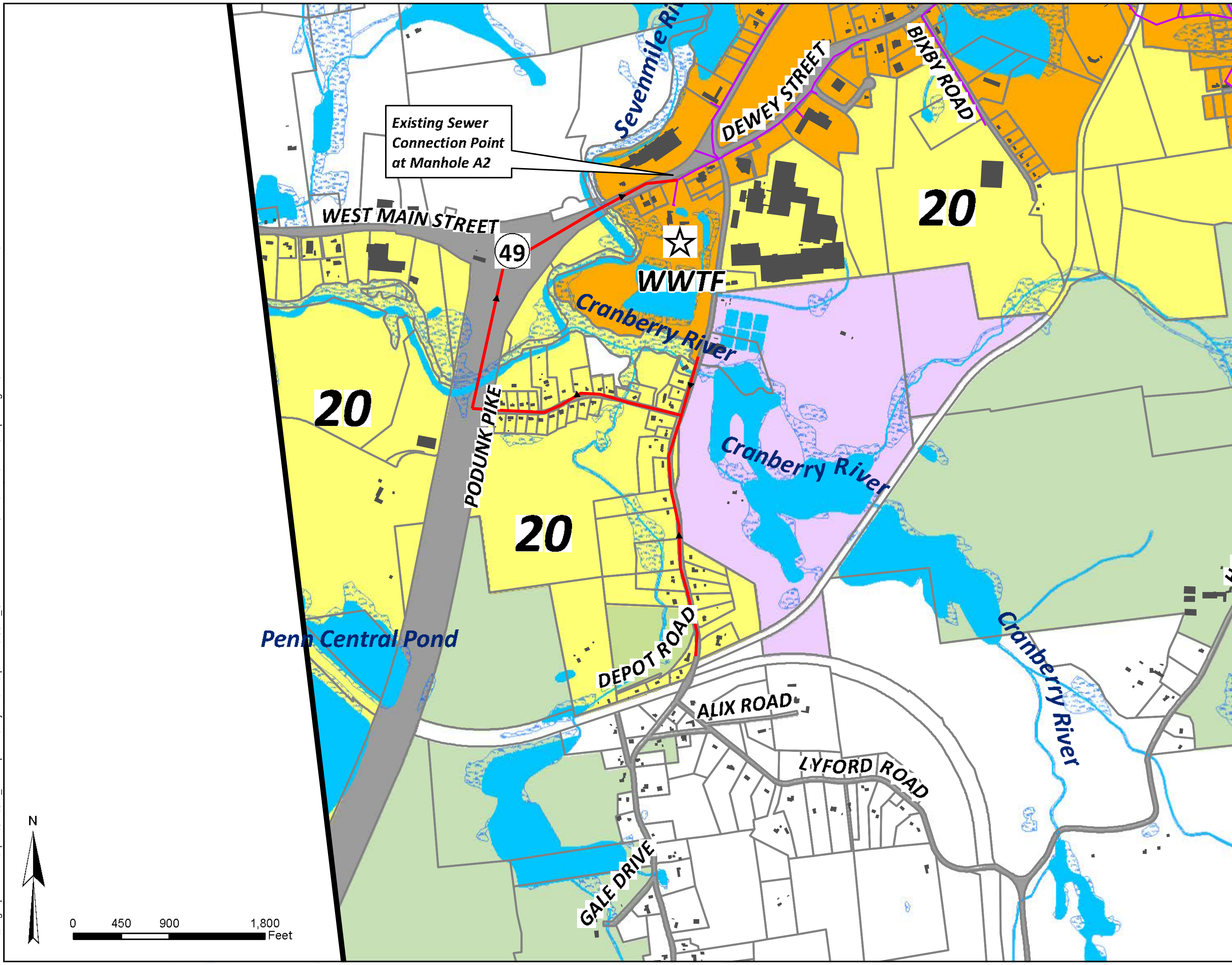
TABLE 8-3

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$12,700,000
Present Worth O&M Costs	$ 0
Total Present Worth	$12,700,000

8.2.4 Summary of Cost Estimates

As shown in Table 8-4 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 20. The wastewater collection system extension option does not appear to be economically feasible because of the distance to the nearest existing collection system connection point and the necessity to own and operate two pump stations. There are additional options for reducing cost. This would involve sewering smaller parts of Needs Area 20 and not the whole Area, as well as combining parts of Needs Area 18. This is discussed later in Section 12.



Legend

- WWTF
- Proposed 8" Gravity Main
- Existing Gravity Main
- Building
- Parcel
- Open Water
- River/Stream
- Wetland
- Town-Owned Land
- Chapter 61
- ROW
- Sewered Area
- Focus Area

Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 20
Wastewater Collection System Extension

PROJ NO:	DATE:
13927	12/3/2018

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FIGURE: 8-1

TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure8-1-WWExtension-NeedsArea20-v2-11x17-L.mxd

TABLE 8-4

SUMMARY OF COST ESTIMATES FOR STUDY AREA 20

COST ESTIMATE	TREATMENT ALTERNATIVES		
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM	WASTEWATER EXTENSION
Initial Capital Cost	$ 0	$ 0	$12,700,000
Present Worth of Future Capital Costs	$ 2,057,000	$ 1,763,000	$0
Present Worth O&M Costs	$ 253,000	$ 1,900,000	$ 0
Total Present Worth	$ 2,310,000	$ 3,663,000	$12,700,000

8.3 ENVIRONMENTAL ANALYSIS

The alternatives (septic systems, I/A systems, and extending the sewers to an existing collection system) for Study Area 20 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 8-5**.

8.3.1 Direct Impacts

8.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 20. The wastewater collection system extension option would be located within an existing ROW; and therefore, will not disturb any of the potential historical areas along the proposed force main route.

8.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas. During construction of the wastewater extension option, best management practices would be used to help minimize any disturbances to wetlands and potential priority habitats for rare species.

Also, there would be several stream crossings associated with the sewer extension option, which could be accomplished by open cut, directional drilling, or other installation methods. Prior to construction, a Notice-of-Intent would be developed and submitted to the Town's Conservation Commission for approval.

8.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The study area contains Surface Water Protection Zones around the Cranberry and Seven Mile Rivers. Connecting to the existing collection system would treat wastewater to a higher degree than septic or I/A systems.

8.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation. The wastewater collection system extension alternative would provide improved effluent quality and nutrient removal as it would be treated at an existing WWTF.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater. The wastewater collection system extension would keep the wastewater within the Chicopee River watershed.

8.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

8.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

8.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

8.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area. For the sewer extension option, there may be minimal population growth on parcels that meet the Town's residential zoning requirements.

TABLE 8-5

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 20 – ROUTE 49

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N
Collection System Extension	N	T	N	M	T	M	N	M

M = Minimal
N = None
T = Temporary during construction

8.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal. The wastewater collection system extension option would require additional labor from the Town’s WWTF personnel to maintain the collection system and the pump stations.

8.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Measures for reducing I/I into the collection system (Town sewer bank requires a 4:1 removal for any new hook-up)
- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

8.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

8.7 LOCATION OF FACILITIES

The Town's WWTF would treat the wastewater from the proposed sewer extension.

8.8 REVISION OF WASTE LOAD ALLOCATION

It would not be necessary to revise the Town's NPDES permit because the WWTF has available treatment capacity for the estimated wastewater flow. Refer to the Phase 1 report or Section 11 of this report for additional information regarding the WWTF.

8.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period. Prior to property owners being able to connect to the proposed wastewater collection system extension option, it would be necessary for the sewer transmission pipes to be constructed, tested, and approved to accept wastewater.

8.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

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9

SECTION 9

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 28 – STILES RESERVOIR, WEST

9.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 28 had two wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

9.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

9.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 28 is 203. If we assume each building has a septic system, then that means there are 203 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 55, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 203 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $6,682,000, as shown in **Table 9-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 9-3**.

TABLE 9-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 5,947,000
Present Worth O&M Costs	$ 735,000
Total Present Worth	$ 6,682,000

9.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 101 retrofitted I/A systems would be installed and 102 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 203 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 203 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.28 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $10,645,000 as shown in **Table 9-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 9-3.

TABLE 9-2

PRESENT WORTH COST - I/A SYSTEMS

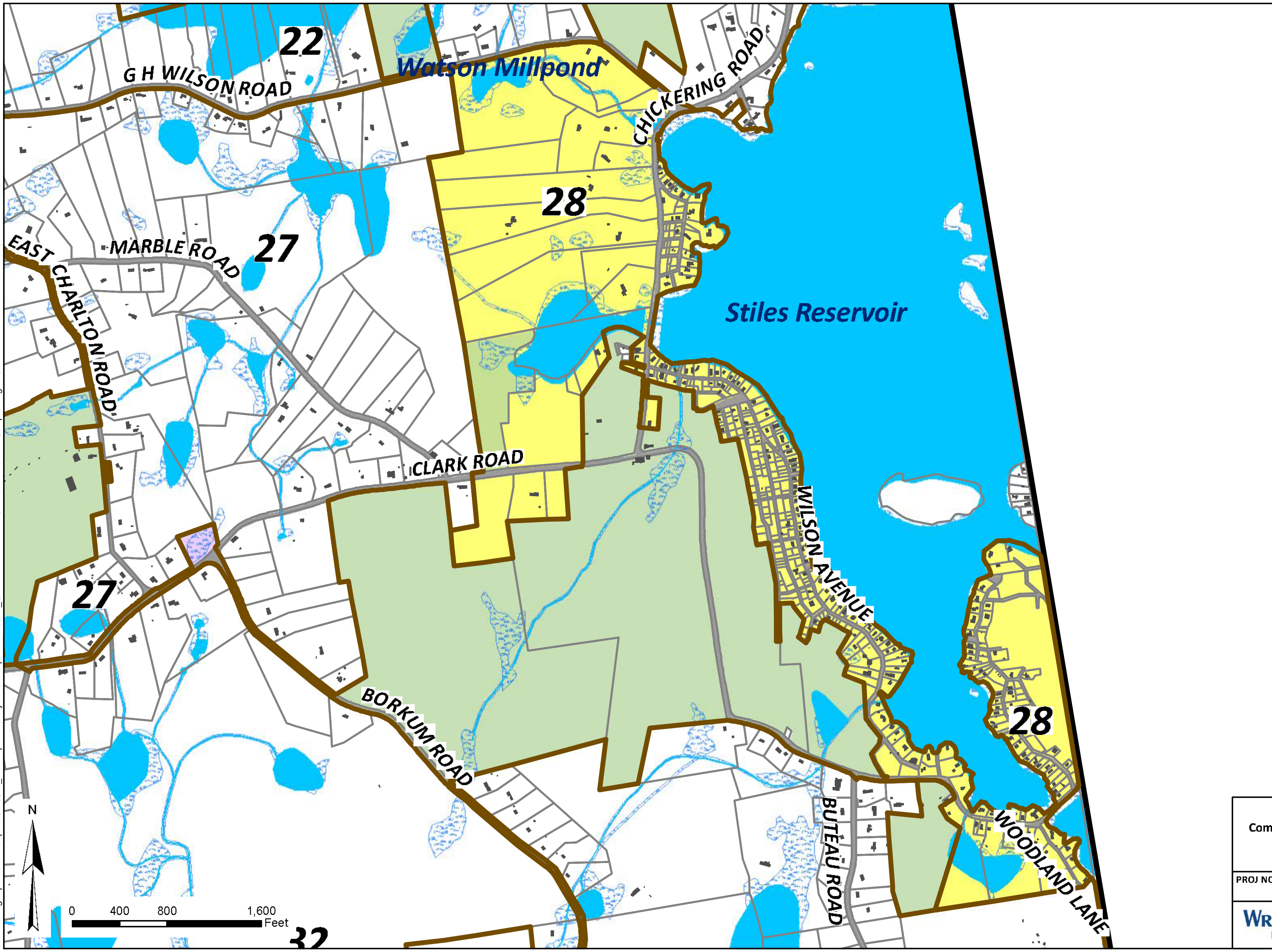
COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 5,143,000
Present Worth O&M Costs	$ 5,502,000
Total Present Worth	$ 10,645,000

9.2.3 Wastewater Collection System Extension

The collection system alternative was not included for this Needs Area as the cost was too high due to the distance from the existing system and the pump stations required.

9.2.4 Summary of Cost Estimates

As shown in Table 9-3 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 28.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 28

PROJ NO: 13927	DATE: 11/27/2018
WRIGHT-PIERCE Engineering a Better Environment	FIGURE: 9-1

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TABLE 9-3

SUMMARY OF COST ESTIMATES FOR STUDY AREA 28

COST ESTIMATE	TREATMENT ALTERNATIVES	
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0	$ 0
Present Worth of Future Capital Costs	$ 5,947,000	$ 5,143,000
Present Worth O&M Costs	$ 735,000	$ 5,502,000
Total Present Worth	$ 6,682,000	$ 10,645,000

9.3 ENVIRONMENTAL ANALYSIS

The alternatives for Study Area 28 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 9-4**.

9.3.1 Direct Impacts

9.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 28.

9.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

9.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

9.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater.

9.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

9.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

9.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

9.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area.

9.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal.

9.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

9.6 RESIDUALS DISPOSAL

For on-site systems (Septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

9.7 LOCATION OF FACILITIES

The septic and I/A systems would be onsite on the homeowner's land.

9.8 REVISION OF WASTE LOAD ALLOCATION

The two proposed treatment alternatives would not affect the waste load allocation.

9.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period.

9.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Work*s.

TABLE 9-4

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 28 – STILES RESERVOIR, WEST

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N

M = Minimal
N = None
T = Temporary during construction

10

SECTION 10

EVALUATION OF SHORTLISTED ALTERNATIVES
FOR STUDY AREA 30 – CRANBERRY MEADOW POND

10.1 SUMMARY OF SHORTLISTED ALTERNATIVES

Study Area 30 had two wastewater treatment alternatives that were shortlisted in Phase 2 of the CWMP including the following:

- Septic systems
- I/A systems

The following sections examine the preliminary costs for the alternatives, impacts each alternative has on environmental issues, institutional issues, public health, water supply protection, surface water protection and managed growth.

10.2 PRELIMINARY COST ANALYSIS

The preliminary cost analysis was performed for each one of the Phase 2 shortlisted wastewater treatment alternatives. The cost analysis was based on accepted engineering economic principals as stated in MassDEP Guidelines and was performed using a 20-year present worth analysis. The present worth analysis was primarily based on the capital and O&M costs for each of the treatment alternatives, which are summarized in **Appendix C**. The capital cost estimates included construction, engineering design and construction administration, legal, land acquisition, easements, and contingencies. The O&M costs consisted of typical items such as labor, energy, chemicals, and sludge disposal. The present worth O&M cost is the total estimated cost to maintain each alternative over the 20-year planning period. In general, the costs are not intended to be used as specific construction cost estimates but are intended to be used to compare viable alternatives.

10.2.1 Septic Systems

For this alternative, the existing septic systems in this study area would remain as the method of treating and disposing of the property owner's wastewater. For the cost analysis, the worst-case scenario was used, where every septic system in the study area would have to be replaced during the 20-year planning period.

The number of parcels with an existing building in Study Area 30 is 156. If we assume each building has a septic system, then that means there are 156 septic systems that will need replacement during the 20-year planning period. The number of "build-out" homes is estimated to be 110, but those were not considered in this analysis. The build-out flow analysis is completed later in this report (Section 12).

The capital costs for each type of on-site wastewater disposal system were estimated using cost information from various on-site disposal system manufacturers and construction contractors. Each septic system was estimated to cost $20,000 to replace with a new septic system. The unit price estimate includes the cost to decommission the existing septic system. This alternative's total present worth capital cost includes the present worth cost for each of the 156 septic systems and other fees such as engineering, construction administration, legal and contingencies. The replacement costs were distributed evenly over the 20-year period.

A septic system is typically pumped out once every two years and currently costs approximately $400 per "pump out" of a 1,500-gallon tank. This would be an annual cost of $200. There are generally no other associated O&M costs for a septic system.

The total present worth cost for continuing with the use of septic systems for treating and disposing of wastewater for this study area was estimated at approximately $5,139,000, as shown in **Table 10-1**. A summary comparing all the different alternatives' capital costs, O&M costs, and total present worth costs is presented later in **Table 10-3**.

TABLE 10-1

PRESENT WORTH COST - SEPTIC SYSTEMS

COST ESTIMATE	SEPTIC SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 4,574,000
Present Worth O&M Costs	$ 565,000
Total Present Worth	$ 5,139,000

10.2.2 Innovative/Alternative (I/A) Systems

Under this wastewater treatment alternative, each of the existing septic systems would be replaced with a new I/A system. It was also assumed that half of the properties would be able to retrofit their existing system and half would not (therefore needing a completely new system). Therefore, 78 retrofitted I/A systems would be installed and 78 new I/A systems would be installed over the 20-year planning period.

There is a wide variety of MADEP approved I/A systems available (as was described in the Phase 2 Report). A few of the I/A manufactures were contacted to obtain construction and O&M costs. It was determined that the estimated average price for a retrofitted I/A system is approximately $9,500 and a new system was $25,000. This alternative's total present worth capital cost includes the present worth cost for each of the 156 I/A systems and other fees such as engineering, construction administration, legal and contingencies. It was assumed that the construction of the 156 I/A systems would be equally distributed over the 20 years.

In order to obtain a higher level of treatment, most of the I/A systems require pumps and/or blowers to operate. The O&M costs were calculated based on estimates for sludge removal and disposal, testing and electrical usage. The cost to pump out an I/A system currently averages $400, which should be performed once every two years (same as a septic system). Regarding the DEP sampling requirements, the average annual cost for a certified laboratory to perform sampling and testing of an I/A system varies between $100 and $500, with some requiring higher first-year testing costs. The average electrical cost per unit is estimated to be $200 per year (at $ 0.30 per kw-hr). It was assumed that an average total annual O&M cost is approximately $1,000.

The total present worth cost for retrofitting I/A systems for treating and disposing of wastewater for this study area is estimated at approximately $8,180,000 as shown in **Table 10-2**. A summary comparing all the different alternatives' capital costs, O&M costs, salvage values, and total present worth costs is presented in Table 10-3.

TABLE 10-2

PRESENT WORTH COST - I/A SYSTEMS

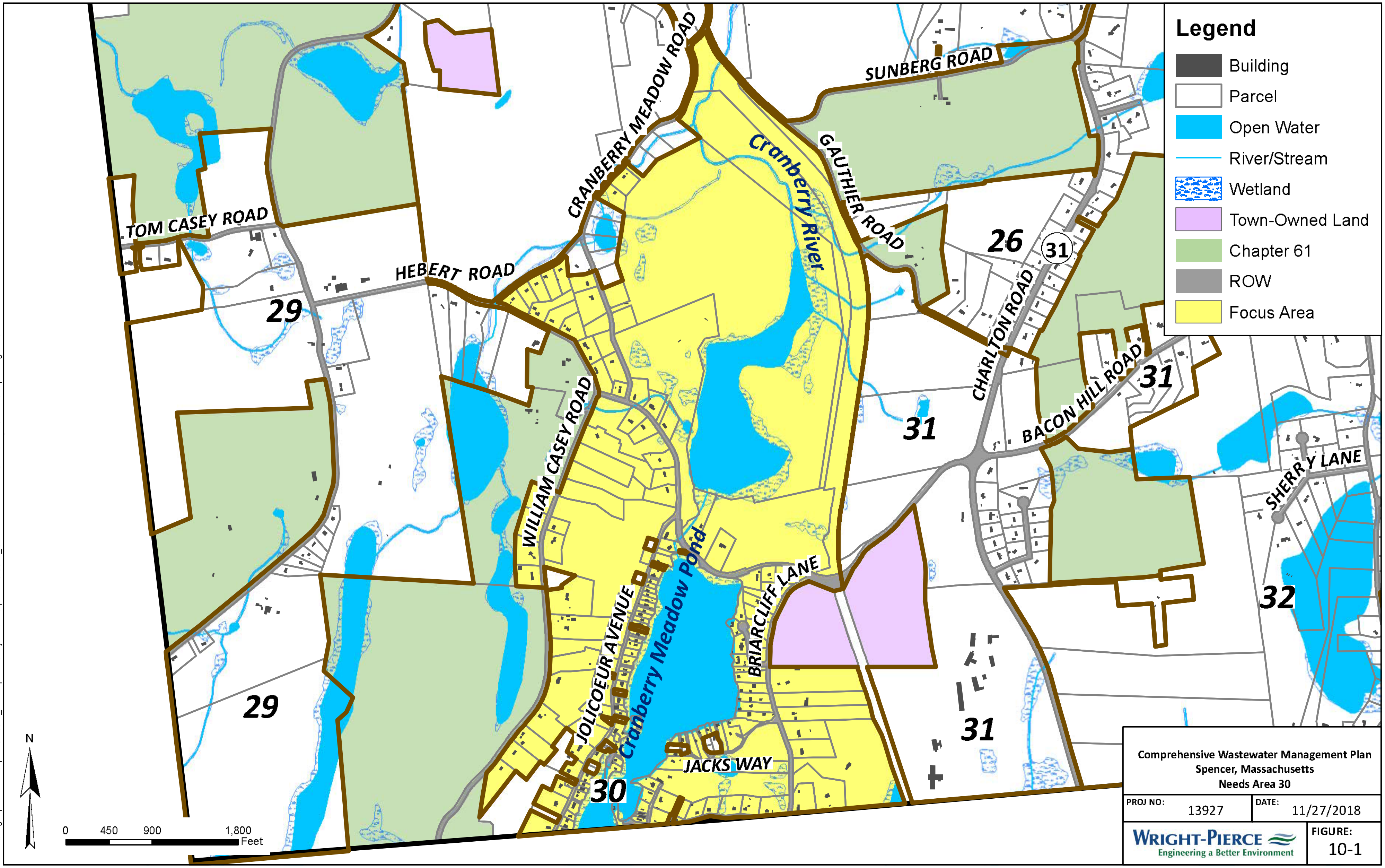
COST ESTIMATE	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0
Present Worth of Future Capital Costs	$ 3,945,000
Present Worth O&M Costs	$ 4,235,000
Total Present Worth	$ 8,180,000

10.2.3 Wastewater Collection System Extension

The collection system alternative was not included for this Needs Area as the cost was too high due to the distance from the existing system and the pump stations required.

10.2.4 Summary of Cost Estimates

As shown in Table 10-3 below, septic systems appear to be the most cost-effective wastewater treatment alternative for Needs Area 30.



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 30

PROJ NO: 13927 DATE: 11/27/2018

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FIGURE: 10-1

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TABLE 10-3

SUMMARY OF COST ESTIMATES FOR STUDY AREA 30

COST ESTIMATE	TREATMENT ALTERNATIVES	
	SEPTIC SYSTEM	INNOVATIVE/ ALTERNATIVE SYSTEM
Initial Capital Cost	$ 0	$ 0
Present Worth of Future Capital Costs	$ 4,574,000	$ 3,945,000
Present Worth O&M Costs	$ 565,000	$ 4,235,000
Total Present Worth	$ 5,139,000	$ 8,180,000

10.3 ENVIRONMENTAL ANALYSIS

The alternatives for Study Area 30 were screened for potential direct and indirect environmental impacts in accordance with DEP's 1996 CWMP Guidelines. A brief discussion of how each one of the environmental factors may be impacted by each treatment alternative is presented in the following sections. A summary of the impacts is shown in **Table 10-4**.

10.3.1 Direct Impacts

10.3.1.1 Historical, Archaeological, Cultural, Conservation, and Recreation

The construction of any of the proposed treatment methods would have no impact on historical, archaeological, or cultural aspects of the Town. As described in detail in Phase 1, there are no known historical places within Study Area 30.

10.3.1.2 Wetlands, Flood Plains, Agricultural Lands, and Environmentally Sensitive Areas

Each of the proposed wastewater treatment alternatives, if constructed, would have temporary impact on wetlands, flood plains, agricultural lands, and/or environmentally sensitive areas.

10.3.1.3 Zones of Contribution of Existing and Proposed Water Supply Sources

The entire study area is outside of any Surface Water Protection Zones. Therefore, none of the three treatment options would impact any public or private drinking water sources.

10.3.1.4 Surface and Groundwater Resources

Properly functioning septic and I/A systems would provide some level of wastewater treatment if selected for future use for this study area. A septage management plan where property owners are required to pump out their septic tank once every two years would help to maintain proper operation.

Septic and I/A systems would keep effluent disposal systems on-site, which would help to recharge the local groundwater.

10.3.1.5 Displacement of Households, Businesses and Services

Each of the wastewater treatment alternatives would result in only minimal and temporary impact to residents or businesses during construction activities. None of the construction activity should result in the complete displacement of households, businesses, or other services. In addition, one lane of traffic would remain open during sewer construction to help minimize any inconvenience.

10.3.1.6 Noise Pollution, Air Pollution, Odor and Public Health Issues

The I/A system option and wastewater collection system extension option both have pumps and/or blowers, and these may cause minimal noise pollution. A pump station also has the potential to emit odors; however, they could be designed with odor control systems to minimize any potential impacts. A typical septic system does not contain any mechanical equipment; therefore, it should not cause any form of noise or air pollution. Any of the wastewater options would provide for proper handling of sewage, minimizing the potential public health issues associated with any failing septic systems.

10.3.1.7 Violation of Federal, State or Local Environmental and Land Use Statutes

All the alternatives would be designed, constructed, and operated in accordance with all federal, state, and local environmental and land-use statutes, regulations, and plans.

10.3.2 Indirect Impacts

For this analysis, it has been determined that the wastewater alternatives will result in minimal indirect impacts. There are no impacts or changes to the land use patterns in the study area.

10.4 INSTITUTIONAL ARRANGEMENTS

The continued use of septic systems would not require any additional work from the Town's Board of Health. If the I/A systems are selected it may require the Board of Health to review DEP mandated semi-annual inspection reports for these types of systems which provide nitrogen removal and provide annual inspections for those systems that do not provide nitrogen removal.

10.5 FLOW AND WASTE REDUCTION

Several various types of flow and waste reduction methods were discussed in Phase 2 of the CWMP. Some specific examples of flow and waste reduction measures include the following:

- Water conservation
- Land use and development regulations
- Industrial reuse, recycling, and pretreatment programs
- Use of on-site facilities (i.e., Septic and I/A systems)
- Pollution Prevention initiatives

The reduction in wastewater volume allows for minimized collection, treatment, and effluent disposal processes. Water and thereby wastewater use habits start at the source with each individual property owner. However, in order to realize significant water use reductions, it is the responsibility of the community and should be taken on as a Town-wide initiative.

Regarding a pollution prevention initiative, the Town of Spencer should consider the implementation of a Septage Management Plan (SMP) for the management of on-site Septic systems. The general intent of the SMP is to implement appropriate regulations, controls and/or guidelines to ensure the proper operation for systems in areas where on-site treatment and disposal methods are recommended as a long-term solution.

10.6 RESIDUALS DISPOSAL

For on-site systems (septic and I/A), the residuals are typically pumped out of the septic tanks or equalization tanks on an annual or bi-annual basis. The septage is then transported and disposed of at a DEP-approved septage treatment facility, such as the Town's WWTF. At the Spencer WWTF, sludge solids are pumped to a belt filter press where it is dewatered or thickened and transported offsite.

10.7 LOCATION OF FACILITIES

The septic and I/A systems would be onsite on the homeowner's land.

10.8 REVISION OF WASTE LOAD ALLOCATION

The two proposed treatment alternatives would not affect the waste load allocation.

10.9 PHASED CONSTRUCTION

If septic systems or I/A systems are selected for future wastewater treatment, then individual systems should be replaced as existing septic systems fail over the 20-year planning period.

10.10 FLEXIBILITY AND RELIABILITY

The wastewater management alternatives would be designed to be flexible and reliable so that any unforeseen circumstances could be accommodated within a timely manner. All infrastructure and wastewater treatment would be designed in accordance with the New England Interstate Water Pollution Control Commission's (TR-16) *Guide for the Design of Wastewater Treatment Works*.

TABLE 10-4

ENVIRONMENTAL IMPACTS FOR SHORTLISTED ALTERNATIVES

FOR STUDY AREA 30 – CRANBERRY MEADOW POND

TREATMENT ALTERNATIVES	ENVIRONMENTAL IMPACTS							
	Direct							Indirect
	Historical & Archeological	Wetlands & Floodplains & Habitats	Water Supply Protection	Surface & Groundwater Resources	Displacement of Households	Noise & Air Pollution	Violation of Statutes	Population Growth & Land Use Changes
Septic Systems	N	T	N	M	N	N	N	N
I/A Systems	N	T	N	M	N	M	N	N

M = Minimal
N = None
T = Temporary during construction

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SECTION 11

EVALUATION OF THE WASTEWATER TREATMENT FACILITY

11.1 INTRODUCTION

As shown in **Figure 11-1**, the Town of Spencer owns and operates a Wastewater Treatment Facility (WWTF), located on West Main Street, which services the greater downtown area and most of the residential development. The WWTF collects both wastewater and septage from the Town of Spencer and other communities adjacent to the Town. The WWTF currently treats approximately 770,000 gallons of wastewater per day (annual average) and discharges to the Cranberry River. Under the 2019 NPDES Permit (NPDES #MA0100919), the current design capacity is 1.08 million gallons per day (MGD) annual average.

11.2 SUMMARY OF EXISTING CONDITIONS

Wastewater flows into the treatment facility through a 24-inch diameter gravity sewer directly to the screening and grit removal facilities where it receives preliminary treatment to remove large solids and grit. Septage is also added at this point. Flow continues to the lime slurry tank where lime is added and mixed. Flow then continues to the screw pump lift station and is pumped to the aeration basins for biological treatment, including nitrification. Following aeration, the wastewater flows through a chemical feed manhole where alum is introduced, as needed, to enhance phosphorus removal. The biomass and chemicals are blended in a rapid-mix splitter box prior to flowing into the final clarifier. Settled solids, return activated sludge (RAS), are returned to the aeration tanks. Excess sludge is removed as thickened waste sludge by a belt filter press. Final clarifier effluent enters wetland beds for tertiary treatment and then is disinfected using ultraviolet (UV) radiation. The final effluent is aerated and replenished with dissolved oxygen (DO) as it flows down a cascade outfall to the Cranberry River.

FIGURE 11-1

SPENCER WASTEWATER TREATMENT FACILITY

The wastewater treatment equipment at the facility is summarized as follows:

Preliminary Treatment

- One manually-cleaned coarse bar rack and one automatic fine bar screen
- Aerated Grit tank
- Septage Receiving – direct to screenings channel
- Lime Slurry Tank

Influent Pump Station

- Two Screw Pumps

Primary Treatment

- None

Secondary Treatment

- Two Aeration Tanks that utilize fine bubble diffusers
- Blowers to provide air to the aeration tanks
- Two secondary clarifiers (one in service)
- Rapid Mix tank that has been redesigned to include a blower for mixing

Disinfection/Reaeration

- One UV contact tank with two chambers
- Reaeration cascade in outfall to increase dissolved oxygen (DO) levels

Solids Handling

- A belt filter press is currently used to process sludge for disposal, but is used as a gravity belt thickener

Influent flow typically exceeds the effluent flow at the facility, indicating that a portion of the flow that enters the facility is being lost to groundwater (via wetland beds) and/or used in recycle. Septage addition is captured by the influent flowmeter. The loss of flow is most likely occurring in the wetland treatment system through groundwater recharge. The loss of flow from the wetland system to groundwater has been as high as 45 percent or 0.5 MGD (April 2005), while on average, the loss of flow to groundwater is estimated to be approximately 0.2 MGD.

Occasionally, secondary treatment process bypass events occur at the facility when influent flows exceed the capacity of the screw pump lift station (5.48 MGD). Influent flows exceeding 5.48 MGD discharge to the wet weather pump station and are pumped to the last two constructed wetland beds for treatment. Bypassed flows mix with the fully treated secondary effluent flows prior to disinfection. For the bypass events, flow data from the facility indicates that instantaneous peak influent flows exceeding 5.48 MGD occur for only short periods of time during the event. The volumes of the bypassed flow during these events have ranged between 1.2 and 6.7 percent of the total influent flow volume received at the WWTF on the day that the bypass occurred. In all cases, the bypass events were caused by wet weather conditions that resulted in high I/I in the collection system.

11.2.1 Flows and Loads

Wastewater influent flows and loads to the treatment facility were developed using operations and reporting data collected from January 2015 to November 2017 as presented in **Table 11-1**.

TABLE 11-1

CURRENT INFLUENT FLOWS AND LOADS, SPENCER WWTF (2015-2017)

PARAMETER	FLOW		BOD5		TSS		NH3-N		Total-P	
	mgd	P.F.[8]	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day	mg/L	lb/day
Minimum Month (BOD_5 Based)[1,2]	0.43	0.6	231	801	408	1,413	29.9	103	7.51	26
Annual Average	0.77	—	255	1,400	350	1,805	26.9	135	6.00	29
Maximum Month (Flow Based)[3]	1.56	2.1	111	1,407	146	1,850	7.5	95	2.26	29
Maximum Month (BOD_5 Based)[4]	1.07	1.5	282	2,462	302	2,635	19.5	170	3.26	28
Maximum Day (Flow Based)[5]	3.07	4.2	81	2,023	52	1,291	6.1	152	1.91	48
Maximum Day (BOD Based)[6]	1.13	1.6	392	3,614	363	3,341	18.4	170	3.09	28
Peak Hour (Flow Based)[7]	5.47	7.1	—	—	—	—	—	—	—	—
Peak Instantaneous Flow	9.79[9]	12.7	-	-	-	-	-	-	-	-

Notes:

1. The maximum month BOD_5 loading condition represents the maximum 30-day BOD_5 loading received at the WPCF. The associated flow rate, TSS loading, NH_3-N loading, and TP loading are the actual influent loads of each parameter that occurred concurrently with the historical 30-day maximum BOD_5 load. Thus, the values presented above for all parameters (except BOD_5) may or may not be the historical maximum 30-day influent loading condition for each parameter.
2. Minimum month BOD loadings occurred on 07/15/2016.
3. Maximum month Flow loadings occurred on 04/23/2015.
4. Maximum month BOD loadings occurred on 01/20/2017.
5. Maximum day Flow loadings occurred on 04/06/2017.
6. Maximum day BOD loadings occurred on 01/18/2017.
7. Peak Hour Flow occurred on 10/29/2017.
8. Peaking Factor.
9. Peak Instantaneous flow recorded on August 28, 2011.

The Spencer WWTF currently treats an average daily flow of 0.77 MGD, or approximately 70% of the facility's permitted capacity. A copy of the WWTF's current NPDES permit is listed in **Table 11-2**.

11.2.2 NPDES Permit

EPA has issued a new NPDES permit that includes a stricter phosphorous limit. Specifically, the stricter permit includes a total nitrogen (TN) goal of 87 lbs/day (not a limit) and a total phosphorus (TP) limit of 0.1 mg/L or 0.79 lbs/day during the summer months.

TABLE 11-2

NPDES PERMIT LIMITS (2019)

Effluent Characteristic	**Units**	**Discharge Limitation**		
		Average Monthly	**Average Weekly**	**Maximum Daily**
Influent Flow – Annual Average	MGD	1.08	-	-
Influent Flow	MGD	Report	-	-
Effluent Flow – Annual Average	MGD	Report	-	-
Effluent Flow	MGD	Report	-	-
BOD_5				
May 1 to October 31	mg/L	5.6	7.5	Report
	lbs/day	50	68	Report
November 1 to April 30	mg/L	30	45	Report
	lbs/day	270	405	Report
TSS				
May 1 to October 31	mg/L	5.6	7.5	Report
	lbs/day	50	68	Report
November 1 to April 30	mg/L	30	45	Report
	lbs/day	270	405	Report
pH	S.U.	Not less than 6.5 mg/L nor greater than 8.3	Not less than 6.5 mg/L nor greater than 8.3	Not less than 6.5 mg/L nor greater than 8.3
Dissolved Oxygen (Apr 1 – Oct 31)	mg/L	Not less than 6.0 mg/L	Not less than 6.0 mg/L	Not less than 6.0 mg/L
Escherichia Coli Bacteria (April 1 – October 31)	cfu/100 mL	126	-	409
Effluent Characteristic	**Units**	**Discharge Limitation**		

		Average Monthly	Average Weekly	Maximum Daily
Ammonia – Nitrogen				
May 1 to October 31	mg/L	0.56	0.84	Report
	lbs/day	5	7.5	Report
November 1 to April 30	mg/L	6.3	-	Report
	lbs/day	56.7	-	Report
Total Nitrogen	mg/L	Report	-	Report
May 1 -Oct 31	lbs/day	Report	-	Report
	mg/L	Report	-	Report
Nov 1 - Apr 30	lbs/day	Report	-	Report
Total Kjedahl Nitrogen				
May 1 -Oct 31	mg/L	Report	-	Report
	lbs/day	Report	-	Report
Nov 1 - Apr 30	mg/L	Report	-	Report
	lbs/day	Report	-	Report
Nitrate/Nitrite				
May 1 -Oct 31	mg/L	Report	-	Report
	lbs/day	Report	-	Report
Nov 1 - Apr 30	mg/L	Report	-	Report
	lbs/day	Report	-	Report
Total Phosphorous				
April 1 to October 31	mg/L	0.1	-	Report
	lbs/day	0.79	-	Report
November 1 to March 31	mg/L	0.2	-	Report
	lbs/day	1.19	-	Report
Copper	µg/L	10.3	-	15.3
LC_{50}	%	100%		
Chronic NOEC	%	93%		

11.2.3 WWTF Flow Capacity

The Spencer WWTF is permitted to treat an average daily flow (ADF) of 1.08 MGD. The facility currently treats an ADF of 0.77 MGD. Once the facility reaches an ADF of 0.864 MGD for a reporting year, they will trigger the 80% threshold established for reporting capacity related overflows during the year and calculating maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year and a summary of unauthorized discharges during the past year and their causes.

The purpose of this section is to demonstrate that, for the 20-year planning period, the WWTF will maintain available treatment capacity, even if build-out occurs within the existing sewered areas of the town. The recommended Needs Area flow addition and its impact on the WWTF is discussed in Section 12. **Table 11-3** summarizes existing and total build-out flows for the WWTF. The build-out flows include existing residential and commercial/industrial developments that are on septic systems and vacant parcels within the sewered area. The vacant parcels were divided based on existing zoning and parcel size to estimate potential future flow.

TABLE 11-3

BUILD-OUT WASTEWATER FLOWS FOR 20-YEAR PLANNING PERIOD

ADF SOURCE	**MGD**
Current WWTF ADF	0.770
Estimated Flow from Existing Buildings on Septic Systems[1,2,3]	0.145
Total Build-out Flow	**0.915**
Total Permitted Design Flow at WWTF	***1.080***
Remaining Available Capacity at WWTF	**0.165[4]**

Notes:

1 Estimated build-out flow was calculated based on TR-16 Guidelines using 70 gpd/capita. The Town of Spencer averages 2.36 capita/household

2 Number of parcels in existing sewered area that are on septic systems = 352. Estimated from Sewer Billing Data and GIS.

3 Residential flow = 70*2.36*352 = 58,000 gallons. 87,000 gallons estimated for commercial flows.

4 165,000 gallons / 70 gpd/capita / 2.36 capita/home = approximately 1,000 homes of available capacity.

The table above shows that at full build-out, the WWTF will surpass the 80% design flow metric of 0.864 MGD (based on the design average flow of 1.08 MGD). As such, the Sewer Department will need to be cognizant whenever they are approving new connections to the collection system. Currently they have an estimated 94,000 gallons per day (approximately 560 homes) of available capacity before they reach the 80% flow metric. If the proposed buildout flow of 0.145 MGD were to be spread out evenly over the 20-year planning period, that would equate to 7,000 gallons of additional flow each year. It would take approximately 13 years to reach the 80% flow metric. Unless large commercial development(s) were to be added, it is unlikely that the WWTF will reach 0.864 MGD before the next NPDES permit cycle (approximately 2024).

When the Sewer Department begins to implement I/I control methods during the 20-year planning period, much of their capacity-related issues could be reduced. These recommendations are discussed in Section 12. Approximately 70 percent of Spencer's average daily flows are due to I/I.

11.3 WWTF IMPROVEMENTS

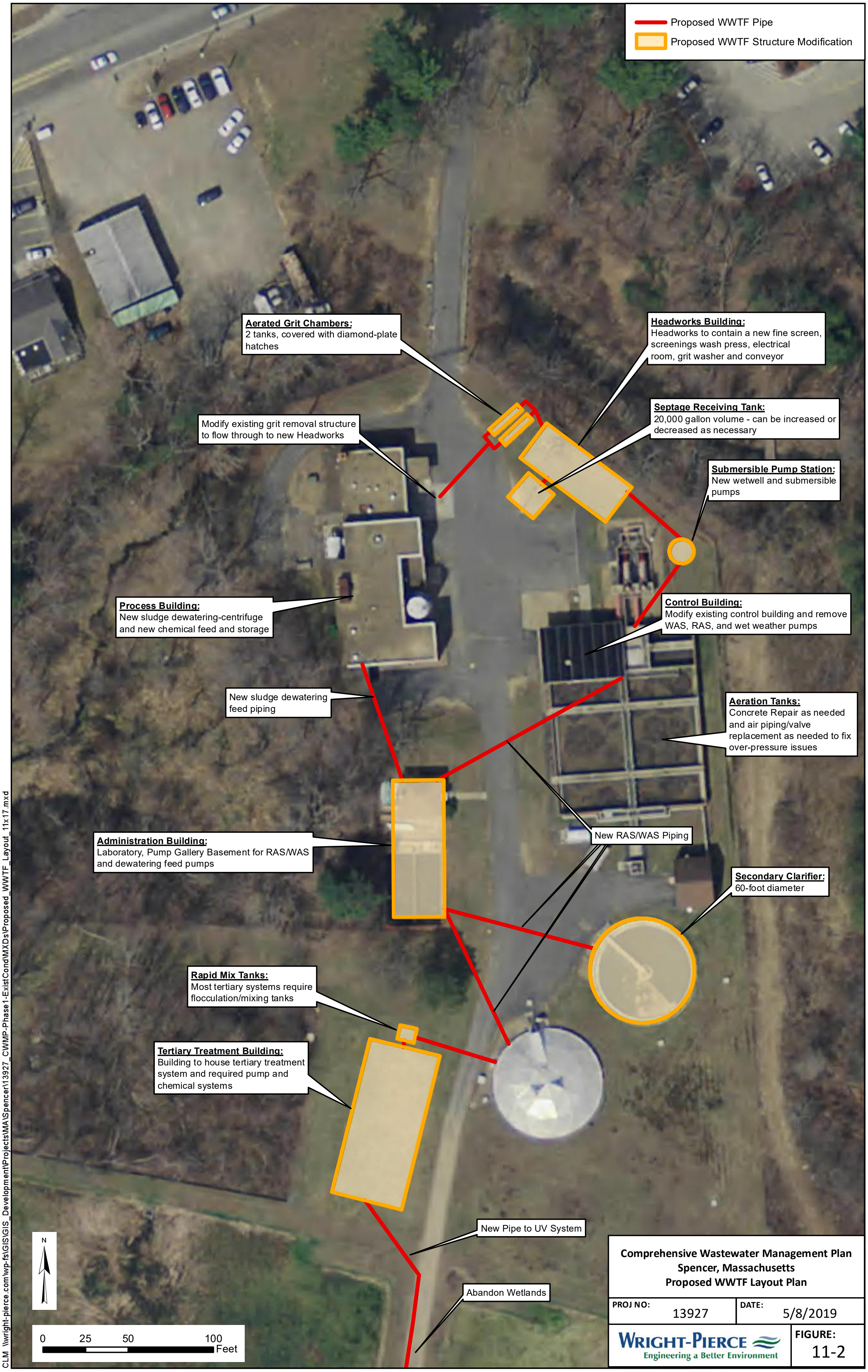
Based on the NPDES permit limits and aging equipment/processes, the following improvements are recommended for the Spencer WWTF:

- Keep existing influent mechanical screen in existing building.
- Demolish existing grit removal system, modify existing tank structure, and construct new grit removal system.
- Grit removal followed by a new headworks building with fine screening, including an electrical room. Recommended to be constructed near the influent pump station.
- New septage receiving tank and pumping system with coarse rock trap. Recommended to be constructed next to new screen building.
- Remove screw pumps and replace with a new pumping system (submersible pumps). Recommend constructing next to existing station. Two large duty pumps with a smaller jockey pump for low flow condition. Sized so a large and small pump can meet peak flows, per TR-16.
- Replace influent flow meter and calibrate for maximum of 10 MGD.
- Keep existing aeration tanks. Repair concrete as needed. Address air piping overpressure issues and replace diffusers, if necessary.
- Remove all process equipment, piping, and valves on lower level of Control Building. Proper influent pump station sizing will remove necessity of wet weather pumps. RAS and WAS pumps are recommended to be replaced and relocated to a new Administration Building.
- Because of NFPA 820 requirements (proximity to open aeration tanks with no prior primary clarification), remove all administrative functions from the Control Building. The building will be repurposed to suit staff needs (storage, etc.).
- Demolish old secondary clarifier. Build new secondary clarifier to match larger one but utilize tow-bro sludge removal design. New RAS and WAS piping.
- New tertiary treatment building. This building would include the tertiary system, rapid mixing tank, and any chemical feed/mixing systems required.

- Tertiary process addition consisting of a two-stage deep bed sand filtration system (beds are in series) to address phosphorous and copper removal. Other tertiary systems will be considered during design.
- New centrifuge and miscellaneous improvements within solids handling building to bring into code compliance.
- New Admin Building consisting of a lab, office space, locker room, and basement with plant water pumps, RAS and WAS pumps.
- Abandon wetlands and connect flow from tertiary treatment to existing UV disinfection.

Figure 11-2 shows the proposed changes and site layout.

The tertiary treatment system is the primary focus for this upgrade as it is mandated in the new NPDES permit, both for the new total phosphorous limit and with a detailed compliance schedule. As noted above, the tertiary treatment system identified at this stage to meet the new requirements is recommended to be a deep bed sand filter, as manufactured by Nexom (BluePRO). This system has been used by another facility in the region with similar phosphorous limits and higher flows. The facility has met a strict phosphorous limit of 0.07 mg/L, similar to the new limit given to the Spencer WWTF. Detailed information on this system can be found in **Appendix E**. This system will also address copper compliance. The final process and equipment selection will be decided during preliminary design and may change from deep bed sand filters.



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11.4 CONSTRUCTION PERMITTING

11.4.1 Federal Permits and Approvals

1. NPDES Stormwater Permit for Construction: Construction sites greater than one acre are subject to a National Pollutant Discharge Elimination System (NPDES) Stormwater Permit for construction. It is expected the disturbed area will be greater than one acre and it will be necessary to apply for a NPDES Stormwater Permit.

2. NPDES Dewatering Permit for Construction: Construction dewatering activities in Massachusetts are subject to a NPDES permit. The depth of excavation is expected to be as much as 20-feet below grade for building footings, underground piping, and utilities. At this depth, construction dewatering will likely be necessary.

3. Army Corps of Engineers: Likely not required.

11.4.2 State Permits and Approvals

1. MEPA: Our review of the MEPA thresholds indicates that an Environmental Notification Form (ENF) and/or Environmental Impact Report (EIR) will not be required for this project. The constructed wetlands will need to be evaluated to see if there are any endangered or threatened species that have created a habitat in them.

2. Massachusetts Historical Commission (MHC) Approval: The construction of the project will take place within the existing limits of the WWTF. As this site has already been disturbed by construction of the existing WWTF, no action is anticipated to be required regarding the MHC.

3. Wetlands: Site disturbances have the potential to fall under the wetland regulations 100-foot buffer zone. Previous site plans do not show a wetland boundary, so it appears that there is no existing flagging (and it would likely be dated if there was). A detailed site investigation is the only way to truly delineate the wetland boundary. It will be necessary to file a Notice-of-Intent (NOI). The constructed wetlands may be an issue as well.

4. Flood Plain: The WWTF was constructed in compliance with the flood plain data that was available at the time. An investigation into facility compliance with the floodproofing requirements of the National Flood Insurance Program should be completed. This involves new Federal guidelines for floodproofing of critical infrastructure. The new Federal guidelines require a minimum 3-foot freeboard above the 100-year flood elevation for critical infrastructure, which includes disinfection. These guidelines are recommended in TR-16, which are standards for WWTF design.

5. MassDEP Plan Approval: The proposed project will be subject to plan approval for modifications to a treatment facility. The submittal process will be in accordance with DEP Form # WP-68. This typically involves submitting the Preliminary Design Report and plans and specifications submittal to DEP for review and comment.

6. Air Quality Permit: The project does not have any component that would trigger air quality control permit requirements.

7. Backflow Prevention: The project will include new backflow preventers to isolate process water uses from domestic water uses. This will require that the Town of Spencer plumbing inspector review the type and location of any backflow preventers prior to start-up.

8. Operator Certification: The Town will submit a process flow schematic to the Wastewater Operators Certification Board at the completion of the design phase to determine if any change in the level of operator skills will be mandated. It is anticipated that the level of skill mandated will change, but the existing staff have the necessary licenses to operate the WWTF after the upgrade is complete.

11.4.3 Other Permits and Approvals

Building Permit: The project will require a building permit from the Town of Spencer. The building permit cannot be applied for until a General Contractor has been awarded the project. The specifications will require the Contractor to apply for and obtain the permit prior to construction.

11.5 STATE REVOLVING FUND (SRF) FINANCING

The Town plans to seek zero percent financing from the State Revolving Fund for the project. This would require filing a Project Evaluation Form (PEF) when they become available during the first design year (which is typically the beginning of July). The typical due date for PEFs is in mid-August, and a draft Intended Use Plan (IUP) is issued by the end of the year. The project is likely to make the IUP, since it includes improvements needed to meet the new phosphorus limit. The full SRF loan application is due by October 15th prior to going out to bid the following year.

There are several requirements the Town will need to complete to qualify for zero percent loan financing. The requirements are:

1. The project is primarily intended to remediate or prevent nutrient enrichment of a surface water body or a source of water supply;

2. The applicant is not currently subject, due to a violation of a nutrient-related total maximum daily load standard or other nutrient based standard, to a MassDEP enforcement order, administrative consent order or unilateral administrative order, enforcement action by the United States Environmental Protection Agency or subject to a state or federal court order relative to the proposed project;

3. The applicant has a Comprehensive Wastewater Management Plan (CWMP) approved pursuant to regulations adopted by MassDEP;

4. The project has been deemed consistent with the regional water resources management plans if one exists;

5. The applicant has adopted land use controls, subject to the review and approval of MassDEP in consultation with the Department of Housing and Economic Development and, where applicable, any regional land use regulatory entity, intended to limit wastewater flows to the amount authorized under the land use controls that were in effect on the date the Secretary of the Executive Office of Energy and Environmental Affairs issued a certificate for the CWMP pursuant to the Massachusetts Environmental Policy Act, M.G.L. c. 30, §§ 61-62H, and the MEPA regulations at 301 CMR 11.00.

11.6 CONSTRUCTION SEQUENCING

Several portions of this project will require significant construction sequencing to maintain treatment for the full contract period. These issues are outlined below:

1. Construct new headworks building, including the grit removal and septage receiving facilities. Once complete, piping can be completed to connect to the existing grit removal structure and tied into the influent pump station wet well.

2. The influent pump station can likely be constructed next to the existing pump station. This would allow construction to finish before taking the existing station out of service.

3. Aeration modifications can occur one tank at a time. One tank would be taken out of service until construction is complete, and then it would be filled, and the other tank would be taken offline for construction. Doing construction during a low flow time of year would be beneficial.

4. The old clarifier can be demolished and the new one constructed while the main clarifier is online.

5. The new tertiary building and piping to UV system can be fully constructed without interfering with operations. Once complete, the system can be connected to the secondary clarifier effluent piping.

6. The new Administration Building and pump gallery basement can be constructed without impacting operations. The plant water, RAS, and WAS pumps can all be switched over upon completion.

7. The solids handling and chemical storage/feed system changes can be completed in the winter, as work is all inside the existing process building.

11.7 CONCEPTUAL COST ESTIMATE

Table 11-4 presents a summary of the conceptual level cost estimate for the project. This cost estimate will be updated throughout the design process to reflect any changes to the design. The estimated cost to upgrade the WWTF was developed using standard cost estimating procedures, utilizing conceptual layouts, equipment quotations and unit cost information. Where appropriate, recent construction cost data were incorporated. Allowances were provided for general contractor overhead and profit, project location multiplier for Massachusetts construction, construction phase contingency, and engineering services for design and construction. The total project cost for the recommended improvements is estimated to be approximately $27 million.

11.8 PROPOSED SCHEDULE

The proposed project schedule is shown in **Table 11-5**. The schedule is subject to change based on funding approval by the Town. The proposed schedule is based on the compliance schedule in the final NPDES permit. The preliminary design phase would be initiated within one month after the annual Town Meeting (needed to appropriate design funds) in the year after the permit is issued. The Town Meeting is held in May each year.

TABLE 11-4
CONCEPTUAL COST ESTIMATE

ITEM	ESTIMATED COST
Civil	$975,000
Architectural	$1,020,000
Structural	$1,960,000
Process Equipment & Piping	$4,861,000
HVAC/Plumbing	$675,000
Instrumentation	$859,000
Electrical	$2,267,000
Contractor Mobilization (5%)	$631,000
Itemized Construction Subtotal	**$13,248,000**
Contractor Overhead and Profit (20%)	$2,650,000
Contractor Mark-up on Subcontractor Work, Subcontractor Profit, Bonds and Insurance, Unit Price Items	$714,000
Construction Cost Subtotal	**$16,612,000**
Design Contingency (20%)	$3,322,000
Inflation to Mid-point of Construction (5%)	$831,000
Total Estimated Construction Cost	**$20,765,000**
Construction Phase Contingency (5%)	$1,038,000
Total Estimated Bid Cost	**$21,803,000**
Engineering Services – Design & Construction Administration (18%)	$3,738,000
Materials Testing (1%)	$208,000
Town Legal/Administration Fees (2%)	$415,000
Financing (1%)	$262,000
Total Project Cost	**$26,426,000**

TABLE 11-5

PROPOSED SCHEDULE

MILESTONE	DATE
Final NPDES Permit Issuance*	February 2019
Final CWMP	May 2019
CWMP Public Hearing	July 2019
Conceptual Design Report Due**	By December 31, 2019
Spencer Annual Town Meeting to Appropriate Design Funds	May 2020
Preliminary Design Begins	July 2020
MassDEP SRF Project Evaluation Form (PEF) Submitted	August 2020
Preliminary Design Report (30%)	December 2020
MassDEP SRF Intended Use Plan (IUP) Notification Draft	By December 31, 2020
Final IUP	January 2021
Final Design & Permitting Begins	January 2021
Spencer Annual Town Meeting to Appropriate Construction Funds	May 2021
SRF Application Submission (90% Design)	By October 15, 2021
100% Design & Permitting Complete	By December 31, 2021
Bidding	January through March 2022
Start Construction	By June 30, 2022
Substantial Completion	October 2023
Final Completion December 2023	December 2023
One-year Warranty Period	October 2024
Attain Compliance	By December 31, 2024

*Went into effect May 1, 2019

**CWMP understood to satisfy this requirement

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SECTION 12

RECOMMENDED WASTEWATER MANAGEMENT PLAN

12.1 INTRODUCTION

The recommendations presented in this section of the CWMP were developed from a review of potential environmental impacts, conceptual design criteria, economic factors, regulatory compliance, and an implementation schedule that is appropriately suited for the Town of Spencer. Further, a comprehensive set of criteria were analyzed, as presented in each Phase, to ensure the most appropriate wastewater management system was selected; including protection of public health, water supply, surface water, and to preserve community character. It is important to note that economic factors are important, but they are only part of the evaluation process for recommending the appropriate wastewater management plan.

12.2 COMPARISON AND RANKING OF ALTERNATIVES FOR PLAN SELECTION

In Sections 2 through 10 of this report, the potential environmental impacts for the shortlisted alternatives for each Needs Area were discussed. Other conditions, which factored into the final ranking, included implementation, institutional, monetary, and other impacts as presented in the following sections. Based on the analysis, the final ranking of the shortlisted alternatives for each Needs Area are summarized in **Tables 12-1** through **12-9**, respectively.

12.2.1 Environmental Impacts

As shown in the tables, on-site wastewater treatment alternatives (septic and I/A systems) for Needs Areas 11, 12, 13, 15, 16, 18, 20, 28, and 30 will have a minimal impact on the environment, assuming the treatment systems are properly designed, installed, and operated. Once constructed, there should be no environmental impacts from the wastewater collection system extension option, provided the proposed sewer pipes and pump stations are properly installed. The septic systems and I/A systems would not promote population growth or changes in the land use pattern. However, the sewer extension alternative may promote some population growth within those Needs Areas, as currently not all the parcels are developed.

TABLE 12-1

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 11 – WIRE VILLAGE ROAD AND SUGDEN RESERVOIR, NORTH, AND WEST

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 4,416,000
2	I/A Systems	M	N	N	A	$ 7,028,000
3	Collection System Extension	N	M	M	E	$ 24,993,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-2

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 12 - SUGDEN RESERVOIR, SOUTH, AND EAST

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 6,757,000
2	I/A Systems	M	N	N	A	$ 10,746,000
3	Collection System Extension	N	M	M	E	$ 31,189,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-3

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 13 – COONEY ROAD

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 2,044,000
2	I/A Systems	M	N	N	A	$ 3,253,000
3	Collection System Extension	N	M	M	E	$ 18,083,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-4

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 15 – HIGH RIDGE ROAD

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 758,000
2	I/A Systems	M	N	N	A	$ 1,202,000
3	Collection System Extension	N	M	M	E	$ 8,223,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-5

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 16 – LAKE WHITTEMORE

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 4,119,000
2	I/A Systems	M	N	N	A	$ 6,555,000
3	Collection System Extension	N	M	M	E	$ 13,493,000

<u>Legend</u>
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-6

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 18 – ROUTE 9 AND 49 INTERSECTION, NORTH

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 2,341,000
2	I/A Systems	M	N	N	A	$ 3,729,000
3	Collection System Extension	N	M	M	E	$ 14,820 ,000

<u>Legend</u>
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-7

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 20 – ROUTE 49

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic 5 Systems	M	N	N	M	$ 2,311,000
2	I/A Systems	M	N	N	A	$ 3,664,000
3	Collection System Extension	N	M	M	E	$ 12,700,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-8

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 28 –STILES RESERVOIR, WEST

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT			
1	Septic Systems	M	N	N	M	$ 6,682,000
2	I/A Systems	M	N	N	A	$ 10,646,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

TABLE 12-9

FINAL RANKING OF SHORTLISTED ALTERNATIVES FOR STUDY

AREA 30 – CRANBERRY MEADOW POND

RANK	TREATMENT ALTERNATIVE	ENVIRONMENTAL IMPACTS		IMPLEMENTATION OR INSTITUTIONAL IMPACTS	LEVEL OF TREATMENT	PROPOSED LENGTH OF SEWER PIPE (FT)	TOTAL PRESENT WORTH COST ($)
		DIRECT	INDIRECT				
1	Septic Systems	M	N	N	M	-	$ 5,139,000
2	I/A Systems	M	N	N	A	-	$ 8,181,000

Legend
A = Adequate, E = Enhanced, M = Minimal, N = None

12.2.2 Implementation and Institutional Impacts

None of the on-site wastewater treatment alternatives (Septic and I/A systems) should result in any significant implementation or institutional impacts to the Town. The wastewater collection system extension options would increase the workload of the Town's Sewer Department personnel because the Town's staff would be responsible for operating and maintaining the additional sewer pipes and potential pump station(s).

12.2.3 Monetary Impacts

For all Needs Area's economic analysis, continuing the use of conventional septic systems over the 20-year planning period proved to be the most economical wastewater treatment alternative as shown in Tables 12-1 through 12-9. I/A systems were the second most economical option for these Needs Areas. Finally, extension of the municipal collection system to the needs areas was the least economical.

12.2.4 Other Impacts and Considerations

As part of providing a complete evaluation for selecting the appropriate wastewater treatment alternative, it is also imperative that the level of treatment obtainable with the proposed systems be considered. As was previously discussed in the CWMP Phase 2 report, septic systems will provide only a minimal level of wastewater treatment. Septic systems will not provide any significant treatment for BOD or other nutrients, such as nitrogen or phosphorus, or bacteria.

Depending on its complexity, an I/A system could produce an improved level of wastewater treatment as compared to a septic system. If the I/A system is designed with a blower and air diffuser system, it could provide an adequate level of wastewater treatment for BOD and nutrient removal, if properly operated.

Any of the wastewater collection system extension alternatives will provide an enhanced level of treatment because the wastewater will be treated at the Town's WWTF. The discharge limits at the WWTF are stricter than can be accomplished through septic or I/A systems. The WWTF will also be upgraded to further reduce phosphorous in the near future.

12.3 RECOMMENDATIONS FOR EXISTING WASTEWATER SYSTEM

The existing wastewater system in the Town of Spencer (collection system and WWTF) has been evaluated for hydraulic capacity. The following sections evaluate the impacts in the collection system and the capacity at the WWTF for existing flow, buildout flow within the existing collection system, and impacts from adding any Needs Area flows. **Figure 12-1** shows the existing collection system.

In conjunction with the CWMP development, an I/I control plan was completed and a sewer system evaluation survey (SSES) is ongoing by the Town of Spencer. The results are discussed in the following section.

12.3.1 Existing Wastewater Collection System (I/I Removal)

The Town of Spencer conducted three flow monitoring projects during the spring 2017 season, winter 2017/2018 season, and spring 2018 season. The manhole locations metered in the spring 2017 season were previously identified as high inflow areas as indicated in the 1990 I/I Analysis and Sewer Evaluation. The twelve manholes metered in winter 2017 and spring 2018 are the same twelve manholes metered and reported in the 1990 I/I Analysis and Sewer Evaluations. **Figure 12-2** shows the meter locations.

12.3.1.1 2018 I/I Control Plan

Flow monitoring was accomplished using area-velocity flow meters. The flow meter locations were named by referencing the meter and the manhole where the meters were located. These meters measured flow based on level and velocity data collected at 15-minute intervals. Manual depth and velocity measurements were taken at each site visit to calibrate the meters. Data was collected and automatically uploaded to a data viewing website. Wright-Pierce reviewed the flow metering data on the data viewing website daily for trends and anomalies. Any issues were reported to the data viewing website.

During the spring 2018 flow monitoring period, flow imbalances between G1 and F1 occurred; the flow measured at G1 was significantly higher than the downstream meter F1. After further investigations, Wright-Pierce performed one round of night flow isolations (NFIs) and flow isolations in meter basin G. NFIs took place between 2:00 AM to 4:00 AM (during times of low wastewater use) and flow isolations were completed between 2:00 PM and 4:00 PM. Results from these investigations did not isolate the source of high I/I entering the system. Additional smoke testing around Muzzy Pond was performed; results from the investigation were inconclusive and did not add any additional information to why flow at G1 was overestimated. Therefore, G1 was not analyzed due to flawed data. Wright-Pierce recommended the Town CCTV the meter basin to identify if there are defects within the meter basin that are contributing to high I/I.

Inflow results at F6 were found inconclusive due to flawed data and were not reported. Smoke testing around Muzzy Pond further justified that the data recorded in meter F6 was flawed as the results from the smoke testing did not show any additional results.

Based on the spring 2018 monitoring data, an estimated 0.56 MGD of base infiltration and 6.88 MG of inflow were estimated in the project area. **Table 12-10** summarizes the base infiltration results and ranking for the meter basins. The ranking is based on the 4,000 gpd/IDM guideline per MassDEP. The three-meter basins with a net base infiltration unit rate equal to or greater than 4,000 gpd/IDM are highlighted in gray. **Table 12-11** summarizes the inflow results and ranking for the meter basins. The ranking is based on MassDEP's 80 percent threshold, and the six-meter basins that account for at least 80 percent of the total system inflow volume are highlighted in gray.

Table 12-12 displays initial recommendations from the I/I Control Plan. **Table 12-13** quantifies the recommended SSES work, **Table 12-14** shows planning level costs of the recommendations, and **Table 12-15** shows an implementation schedule. For all the SSES recommendations, the planning-level cost estimate is $393,100.

TABLE 12-10

SUMMARY OF BASE INFILTRATION (BI) BY METER BASIN

METER BASIN	NET BI (MGD)	NET BI UNIT RATE (GPD/IDM)	BI RANKING
F1	0.10	30,600	1
H1	0.15	7,262	2
C1	0.20	5,842	3
K1	0.05	2,796	4
B14C	0.06	1,472	5
D1A	0.01	493	6
J2	0.01	407	7
A2	0.0	0	8
B1	0.0	0	8
B10	0.0	0	8
F6	0.0	0	8
TOTAL	**0.56**		

1. Gray highlights represent meter basins prioritized for further SSES investigations for infiltration sources (≥ 4,000 gpd/IDM).

TABLE 12-11

SUMMARY OF INFLOW BY METER BASIN

METER BASIN	NET PEAK INFLOW RATE[1,2] (MGD)	NET INFLOW VOLUME[2] (MG)	PERCENT TOTAL INFLOW	CUMULATIVE PERCENT	INFLOW RANKING
J2	0.56	1.23	18.0%	18.0%	1
H1	0.88	1.22	18.0%	36.0%	2
B14C	0.56	1.08	16.0%	52.0%	3
A2	0.31	0.88	13.0%	64.0%	4
C1	0.27	0.58	8.0%	73.0%	5
F1	0.24	0.57	8.0%	81.0%	6
D1A	0.22	0.55	8.0%	89.0%	7
B1	0.34	0.27	4.0%	93.0%	8
K1	0.14	0.27	4.0%	97.0%	8
B10	0.21	0.23	3.0%	100.0%	10
TOTAL	**3.73**	**6.88**			

1. Peak inflow is determined over a 1-hour period.
2. Direct inflow is calculated per MassDEP guidelines.
3. Delayed inflow is calculated per MassDEP guidelines.
4. Inflow results for meter basins F6 and G1 were inconclusive.
5. Gray highlights represent meter basins prioritized for further SSES investigations for inflow sources (top 80%).

TABLE 12-12

I/I CONTROL PLAN RECOMMENDATIONS

METER BASIN	INFILTRATION PRIORITY	INFLOW PRIORITY	CCTV INSPECTION	NIGHT FLOW ISOLATION	MANHOLE INSPECTION	SMOKE TESTING	DYE TESTING	BUILDING INSPECTION
A2	No	Yes	No	No	Yes	Yes	Yes	Yes
B1	No	No	No	No	No	No	No	No
B10	No	No	No	No	No	No	No	No
B14C	No	Yes	No	No	Yes	No	No	Yes
C1	Yes	Yes	Yes	Yes	Yes	No	No	Yes
D1A	No	No	No	No	No	No	No	No
F1	Yes	Yes	Yes	Yes	Yes	No	No	Yes
F6	Yes	No	Yes	No	Yes	No	No	No
G1	Yes	No	Yes	No	Yes	No	No	No
H1	Yes	Yes	Yes	Yes	Yes	No	No	Yes
J2	No	Yes			Yes	Yes	Yes	Yes
K1	No	No	No	No	No	No	No	No
# of Meter Basins	**5**	**6**	**5**	**3**	**8**	**2**	**2**	**6**

TABLE 12-13

I/I CONTROL PLAN RECOMMENDED SSES WORK QUANTITIES

METER-BASIN	CCTV INSPECTIONS (LF)	NIGHT FLOW ISOLATIONS (EA)	MANHOLE INSPECTIONS (EA)	SMOKE TESTING (LF)	DYE TESTING (LF)	BUILDING INSPECTIONS (EA)
A2	0	0	10	3,245	2	4
B14C	0	0	73	0	0	22
C1	20,084	10	63	0	0	32
F1	1,345	0	4	0	0	6
F6	510	0	2	0	0	0
G1	2,940	0	19	0	0	0
H1	12,175	6	37	0	0	12
J2	0	0	36	9,958	2	10
TOTAL	**37,054**	**16**	**244**	**13,203**	**4**	**86**

TABLE 12-14

PLANNING LEVEL COST ESTIMATE FOR RECOMMENDED SSES WORK

SSES PHASE	METER BASIN	TOTAL COST
Phase 1	F6; portions of other basins	$59,900
Phase 2	H1, J2	$91,600
Phase 3	A2, B14C	$75,300
Phase 4	C1, F1, G1	$166,300
TOTAL		**$393,100**

TABLE 12-15

10- YEAR IMPLEMENTATION SCHEDULE

PHASE	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1	■									
2		■								
3				■						
4						■				

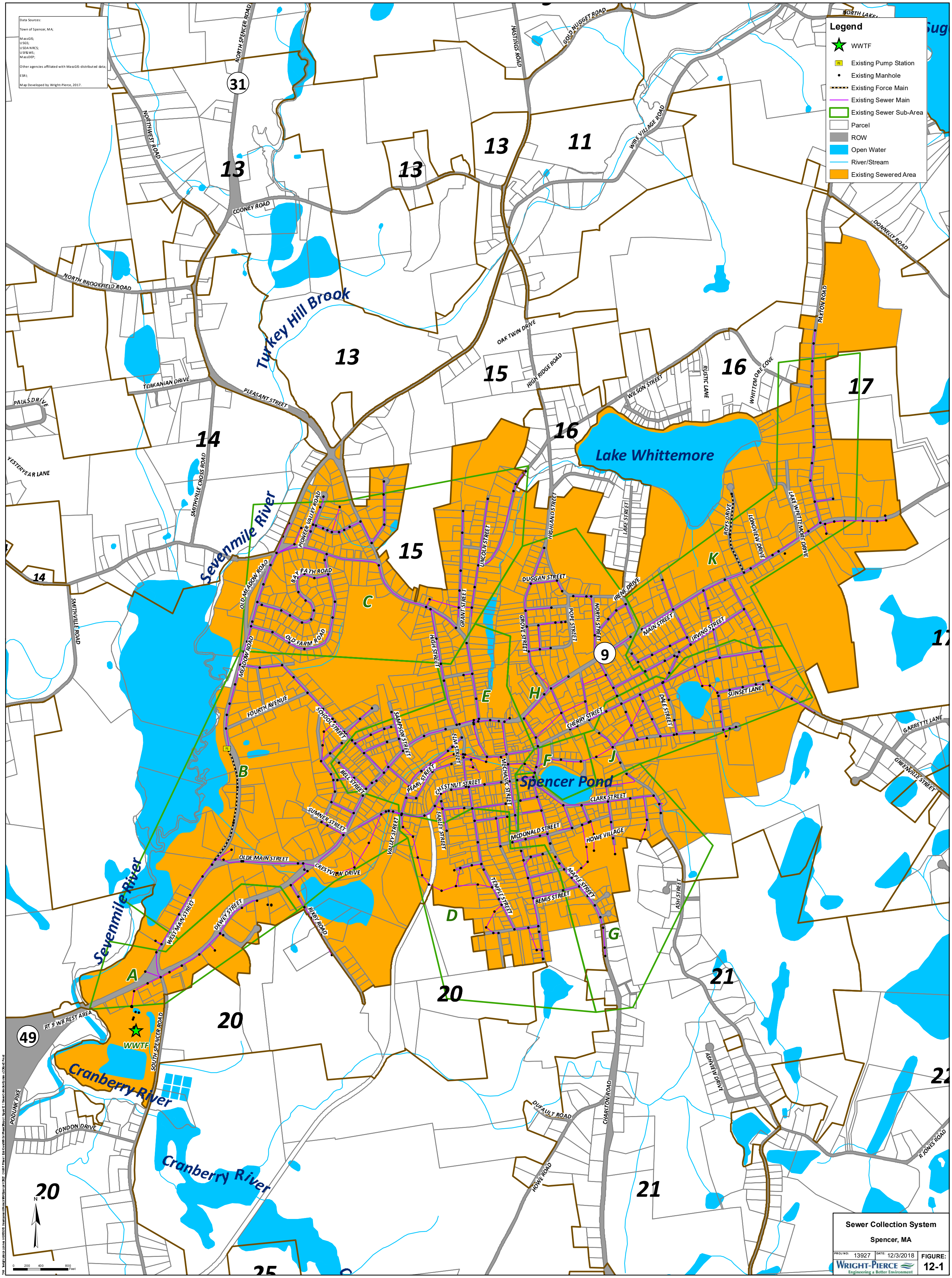
12.3.2 Existing Collection System Capacity Analysis

The existing collection system, shown in Figure 12-1, was analyzed for existing capacity issues using data collected at the WWTF Parshall flume and sewer usage billing data for the period from July 2017 through July 2018. The average daily influent flow at the WWTF was calculated to be 0.77 MGD for the time period. The billing data was used to geo-locate the flow from each building to the respective receiving pipe in the collection system. A spreadsheet was then created to add flow from pipe segment to pipe segment and to add I/I values derived from dry weather flow data obtained during the 2018 I/I Control Plan for each pipe segment. This method ensured all flow was accounted for in each pipe and was summed for each downstream pipe segment as flow progresses through the system. TR-16 recommends that when a sewer pipe reaches 80% full capacity under average daily flows, the pipe size should be increased. This 80% threshold was used for the capacity analysis. It should be noted that manhole invert elevations were not available, so minimum pipe slope was used (most conservative estimate).

Under average daily flow conditions, no pipes were found to be over capacity or approaching 80% full in the existing collection system. Using empirical flow meter data from the 2018 I/I Control Plan and confirming the value using the WWTF Parshall flume, a peaking factor of 5.0 was calculated for the time period. This is consistent with flow data from the WWTF for the years 2015-2017. The peaking factor was applied to the capacity analysis spreadsheet to determine if any pipes were over capacity during peak flow periods. During peaked flow conditions, pipes in basin K, F and B exceeded the TR-16 80% capacity threshold, but less than 90%. Pipes between manholes K6 to K3, F6 to F3 and B14 to B7 were all found to be over the 80% capacity threshold. The pipe segments are shown on **Figure 12-3** in red. These segments should be monitored by the Town during I/I removal projects and, in the future, analyzed again to see if increasing the pipe size is necessary.

Future Flows

Buildout flows for the existing collection system were analyzed during Phase 2 of the CWMP. This analysis focused on properties that were within the existing sewered area but not connected to the sewer. As the analysis was done parcel by parcel, the spreadsheet was able to add in the estimated flows from each parcel not already connected to sewer into the respective receiving pipe through geo-location. When the buildout flows were added into the collection system, average daily influent flow was approximately 1.08 MGD, which is the design capacity of the WWTF. Under average daily conditions, no pipes were above the 80% threshold capacity. Using the same peaking factor, pipe segments in basin K, J, F, E and B exceed the capacity threshold. Pipes between manholes K7 to K3, J5 to J1, F6 to F1, E9 to B15 and B14 to B6 all were found to be over the 80% capacity threshold (but not above 90%). These segments should be monitored during I/I removal projects and in the future and analyzed again to see if increasing the pipe size is necessary, especially if any properties are looking to connect to the respective pipe segments or upstream of them. These pipe segments are outlined on Figure 12-3 in orange.



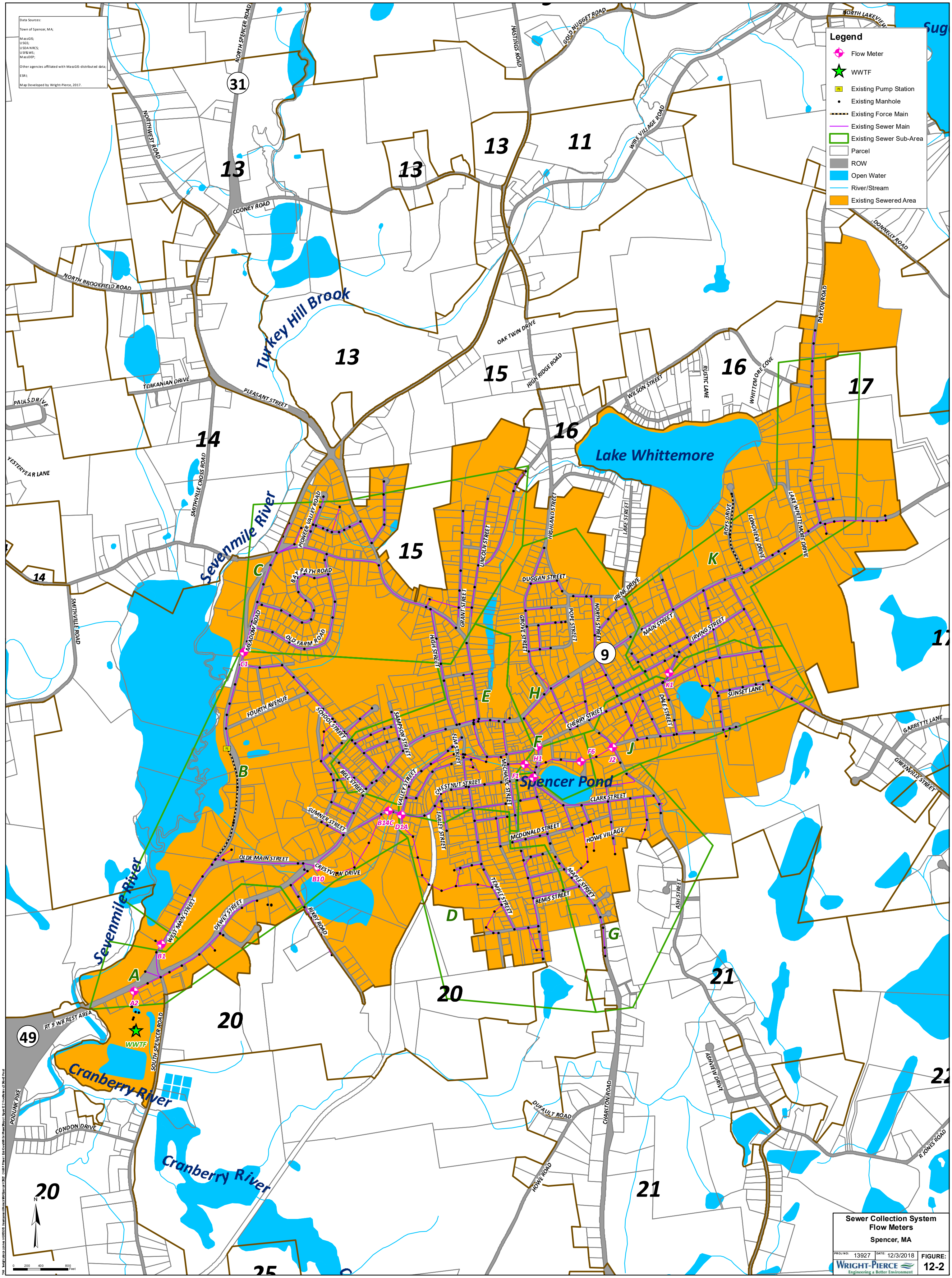
Sewer Collection System

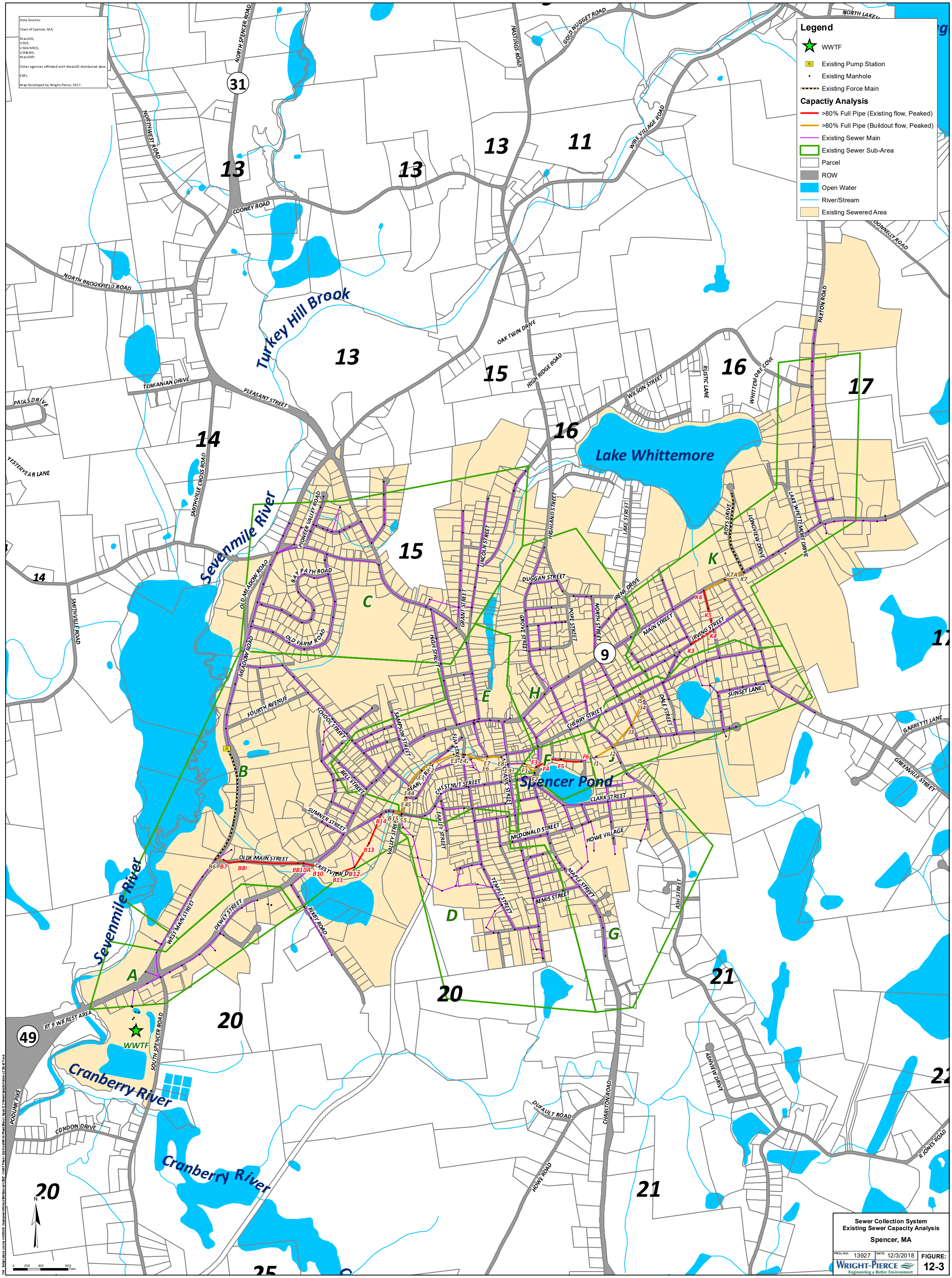
Spencer, MA

PROJ NO: 13927 DATE: 12/3/2018

WRIGHT-PIERCE
Engineering a Better Environment

FIGURE: 12-1


Legend
Flow Meter
WWTF
Existing Pump Station
Existing Manhole
Existing Force Main
Existing Sewer Main
Existing Sewer Sub-Area
Parcel
ROW
Open Water
River/Stream
Existing Sewered Area
Lake Whittemore
Spencer Pond
Turkey Hill Brook
Sevenmile River
Cranberry River
Sewer Collection System
Flow Meters
Spencer, MA
PROJ NO: 13927
DATE: 12/3/2018
FIGURE: 12-2
WRIGHT-PIERCE
Engineering a Better Environment


Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
WWTF
Existing Pump Station
Existing Manhole
Existing Force Main
Capactiy Analysis
>80% Full Pipe (Existing flow, Peaked)
>80% Full Pipe (Buildout flow, Peaked)
Existing Sewer Main
Existing Sewer Sub-Area
Parcel
ROW
Open Water
River/Stream
Existing Sewered Area
Lake Whittemore
Spencer Pond
Turkey Hill Brook
Sevenmile River
Cranberry River
WWTF
A
B
C
D
E
F
G
H
J
K
Sewer Collection System
Existing Sewer Capacity Analysis
Spencer, MA
PROJ NO: 13927
DATE: 12/3/2018
FIGURE:
12-3
WRIGHT-PIERCE
Engineering a Better Environment

12.4 RECOMMENDATIONS FOR NEEDS AREAS WASTEWATER MANAGEMENT PLAN

The recommendations for Needs Area 11, 12, 13, 15, 16, 18, 20, 28, and 30 are to continue with the use of septic systems throughout the 20-year planning period. These decisions were based on the work performed in each phase of the CWMP, which included engineering evaluation, economic analysis, environmental and institutional impacts evaluation, and plan implementation. The recommendations are primarily based on the high capital cost of sewering the entire Needs Area. Later in this section, an evaluation is presented regarding the possibility of taking portions of Needs Areas (such as a portion of Needs Area 11 and Needs Area 12) that are in close proximity to each other, would share a pump station, or would flow through each other to connect to the existing collection system, to reduce capital costs of connecting entire Needs Areas in favor of sewering portions that are in the most need.

12.4.1 Study Area 11 – Wire Village Road and Sugden Reservoir, North and West

Study Area 11 is in the northeast central part of Spencer and is bordered by Chapter 61 lands to the north, Study Areas 9 and 13 to the west, Study Areas 10 and 12 to the east, and Chapter 61 lands to the south. This study area encompasses approximately 423 acres and is comprised of 190 parcels. During Phase 1 of the CWMP, this area scored a total of 28 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 11 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years. An example SMP is included in **Appendix D**.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately six times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan.

12.4.2 Study Area 12 – Sugden Reservoir, South and East

Study Area 12 is in the central east part of Spencer. Study Area 10 borders it to the north, Study Area 11 to the west, the Town of Leicester to the east, and Chapter 61 lands and Study Area 17 to the south. This study area encompasses approximately 280 acres and is comprised of 250 parcels. During Phase 1 of the CWMP, this area scored a total of 28 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 12 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately 4.5 times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan.

12.4.3 Combined Area 11/12 Recommendation

To reduce costs and to serve the high needs in the area surrounding Sugden Reservoir, an evaluation was completed to see if partial sewering of Areas 11 and 12 would be worthwhile. The portion of Needs Area 11 would consist of the immediate north and west areas of Sugden Reservoir and the portion of Paxton Road that would connect to the existing collection system on Paxton Road at the school. This would include one pump station. The portion of Needs Area 12 that was selected is the area around Sugden Reservoir to the southwest that can drain by gravity to the proposed pump station on Paxton Road. **Figure 12-4** shows the proposed collection system.

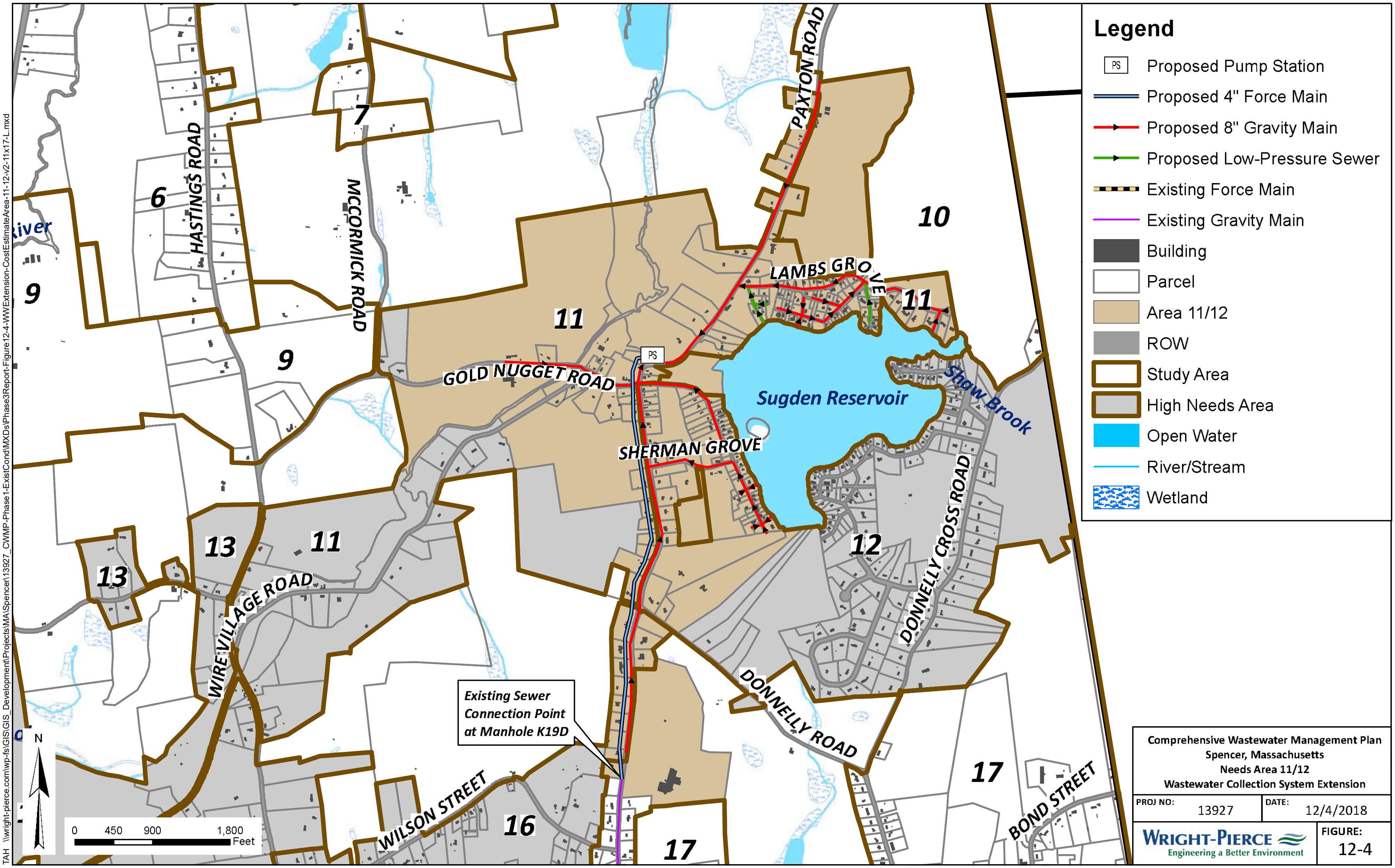
The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated to be approximately $19,011,000 as shown below in **Table 12-16**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any building interior plumbing rearrangements. O&M costs attributed to running the pump station were assumed. The revenue from charging a user a connection fee was not included in the analysis.

TABLE 12-16

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$18,400,000
Present Worth O&M Costs	$ 611,000
Total Present Worth	$ 19,011,000

The cost for combining portions of each area is still significantly higher than either septic or I/A related system costs. As such, it is not recommended to proceed with connecting to the existing collection system.



Legend
PS Proposed Pump Station
Proposed 4" Force Main
Proposed 8" Gravity Main
Proposed Low-Pressure Sewer
Existing Force Main
Existing Gravity Main
Building
Parcel
Area 11/12
ROW
Study Area
High Needs Area
Open Water
River/Stream
Wetland
Sugden Reservoir
Shaw Brook
PAXTON ROAD
LAMBS GROVE
GOLD NUGGET ROAD
SHERMAN GROVE
DONNELLY CROSS ROAD
DONNELLY ROAD
HASTINGS ROAD
MCCORMICK ROAD
WIRE VILLAGE ROAD
WILSON STREET
BOND STREET
Existing Sewer Connection Point at Manhole K19D
10
11
12
13
16
17
6
7
9
0 450 900 1,800 Feet
N
Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 11/12
Wastewater Collection System Extension
PROJ NO: 13927
DATE: 12/4/2018
WRIGHT-PIERCE Engineering a Better Environment
FIGURE: 12-4
TAH \\wright-pierce.com\wp-fs\GIS\GIS_Development\Projects\MA\Spencer\13927_CWMP-Phase1-ExistCond\MXDs\Phase3Report-Figure12-4-WWExtension-CostEstimateArea-11-12-v2-11x17-L.mxd

12.4.4 Study Area 13 – Cooney Road

Study Area 13 is in the central part of Spencer, just north of the downtown sewered area. It is bordered by Study Area 9 and Chapter 61 lands to the north, Study Area 14 and Chapter 61 lands to the west, Chapter 61 lands and Study Areas 11 and 15 to the east, and Study Areas 14 and 15 to the south. This study area encompasses approximately 325 acres and is comprised of 73 parcels. During Phase 1 of the CWMP, this area scored a total of 36 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 13 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately nine times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan.

12.4.5 Study Area 15 – High Ridge Road

Study Area 15 is in the central part of Spencer close to downtown. Study Area 13 and 11 borders it to the north, Study Area 13 to the west, Study Area 16 to the east, and existing sewered area to the south. This study area encompasses approximately 135 acres and is comprised of 31 parcels. During Phase 1 of the CWMP, this area scored a total of 9 points and was identified as a "Very Low" Needs Area. However, the Town identified this Study Area as a potential "Future

Development" Area and it was carried forward to be evaluated. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 15 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately 11 times as much as septic systems for this area. This is mainly due to the low amount of existing buildings in the area. If the area is developed, the costs may increase for septic and I/A systems but remain somewhat equal for the collection system alternative. Therefore, neither I/A systems or collection system extension is economically feasible and was not selected as part of the recommended plan. If Area 15 is developed in the future, connection to the existing collection system should be re-evaluated.

12.4.6 Study Area 16 – Lake Whittemore

Study Area 16 is in the central part of Spencer, north of the existing sewered area. It is bordered by Study Area 15 and Chapter 61 lands to the north, Study Area 15 and Chapter 61 lands to the west, Study Area 17 to the east, and existing sewered area to the south. This study area encompasses approximately 138 acres and is comprised of 143 parcels. During Phase 1 of the CWMP, this area scored a total of 28 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 16 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately three times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan. As the collection system alternative is not significantly higher than septic or I/A system costs, this alternative could be re-evaluated in the future if septic system failures or water quality in Lake Whittemore become an issue.

12.4.7 Study Area 18 – Route 9 and 49, North

Study Area 18 is in the west central part of Spencer and is bordered by Chapter 61 Lands to the north, the Town of East Brookfield to the west, Chapter 61 Lands and the existing sewered area to the east, and Study Area 20 to the south. This study area encompasses approximately 362 acres and is comprised of 74 parcels. During Phase 1 of the CWMP, this area scored a total of 28 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 18 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately six times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan.

12.4.8 Study Area 20 – Route 49

Study Area 20 is in the west central part of Spencer and is bordered by Study Area 18 and downtown Spencer to the north, Town of East Brookfield to the west, Chapter 61 lands to the east, and Chapter 61 lands and Study Areas 24 and 25 to the south. This study area encompasses approximately 480 acres and is comprised of 85 parcels. During Phase 1 of the CWMP, this area scored a total of 34 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 20 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems, and the improved level of treatment for the I/A systems is not cost-effective. The wastewater collection system extension alternative proved to cost approximately 5.5 times as much as septic systems for this area. Therefore, neither of these two options is economically feasible and was not selected as part of the recommended plan.

12.4.9 Combined Area 18/20 Recommendation

To reduce costs and to serve the high needs in the area surrounding the Seven Mile River, an evaluation was completed to see if partial sewering of Areas 18 and 20 would be worthwhile. The portion of Needs Area 18 would consist of the area immediately surrounding Route 9, from the border of North Brookfield to the WWTF. The entirety of Area 20 was included. **Figure 12-5** shows the proposed collection system.

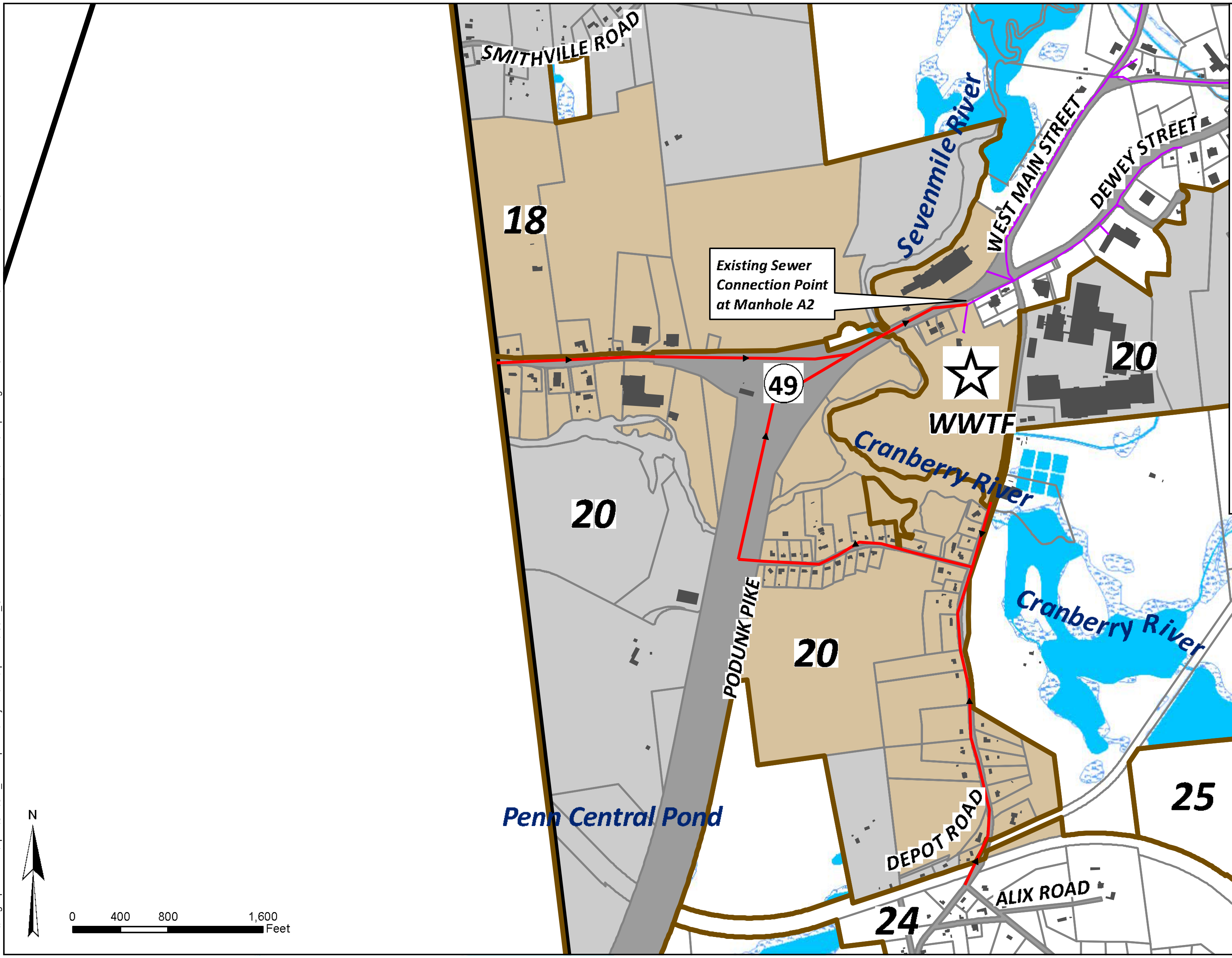
The total present worth cost for installing the proposed sewer, including trenching, and paving, was estimated at approximately $10,750,000 as shown below in **Table 12-17**. The estimate does include the cost to decommission the existing septic systems but does not include cost for any building interior plumbing rearrangements. The revenue from charging a user a connection fee was not included in the analysis. This addition to the collection system would be all gravity sewer.

The cost for combining portions of each area is reasonable, especially if this area receives development for industrial zoning. The Seven Mile River and its tributaries would improve in water quality due to the removal of poorly treated wastewater from septic systems and the additional treatment it would receive at the WWTF. This option should be re-evaluated if the land gets developed for industrial use. Until that point, this area is not recommended to be connected to the existing collection system.

TABLE 12-17

PRESENT WORTH COST - WASTEWATER COLLECTION SYSTEM EXTENSION

COST ESTIMATE	WASTEWATER COLLECTION EXTENSION
Initial Capital Cost	$10,750,000
Present Worth O&M Costs	$ 0
Total Present Worth	$10,750,000



Comprehensive Wastewater Management Plan
Spencer, Massachusetts
Needs Area 18/20
Wastewater Collection System Extension

PROJ NO:	DATE:
13927C	11/27/2018

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FIGURE: 12-5

12.4.10 Study Area 28 – Stiles Reservoir, West

Study Area 28 is in the southeast part of Spencer and is bordered by Study Area 23 to the north, Study Area 27 and Chapter 61 Lands to the west, the Town of Leicester to the east, and Study Area 33 to the south. This study area encompasses approximately 217 acres and is comprised of 375 parcels. During Phase 1 of the CWMP, this area scored a total of 35 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 28 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems. The wastewater collection system extension alternative was not evaluated in Phase 3 as the distance and pumping requirements did not prove effective in Phase 2. As the I/A costs are not significantly higher for this area, the properties surrounding the reservoir could be converted to I/A systems on a property-by-property basis, especially if the water quality in the Reservoir begins to deteriorate.

12.4.11 Study Area 30 – Cranberry Meadow Pond

Study Area 30 is in the southwest part of Spencer and is bordered by Study Area 24 and 25 to the north, Study Area 29 and Chapter 61 Lands to the west, Study Area 31 to the east, and the Town of Charlton to the south. This study area encompasses approximately 485 acres and is comprised of 173 parcels. The area is approximately evenly split between poor and very good soils, with the poor soils surrounding the surface waters. About half of the area has high groundwater concerns and there are no bedrock impacts. During Phase 1 of the CWMP, this area scored a total of 31 points and was identified as a "High" Needs Area. It is recommended that the continued use of on-site septic systems be used for this Needs Area based on the engineering evaluation and economic analysis provided throughout the various phases of the CWMP. Septic systems appear to be an appropriate treatment technology for this Needs Area, and if operated and maintained properly, they will consistently provide a minimal level of wastewater treatment.

The concept behind the recommended wastewater management plan for Study Area 30 is to continue to use the existing septic systems over the 20-year planning period until such time when the existing systems show signs of failure. At that time, new septic systems would need to be constructed, as necessary. To help ensure proper maintenance, the Town of Spencer could implement a Septage Management Plan (SMP), which would require the property owner to pump the septic tank once every two years.

The I/A system alternative was approximately 1.6 times costlier than septic systems. The wastewater collection system extension alternative was not evaluated in Phase 3 as the distance and pumping requirements did not prove effective in Phase 2. As the I/A costs are not significantly higher for this area, the properties surrounding the pond could be converted to I/A systems on a property-by-property basis, especially if the water quality in the pond begins to deteriorate.

12.4.12 Needs Area Flow Impact on Collection System and WWTF

The capacity analysis from section 12.3.2 above was used again to calculate the impact from the contributing flows from the high needs areas on the existing collection system and the WWTF. This was done to see if the resulting impact would necessitate a pipe size increase in the collection system or a capacity increase at the WWTF. The resulting cost for incorporating such a change would have to be considered in the recommended plan. The flows for the high needs areas were developed in Phase 2 of the CWMP and are listed below in **Table 12-18**.

TABLE 12-18

AVERAGE WASTEWATER FLOW ESTIMATES FOR HIGH NEEDS AREAS

AREA	POTENTIAL FLOW[1]		ESTIMATED FLOW FROM I/I[2]		TOTAL FLOW ESTIMATE
11	22,100	+	24,600	=	46,700
12	33,850	+	3,600	=	37,450
13	10,250	+	7,800	=	18,050
15	3,800	+	3,600	=	7,400
16	20,650	+	7,200	=	27,850
18	11,700	+	4,500	=	16,200
20	11,550	+	10,200	=	21,750
Total	**113,900**	+	**61,500**	=	**175,400**

Notes:

1 Estimated sanitary flow was calculated based on the TR-16 Guideline of 70 gpd/capita, the United States Census Bureau (USCB) reported in 2012-2016 the Town of Spencer averages 2.36 capita/household, and GIS record that the parcel had an existing building on it. (70 gpd/capita * 2.36 capita/home * # of parcels with a building)

2 I/I estimate is based on TR-16 Guidelines at 375 gpd/inch-diameter/mile, road lengths where sewer pipes would be constructed, and 8-inch diameter pipe (i.e. [375 gpd/inch-diameter/mile]*[miles of sewer]*[8-inch diameter pipe]).

Using the peaking factor of 5.0, **Table 12-19** shows what the peak flows would be for each high needs area.

TABLE 12-19

PEAK WASTEWATER FLOW ESTIMATES FOR HIGH NEEDS AREAS

AREA	POTENTIAL FLOW FROM EXISTING BUILDINGS		ESTIMATED FLOW FROM I/I		TOTAL FLOW ESTIMATE
11	110,500	+	24,600	=	135,100
12	169,250	+	3,600	=	172,850
13	51,250	+	7,800	=	59,050
15	19,000	+	3,600	=	22,600
16	103,250	+	7,200	=	110,450
18	58,500	+	4,500	=	63,000
20	57,750	+	10,200	=	67,950
Total	**569,500**	+	**61,500**	=	**631,000**

Each one of the needs areas was connected via one or more pipe connections to the existing collection system. The connection point for each needs area is shown on **Figure 12-6**. Needs area 11 was added via two connections; one to manhole C40 on Meadow Road and the other to manhole K19D on Paxton Road. Needs area 12 was added via two connections; one to manhole K19D on Paxton Road and the other connects to manhole K12G on Main Street. Needs areas 13 and 15 were added via one connection to manhole C40 on Meadow Road. Needs area 16 was added via three flow connections; one to manhole C38A on Wilson Street, another to manhole H32 at Highland and Hastings and the final to manhole K19 at the intersection of Paxton Street and Wilson. Needs area 18 was added via two flow connections; one to manhole C40 on Meadow Road and the other to manhole A2 on West Main Street. Needs area 20 was added via connection to manhole A2 on West Main Street. Scenarios were modeled for both average daily flows and peak flows by adding and removing the needs areas' estimated flows to the municipal collection system at their connection points and seeing the resulting impact on the capacity of the system.

Average Flows

Upon modeling the addition of all high needs areas to the existing collection system at average daily flows, no pipes were over 80% capacity. No further analysis was completed as this was the worst-case scenario.

Peak Flows

The capacity analysis was also conducted with peak flows. Several scenarios were investigated.

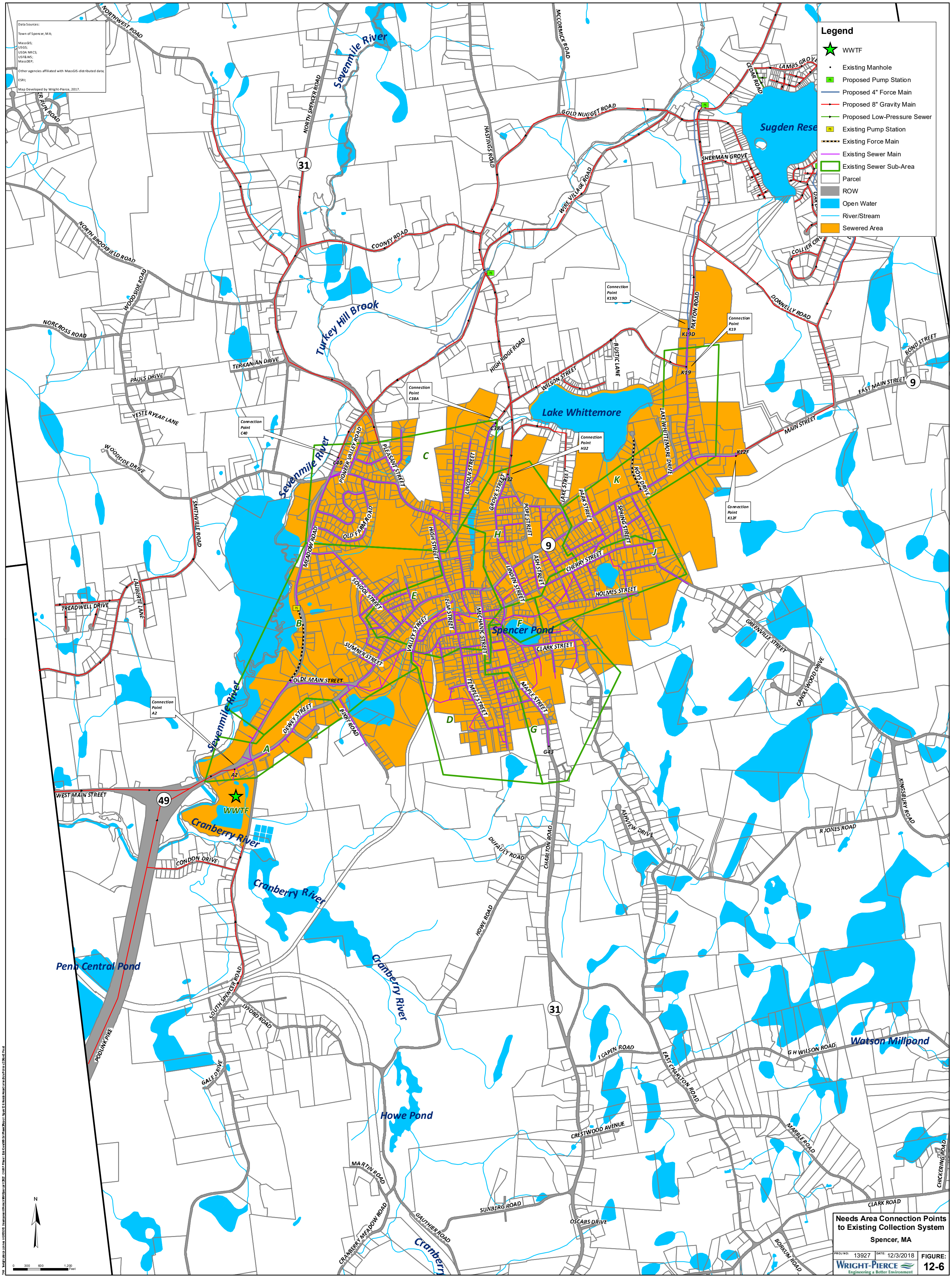
- Scenario 1 – all high needs areas connected
- Scenario 2 – Partial selection from Areas 11 and 12 (shown on Figure 12-4)
- Scenario 3 – All Needs Areas connected to Manhole C40
- Scenario 4 – Partial selection from Areas 18 and 20 (shown on Figure 12-5)

The first scenario added all flow from the high needs areas to the municipal collection system. Pipe segments from manholes K12 to K3, J6A to F3 and B9A to B6 were over 80% capacity. **Figure 12-7** displays the scenarios investigated and outlines overcapacity pipes in red.

The second scenario investigated adding flows from part of areas 11 and 12 that would likely get constructed together. The flow would be connected at Manhole K19D. No pipes were over the 80% threshold, however several segments in Basin B were in the 70% range with 3 segments at 78%. These segments were between manhole B9A and B9, B8 and B7, and B7 and B6.

The third scenario added flows from the connections to manhole C40, which consisted of part of area 11, all of 13 and 15, part of 16 and part of 18. This scenario did not result in any pipe segments being over capacity.

The fourth scenario added flows from part of area 18 and all of 20, with the connection manhole of A2. No pipe segments were shown to be over capacity.



Data Sources:
Town of Spencer, MA;
MassGIS;
USGS;
USDA NRCS;
USF&WS;
MassDEP;
Other agencies affiliated with MassGIS-distributed data;
ESRI;
Map Developed by Wright-Pierce, 2017.
Legend
WWTF
Existing Manhole
Proposed Pump Station
Proposed 4" Force Main
Proposed 8" Gravity Main
Proposed Low-Pressure Sewer
Existing Pump Station
Existing Force Main
Existing Sewer Main
Existing Sewer Sub-Area
Parcel
ROW
Open Water
River/Stream
Sewered Area
Sevenmile River
Turkey Hill Brook
Lake Whittemore
Spencer Pond
Cranberry River
Penn Central Pond
Howe Pond
Watson Millpond
Connection Point K19D
Connection Point K19
Connection Point C38A
Connection Point C40
Connection Point H32
Connection Point K12F
Connection Point A2
G43
WWTF
NORTHWEST ROAD
NORTH SPENCER ROAD
MCCORMICK ROAD
HASTINGS ROAD
GOLD NUGGET ROAD
SHERMAN GROVE
WIRE VILLAGE ROAD
COONEY ROAD
NORTH BROOKFIELD ROAD
WOODSIDE ROAD
NORCROSS ROAD
TERKANIAN DRIVE
PAULS DRIVE
YESTERYEAR LANE
WOODSIDE DRIVE
SMITHVILLE ROAD
TREADWELL DRIVE
HIGH RIDGE ROAD
WILSON STREET
RUSTIC LANE
PAXTON ROAD
DONNELLY ROAD
BOND STREET
EAST MAIN STREET
MAIN STREET
LAKE WHITTEMORE DRIVE
ROYS DRIVE
PLEASANT STREET
PIONEER VALLEY ROAD
OLD FARM ROAD
MEADOW ROAD
HIGH STREET
LINCOLN STREET
GROVE STREET
POPE STREET
LAKE STREET
PARK STREET
SPRING STREET
CHERRY STREET
HOLMES STREET
ASH STREET
LINDEN STREET
SCHOOL STREET
ELM STREET
MECHANIC STREET
VALLEY STREET
SUMNER STREET
CLARK STREET
OLDE MAIN STREET
DEWEY STREET
BIXBY ROAD
TEMPLE STREET
MAPLE STREET
GREENVILLE STREET
CANDLEWOOD DRIVE
KINGSBURY ROAD
R JONES ROAD
ASHVIEW DRIVE
DUFAULT ROAD
CHARLTON ROAD
HOWE ROAD
WEST MAIN STREET
CONDON DRIVE
SOUTH SPENCER ROAD
LYFORD ROAD
PODUNK PIKE
GALE DRIVE
I CAPEN ROAD
EAST CHARLTON ROAD
G H WILSON ROAD
CRESTWOOD AVENUE
MARBLE ROAD
CHICKERING ROAD
CLARK ROAD
SUNBERG ROAD
OSCARS DRIVE
MARTIN ROAD
GAUTHIER ROAD
CRANBERRY MEADOW ROAD
BORKUM ROAD
LAMBS GROVE
CEDAR ROAD
COLLIER CIRCLE
Sugden Rese
9
31
49
A
B
C
D
E
F
G
H
J
K
N
0 300 600 1,200 Feet
Needs Area Connection Points to Existing Collection System
Spencer, MA
PROJ NO: 13927
DATE: 12/3/2018
FIGURE: 12-6
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12.4.12.1 Meadow Road Pump Station

There is one pumping station currently being operated and maintained by the Town's WWTF staff and is located on Meadow Road. The pump station was upgraded in 2012. The Meadow Road pump station is located adjacent to the Seven Mile River wetlands area. The force main from the pump station passes under a tributary to the Seven Mile River and ties into the main trunk sewer on West Main Street. The total force main length is 1,730 feet and is 8-inches in diameter.

TABLE 12-20

SPENCER'S WASTEWATER PUMPING STATION

PUMPING STATION LOCATION	TYPE	NO. PUMPS	PUMP TYPE	CAPACITY (EA)	MOTOR (HP)	GENERATOR
Meadow Road	Gorman -Rupp T36	2	Self-Priming, Non-Clog, Centrifugal, air release valve	520 gpm @ 33 TDH	7.5	Permanent, Propane

As each pump has a capacity of 0.75 MGD, the pumps have available capacity to handle buildout flows within the existing sewered area and any Needs Area flow additions (maximum flow of approximately 0.6 MGD calculated).

12.4.12.2 WWTF Flow Capacity

The wastewater treatment facility is designed and permitted to treat an average daily flow of 1.08 MGD and a maximum daily flow of 6.0 MGD. The current average daily flow is 0.77 MGD, maximum daily flow is 3.07 MGD, and the peak hour flow is 5.47 MGD. This CWMP does not recommend any Needs Area connections to the existing collection system. As such, the only flow increase for the WWTF will result from build-out from within the existing sewered area. This flow addition can vary because of commercial properties, but the estimate for the 20-year planning period is an additional 0.145 MGD average daily flow, which would result in 0.915 MGD of average daily flow. This flow surpasses 0.864 MGD but is within the original design flow of the

WWTF. The existing tanks at the WWTF have capacity to handle buildout flows, but the facility is limited by the screw pump capacity. As part of the pending upgrade, the screw pumps are proposed to be replaced with a new submersible pump station that would be designed to handle peak instantaneous flows and would be designed with turndown capability and/or a small jockey pump to handle minimum and average daily flows. The facility has available capacity (tankage) to handle the future flows, especially when a larger second clarifier gets constructed as part of the proposed upgrade to replace the existing smaller clarifier. The hydraulics of the facility will have to be further evaluated during preliminary design phase of the upgrade, especially once a tertiary treatment system is selected. However, the wetland abandonment should result in a hydraulic increase at the facility to create additional head for the new tertiary system. The 18-inch diameter aeration tank effluent pipe (between the aeration tanks and clarifiers) may need to be increased in size to handle higher flows and return sludge flow rates. It does not appear that the facility will need a capacity increase during the 20-year planning period, especially if I/I control plan recommendations are instituted and I/I to the WWTF is reduced. The Sewer Department would need to review new sewer connections, especially those from industries and commercial properties, during the planning period, but the existing tankage at the facility is properly sized. Any new equipment and systems will need to be properly designed for the current flows and loads with future projections taken into consideration. Also, tertiary systems will need to be designed for the stricter permit season (April 1 to October 30) and high flows seen at the front and back end of that permit season (wet weather in April, May, October, etc.).

12.4.13 Other Non-Needs Study Areas

At the completion of the CWMP Phase 1, it was determined that the other 24 Study Areas are not Needs Areas and appear to be well-suited for the continued use of on-site Title 5 septic systems. As described below, the implementation of a Septage Management Plan may be useful to best manage and prolong the life of the existing septic systems.

12.4.14 Septage Management Plan

A Septage Management Plan (SMP) is recommended for the non-sewered Study Areas where septic systems are being proposed as a long-term on-site wastewater disposal solution. Improper operation and inadequate maintenance of septic systems can hurt the performance and lead to public health issues. The purpose of a SMP is to allow the Town to legally establish the septage management boundaries and to set onsite system management policies.

12.4.15 WWTF Upgrade Recommendations

The WWTF upgrade list of improvements is as follows:

Based on the draft NPDES permit limits and aging equipment/processes, the following improvements are recommended:

- Keep existing influent mechanical screen in existing building.
- Demolish existing grit removal system, modify existing tank structure, and construct new grit removal system.
- Grit removal followed by a new headworks building with fine screening, including an electrical room. Recommended to be constructed near the influent pump station.
- New septage receiving tank and pumping system with coarse rock trap. Recommended to be constructed next to new screen building.
- Remove screw pumps and replace with a new pumping system (submersible pumps). Recommend constructing next to existing station. Two large duty pumps with a smaller jockey pump for low flow condition. Sized so a large and small pump can meet peak flows, per TR-16.
- Replace influent flow meter and calibrate for maximum of 10 MGD.
- Keep existing aeration tanks. Repair concrete as needed. Address air piping overpressure issues and replace diffusers, if necessary.
- Remove all process equipment, piping, and valves on lower level of Control Building. Proper influent pump station sizing will remove necessity of wet weather pumps. RAS and WAS pumps are recommended to be replaced and relocated to a new Administration Building.
- Because of NFPA 820 requirements (proximity to open aeration tanks with no prior primary clarification), remove all administrative functions from the Control Building. The building will be repurposed to suit staff needs (storage, etc.).
- Demolish old secondary clarifier. Build new secondary clarifier to match larger one but utilize tow-bro sludge removal design. New RAS and WAS piping.

- New tertiary treatment building. This building would include the tertiary system, rapid mixing tank, and any chemical feed/mixing systems required.
- Tertiary process addition consisting of a two-stage deep bed sand filtration system (beds are in series) to address phosphorous and copper removal. Other tertiary systems will be considered during design.
- New centrifuge and miscellaneous improvements within solids handling building to bring into code compliance.
- New Administration Building consisting of a lab, office space, locker room, and basement with plant water pumps, RAS and WAS pumps.
- Abandon wetlands and connect flow from tertiary treatment to existing UV disinfection.

12.5 PROJECT COSTS AND FINANCING PLAN

12.5.1 Estimated Project Costs

The financial requirements for the implementation of the recommended wastewater management plan for the "Needs" Areas and the upgrades to the WWTF are presented in the following sections. The Needs Area cost is presented as a total present worth analysis, while the WWTF upgrades are shown as a total estimated project cost.

12.5.1.1 Needs Area Summary of Present Worth Cost

This section presents a summary of the present worth cost for the recommended plan (septic systems) for each of the Needs Areas.

The recommended plan for Needs Area 11 is to continue the use of septic systems. There is a total of 134 septic systems located within Needs Area 11, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 134 septic systems for the 20-year planning period for this Needs Area is $4,416,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 12 is to continue the use of septic systems. There is a total of 205 septic systems located within Needs Area 12, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 205 septic systems for the 20-year planning period for this Needs Area is $6,757,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 13 is to continue the use of septic systems. There is a total of 62 septic systems located within Needs Area 13, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 62 septic systems for the 20-year planning period for this Needs Area is $2,044,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 15 is to continue the use of septic systems. There is a total of 23 septic systems located within Needs Area 15, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 23 septic systems for the 20-year planning period for this Needs Area is $758,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 16 is to continue the use of septic systems. There is a total of 125 septic systems located within Needs Area 16, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 125 septic systems for the 20-year planning period for this Needs Area is $4,119,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 18 is to continue the use of septic systems. There is a total of 71 septic systems located within Needs Area 18, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 71 septic systems for the 20-year planning period for this Needs Area is $2,341,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 20 is to continue the use of septic systems. There is a total of 70 septic systems located within Needs Area 20, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 70 septic systems for the 20-year planning period for this Needs Area is $2,311,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 28 is to continue the use of septic systems. There is a total of 203 septic systems located within Needs Area 28, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 203 septic systems for the 20-year planning period for this Needs Area is $6,682,000. The total present worth cost per household is approximately $33,000.

The recommended plan for Needs Area 30 is to continue the use of septic systems. There is a total of 156 septic systems located within Needs Area 30, and it was assumed that septic systems would be replaced equally over the 20-year planning period. The estimated total present worth cost to replace and maintain all 156 septic systems for the 20-year planning period for this Needs Area is $5,139,000. The total present worth cost per household is approximately $33,000.

Table 12-21 shows a summary of the present worth costs for the Needs Areas.

TABLE 12-21

NEEDS AREA RECOMMENDED PLAN PRESENT WORTH COST

AREA	PRESENT WORTH COST
11	$4,416,000
12	$6,757,000
13	$2,044,000
15	$758,000
16	$4,119,000
18	$2,341,000
20	$2,311,000
28	$6,682,000
30	$5,139,000

12.5.1.2 WWTF Upgrades Estimated Project Cost

The total estimated construction cost for the recommended upgrades to the Town's WWTF is $26,428,000 as presented in **Table 12-22**. The cost estimated is based on an ENR Index for March 2019 (11228).

TABLE 12-22

TOTAL PROJECT COST ESTIMATE

ITEM	ESTIMATED COST
Civil	$975,000
Architectural	$1,020,000
Structural	$1,960,000
Process Equipment & Piping	$4,861,000
HVAC/Plumbing	$675,000
Instrumentation	$859,000
Electrical	$2,267,000
Contractor Mobilization (5%)	$631,000
Itemized Construction Subtotal	**$13,248,000**
Contractor Overhead and Profit (20%)	$2,650,000
Contractor Mark-up on Subcontractor Work, Subcontractor Profit, Bonds and Insurance, Unit Price Items	$714,000
Construction Cost Subtotal	**$16,612,000**
Design Contingency (20%)	$3,322,000
Inflation to Midpoint of Construction (5%)	$831,000
Total Estimated Construction Cost	**$20,765,000**
Construction Phase Contingency (5%)	$1,038,000
Total Estimated Bid Cost	**$21,803,000**
Engineering Services – Design & Construction Administration (18%)	$3,738,000
Materials Testing (1%)	$208,000
Town Legal/Administration Fees (2%)	$415,000
Financing (1%)	$262,000
Total Estimated Project Cost	**$26,426,000**

12.5.2 Financing Plan and Cost Recovery – User Costs

12.5.2.1 Needs Areas

For Study Areas 11, 12, 13, 15, 16, 18, 20, 28, and 30, each property owner, when the time comes, will be responsible for paying to have its septic system replaced. The property owner may qualify for financial assistance from the Commonwealth of Massachusetts' Community Septic Management Program for installing a new Title 5 compliant septic system if their existing system fails.

12.5.2.2 WWTF Upgrades

The Town of Spencer intends to apply for, and if approved, submit a CWSRF Application for financial assistance on the Spencer WWTF Upgrade. This application allows the Town to be eligible for low interest funding (State Revolving Fund) at either a two percent interest rate, or possibly zero percent interest rate for nutrient removal projects.

12.6 IMPLEMENTATION PLAN

The wastewater management plan includes the financing and construction of various capital improvements projects throughout the Town. These recommendations include careful consideration, planning and scheduling over the 20-year planning period. A proposed implementation schedule is included in **Table 12-23**.

12.6.1 Needs Areas

As part of the recommended wastewater management plan, new septic systems in Study Areas 11, 12, 13, 15, 16, 18, 20, 28, and 30 should be installed when the existing systems fail. The cost of each of the new septic system will be funded by each property owner. The permitting, installation, and operation of each new system shall be done in accordance with the Town's Board of Health regulations and Title 5 regulations.

12.6.2 WWTF

A project schedule for the implementation of the proposed improvements to the WWTF is presented in **Table 12-23**. As part of the upgrade, the WWTF will be able to comply with stricter NPDES permit limits, including phosphorus and nitrogen. The proposed schedule is based off the compliance schedule in the final NPDES permit.

TABLE 12-23
PROPOSED SCHEDULE

MILESTONE	DATE
Final NPDES Permit Issuance*	February 2019
Final CWMP	May 2019
CWMP Public Hearing	July 2019
Conceptual Design Report Due**	By December 31, 2019
Spencer Annual Town Meeting to Appropriate Design Funds	May 2020
Preliminary Design Begins	July 2020
MassDEP SRF Project Evaluation Form (PEF) Submitted	August 2020
Preliminary Design Report (30%)	December 2020
MassDEP SRF Intended Use Plan (IUP) Notification Draft	By December 31, 2020
Final IUP	January 2021
Final Design & Permitting Begins	January 2021
Spencer Annual Town Meeting to Appropriate Construction Funds	May 2021
SRF Application Submission (90% Design)	By October 15, 2021
100% Design & Permitting Complete	By December 31, 2021
Bidding	January through March 2022
Start Construction	By June 30, 2022
Substantial Completion	October 2023
Final Completion December 2023	December 2023
One-year Warranty Period	October 2024
Attain Compliance	By December 31, 2024

*Went into effect May 1, 2019
**CWMP understood to satisfy this requirement

WRIGHT-PIERCE
Engineering a Better Environment

A

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Federal Clean Water Act, as amended, (33 U.S.C. §§1251 et seq.; the "CWA"), and the Massachusetts Clean Waters Act, as amended, (M.G.L. Chap. 21, §§ 26-53),

Town of Spencer
Sewer Commission

is authorized to discharge from the facility located at

Spencer Wastewater Treatment Plant
Route 9
Spencer, MA 01562

to receiving water named

Cranberry River

in accordance with effluent limitations, monitoring requirements and other conditions set forth herein.

This permit shall become effective on the first day of the calendar month immediately following sixty days after signature.

This permit expires at midnight five years from the last day of the month preceding the effective date.

This permit supersedes the permit issued on September 27, 2007.

This permit consists of **Part I** (18 pages including effluent limitations and monitoring requirements); **Attachment A** (Freshwater Acute Toxicity Test Procedure and Protocol, February 2011, 8 pages); **Attachment B** (USEPA Region 1 Freshwater Chronic Toxicity Test Procedure and Protocol, March 2013, 7 pages); and **Part II (**21 pages including NPDES Part II Standard Conditions).

Signed this day of

__________________________	__________________________
Ken Moraff, Director Office of Ecosystem Protection Environmental Protection Agency Boston, MA	Lealdon Langley, Director Division of Watershed Management Department of Environmental Protection Commonwealth of Massachusetts Boston, MA

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PART I

A.1. During the period beginning on the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to Cranberry River. The discharge shall be limited and monitored as specified below; the receiving water and the influent shall be monitored as specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS[1,2,3]	
PARAMETER	**AVERAGE MONTHLY**[4]	**AVERAGE WEEKLY**[4]	**AVERAGE MONTHLY**[4]	**AVERAGE WEEKLY**[4]	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
INFLUENT FLOW – ANNUAL AVERAGE[6,7]	********	********	1.08 MGD	********	********	CONTINUOUS	RECORDER
INFLUENT FLOW[6]	********	********	Report MGD	********	Report	CONTINUOUS	RECORDER
EFFLUENT FLOW – ANNUAL AVERAGE[7]	********	********	Report MGD	********	*********	CONTINUOUS	RECORDER
EFFLUENT FLOW	********	********	Report MGD	********	*********	CONTINUOUS	RECORDER
BOD_5[6] *(May 1 - October 31)*	50 lb/day	68 lb/day	5.6 mg/L	7.5 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
(November 1 – April 30)	270 lb/day	405 lb/day	30 mg/L	45 mg/L			
BOD_5 Removal[6]	≥ 85%	********	********	********	********	********	********
TSS[6] *(May 1-October 31)*	50 lb/day	68 lb/day	5.6 mg/L	7.5 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
(November 1 – April 30)	270 lb/day	405 lb/day	30 mg/L	45 mg/L			
TSS Removal[6]	≥ 85%	********	********	********	********	********	********
pH RANGE[8]	6.5 - 8.3 S.U.					1/DAY	GRAB
ESCHERICHIA COLI (*E. coli*)[9] *(April 1 – October 31)*	********	********	126 cfu/100 mL	********	409 cfu/100 mL	1/WEEK	GRAB
TOTAL COPPER[10]	********	********	10.3 µg/L	********	15.3 µg/L	1/MONTH	24-HOUR COMPOSITE[5]
DISSOLVED OXYGEN *(April 1-October 31)*	NOT LESS THAN 6.0 mg/L (daily minimum)					1/WEEK	GRAB

Sampling Location: Effluent cascade to Cranberry River

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A.1. During the period beginning the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to Cranberry River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC	EFFLUENT LIMITS					MONITORING REQUIREMENTS [1,2,3]	
PARAMETER	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY**[4]	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY**[4]	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
AMMONIA-NITROGEN [6,11] *(May 1 – October 31)*	5.0 lb/day	7.5 lb/day	0.56 mg/L	0.84 mg/L	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
(November 1 – April 30)	56.7 lb/day	*********	6.3 mg/L	*********	Report mg/L	2/MONTH	
TOTAL KJELDAHL NITROGEN [6,11] TOTAL NITRATE/NITRITE [6,11] TOTAL NITROGEN [6,11,13] *(May 1 – October 31)*	Report lb/day	*********	Report mg/L	*********	Report mg/L	1/WEEK	24-HOUR COMPOSITE[5]
TOTAL KJELDAHL NITROGEN [6,11] TOTAL NITRATE/NITRITE [6,11] TOTAL NITROGEN [6,11,13] *(November 1 – April 30)*	Report lb/day	*********	Report mg/L	*********	Report mg/L	1/MONTH	24-HOUR COMPOSITE[5]
TOTAL PHOSPHORUS[6,12,13] *(April 1 – October 31)*	0.79 lb/day	*********	0.1 mg/L	*********	Report mg/L	3/WEEK	24-HOUR COMPOSITE[5]
(November 1 – March 31)	1.19 lb/day		0.2 mg/L			1/WEEK	

Sampling Location: Effluent cascade to Cranberry River

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A.1. During the period beginning the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to Cranberry River. Such discharges shall be limited and monitored as specified below.

EFFLUENT CHARACTERISTIC	**EFFLUENT LIMITS**					**MONITORING REQUIREMENTS** [1,2,3]	
PARAMETER	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY** [4]	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY** [4]	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
WHOLE EFFLUENT TOXICITY [14, 15, 16, 17]	Acute $LC_{50} \geq 100\%$ Chronic C-NOEC $\geq 93\%$					2/YEAR	24-HOUR COMPOSITE [5]
Hardness [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Aluminum [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Cadmium [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Copper [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Nickel [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Lead [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]
Total Recoverable Zinc [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	24-HR COMP [5]

Sampling Location: Effluent cascade to Cranberry River

A.1. During the period beginning the effective date and lasting through expiration, the permittee is authorized to discharge treated effluent from outfall serial number **001** to Cranberry River. The receiving water shall be monitored as specified below.

AMBIENT CHARACTERISTIC	**AMBIENT REPORTING REQUIREMENTS**					**MONITORING REQUIREMENTS** [1,2,3]	
PARAMETER	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY** [4]	**AVERAGE MONTHLY** [4]	**AVERAGE WEEKLY** [4]	**MAXIMUM DAILY**	**MEASUREMENT FREQUENCY**	**SAMPLE TYPE**
Hardness [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
pH [17]	*********	*********	*********	*********	Report S.U.	2/YEAR	Grab
Temperature [17]	*********	*********	*********	*********	Report °C	2/YEAR	Grab
Total Recoverable Aluminum [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
Total Recoverable Cadmium [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
Total Recoverable Copper [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
Total Recoverable Nickel [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
Total Recoverable Lead [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab
Total Recoverable Zinc [16]	*********	*********	*********	*********	Report mg/L	2/YEAR	Grab

Sampling Location: Cranberry River at a point upstream of Outfall 001's zone of influence at a reasonably accessible location over a 1-hour period.

Footnotes:

1. Effluent samples shall be taken at a location that yields data representative of the discharge. A routine sampling program shall be developed in which samples are taken at the same location, same time and same days of the week each month. The Permittee shall submit the results to the Environmental Protection Agency Region 1 (EPA) and the State of any additional testing above that required herein, if testing is in accordance with 40 C.F.R. § 136. If there are treatment or wastewater flow changes during the compliance schedules in Section I.B. that warrant a new sampling location to obtain representative effluent samples, the location can be changed with written approval from EPA.

2. In accordance with 40 C.F.R. § 122.44(i)(1)(iv), the Permittee shall monitor according to sufficiently sensitive test procedures (i.e., methods) approved under 40 C.F.R. Part 136 or required under 40 C.F.R. Chapter I, Subchapter N or O, for the analysis of pollutants or pollutant parameters (except WET). A method is "sufficiently sensitive" when: 1) The method minimum level (ML) is at or below the level of the effluent limitation established in the permit for the measured pollutant or pollutant parameter; or 2) The method has the lowest ML of the analytical methods approved under 40 C.F.R. Part 136 or required under 40 C.F.R. Chapter I, Subchapter N or O for the measured pollutant or pollutant parameter. The term "minimum level" refers to either the sample concentration equivalent to the lowest calibration point in a method or a multiple of the method detection limit (MDL), whichever is higher. Minimum levels may be obtained in several ways: They may be published in a method; they may be based on the lowest acceptable calibration point used by a laboratory; or they may be calculated by multiplying the MDL in a method, or the MDL determined by a laboratory, by a factor.

3. When a parameter is not detected above the ML, the Permittee must report the data qualifier signifying less than the ML for that parameter (e.g., < 50 μg/L, if the ML for a parameter is 50 μg/L).

4. In calculating and reporting the average monthly or average weekly concentration when the pollutant is not detected, assign zero to the non-detected sample result if the pollutant was not detected for all monitoring periods in the prior twelve months. If the pollutant was detected in at least one monitoring period in the prior twelve months, then assign each non-detected sample result a value that is equal to one half of the minimum level of detection for the purposes of calculating averages.

5. Each composite sample will consist of at least twenty-four (24) grab samples taken during one consecutive 24-hour period, either collected at equal intervals and combined proportional to flow or continuously collected proportionally to flow.

6. Use influent flow rate to calculate mass loading.

7. Report annual average, monthly average, and the maximum daily flow in million gallons per day (MGD). The limit is an annual average, which shall be reported as

a rolling average. The value will be calculated as the arithmetic mean of the monthly average flow for the reporting month and the monthly average flows of the previous eleven months.

8. The pH shall be within the specified range at all times. The minimum and maximum pH sample measurement values for the month shall be reported in standard units (S.U.).

9. The monthly average limit for *E. coli* is expressed as a geometric mean. *E. coli* monitoring shall be conducted concurrently with TRC monitoring if TRC monitoring is required.

10. Copper analysis must be completed using a test method in 40 C.F.R. § 136 that achieves a minimum level no greater than 3 µg/L.

11. Ammonia nitrogen, total Kjeldahl nitrogen and total nitrate + nitrite nitrogen samples shall be collected concurrently. The results of these analyses shall be used to calculate both the concentration and mass loadings of total nitrogen (total nitrogen = total Kjeldahl nitrogen + total nitrate/nitrite nitrogen).

    The total nitrogen loading values reported each month shall be calculated as follows: Total Nitrogen (lbs/day) = [(average monthly total nitrogen concentration (mg/l) * total monthly influent flow (Millions of Gallons (MG)) / # of days in the month] *8.34

12. The 0.79 lb/day total phosphorus limit is a seasonal average limit for the period April 1 – October 31. The seasonal mass total phosphorus load shall be calculated as the arithmetic mean of the seven monthly average total phosphorus loads for the months of April through October, and shall be reported in November of each year.

    The 1.19 lb/day total phosphorus limit is a seasonal average limit for the period November 1 – March 31. The seasonal mass total phosphorus load shall be calculated as the arithmetic mean of the five monthly average total phosphorus load for the months of November 1 – March 31, and shall be reported in April of each year.

13. See Section I.B. for special conditions related to nitrogen and phosphorus.

14. The Permittee shall conduct acute toxicity tests (LC_{50}) and chronic toxicity tests (C-NOEC) in accordance with test procedures and protocols specified in **Attachments A and B** of this permit. LC_{50} and C-NOEC are defined in Part II.E. of this permit. The Permittee shall test the daphnid, *Ceriodaphnia dubia*, and the fathead minnow, *Pimephales promelas*. Toxicity test samples shall be collected and tests completed during the same weeks each time of calendar quarters ending February 28 and August 31. The test results shall be submitted as an attachment to the monthly DMR submittal immediately following the completion of the test.

15. The receiving water chemical analysis represents analysis of the receiving water

sample collected as part of the WET testing requirements. Such samples shall be taken at a location that provides a representative analysis of the receiving water upstream of the permitted discharge's zone of influence as specified in **Attachment A**. If toxicity test(s) using the receiving water as diluent show the receiving water to be toxic or unreliable, the Permittee shall either follow procedures outlined in **Attachment A**, Section IV., DILUTION WATER, or the Permittee shall follow the Self-Implementing Alternative Dilution Water Guidance found in *NPDES Permit Program Instructions for the Discharge Monitoring Report Forms (DMRs)*.

16. The Permittee shall conduct the analyses specified in **Attachment A and B**, Part VI. CHEMICAL ANALYSIS, of this permit. For Part I.A.1., Whole Effluent Toxicity Testing, the Permittee shall report the results for the effluent sample. For Part I.A.1., Receiving Water Chemical Analysis, the Permittee shall report the results for the receiving water sample. Minimum levels and test methods are specified in **Attachment A and B**, Part VI. CHEMICAL ANALYSIS.

17. A pH and temperature measurement shall be taken of each receiving water sample at the time of collection and the results reported on the appropriate DMR. These pH and temperature measurements are independent from any pH and temperature measurements required by the WET testing protocols.

Part I.A. continued

2. The discharge shall not cause of a violation of water quality standards of the receiving water.

3. The discharge shall be free from pollutants in concentrations or combinations that, in the receiving water, settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

4. The discharge shall be free from pollutants in concentrations or combinations that adversely affect the physical, chemical, or biological nature of the bottom.

5. The discharge shall not result in pollutants in concentrations or combinations in the receiving water that are toxic to humans, aquatic life or wildlife.

6. The discharge shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to the receiving water.

7. The discharge shall be free from oil, grease and petrochemicals that produce a visible film on the surface of the water, impart an oily taste to the water or an oily or other undesirable taste to the edible portions of aquatic life, coat the banks or bottom of the water course, or are deleterious or become toxic to aquatic life.

8. The Permittee must provide adequate notice to EPA Region 1 and MassDEP of the following:

   a. Any new introduction of pollutants into the POTW from an indirect discharger which would be subject to § 301 or § 306 of the Clean Water Act if it were directly discharging those pollutants or in a primary industry category (see 40 C.F.R. §122 Appendix A as amended) discharging process water; and

   b. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.

   c. For purposes of this paragraph, adequate notice shall include information on:

      (1) The quantity and quality of effluent introduced into the POTW; and

      (2) Any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW.

9. Pollutants introduced into the POTW by a non-domestic source (user) shall not pass through the POTW or interfere with the operation or performance of the works.

B. SPECIAL CONDITIONS

1. Total Nitrogen

   a. Within **one year of the effective date of the permit**, the permittee shall complete an evaluation of alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen in order to maintain the annual average mass discharge of total nitrogen at less than the baseline mass loading of 86.2 lb/day, and submit a report to EPA and MassDEP documenting this evaluation and presenting a description of recommended operational changes. The methods to be evaluated include, but are not limited to, operational changes designed to enhance nitrification (seasonal and year-round), incorporation of anoxic zones, septage receiving policies and procedures, and side stream management. This report may be combined with the permittees' annual nitrogen report under Part I.B.1.b, if both reports are submitted to EPA and MassDEP by February 1st.

   b. The permittee shall also submit an annual report to EPA and the MassDEP, by **February 1st** each year, that summarizes activities related to optimizing nitrogen removal efficiencies, documents the annual nitrogen discharge load from the facility, and tracks trends relative to the previous year. If, in any year, the treatment facility discharges in excess of 86.2 lb/day TN on an annual average basis, the annual report shall include a detailed explanation of the reasons why TN discharges have increased, including any changes in influent flows/loads and any operational changes. The report shall also include all supporting data.

2. Total Phosphorus

   In order to comply with the permit limits, the Permittee shall take the following actions with regard to total phosphorus:

   a. The interim monthly average total phosphorus interim limits are 0.2 mg/L from May 1 through October 31 and 0.3 mg/L from November 1 through April 30. The interim loading limits are 0.79 lb/day from May 1 through October 31 and 1.19 lb/day from November 1 through March 1, calculated using the flow rate through Outfall 001. The permittee shall meet these limits until it attains compliance with the final phosphorus effluent limits in Part I.A.1.

   b. No later than **December 31, 2019**, complete a conceptual design to meet the total phosphorus limit.

   c. Complete design plans and specifications for necessary upgrades no later than **July 31, 2021**.

   d. Start construction of necessary upgrades no later than **June 30, 2022**.

   e. Attain compliance with the final effluent limits for total phosphorus no later than **December 31, 2024**.

f. Until the limit is achieved, the Town shall submit an Annual Compliance Schedule Report to EPA and MassDEP no later than **December 31** of each year. The Report shall at a minimum:
   i. Describe the activities undertaken during the calendar year directed at achieving compliance with the final total phosphorus limits;
   ii. Identify all plans, reports, and other deliverables related to the compliance schedule completed and submitted during the calendar year;
   iii. Describe the expected activities to be taken during the next calendar year in order to achieve compliance with the total phosphorus limits;
   iv. Identify any anticipated or potential areas of noncompliance with this Compliance Schedule;
   v. Describe the Town's plans with respect to the wetland beds. The report shall describe whether the Town plans to abandon, line, deposit material into, or build over the wetland beds. The report shall describe whether the town plans to cease directing wastewater flow to the wetland beds and if so, the timeline for ceasing the flow of wastewater to the wetland beds.

g. The Town shall post the report on the Town website simultaneously with the submission of the report to EPA and MassDEP.

C. UNAUTHORIZED DISCHARGES

This permit authorizes discharges only from the outfall(s) listed in Part I.A.1, in accordance with the terms and conditions of this permit. Discharges of wastewater from any other point sources, including sanitary sewer overflows (SSOs), are not authorized by this permit and shall be reported to EPA and MassDEP in accordance with Section D.1.e.(1) of the General Requirements of this permit (Twenty-four-hour reporting).

Notification of SSOs to MassDEP shall be made on its SSO Reporting Form (which includes DEP Regional Office telephone numbers). The reporting form and instruction for its completion may be found on-line at https://www.mass.gov/how-to/sanitary-sewer-overflowbypassbackup-notification.

D. OPERATION AND MAINTENANCE OF THE SEWER SYSTEM

Operation and maintenance (O&M) of the sewer system shall be in compliance with the General Requirements of Part II and the following terms and conditions. The permittee is required to complete the following activities for the collection system which it owns:

1. Maintenance Staff

   The permittee shall provide an adequate staff to carry out the operation, maintenance, repair, and testing functions required to ensure compliance with the terms and conditions of this permit. Provisions to meet this requirement shall be described in the Collection System O&M Plan required pursuant to Section D.5. below.

2. Preventive Maintenance Program

   The permittee shall maintain an ongoing preventive maintenance program to prevent overflows and bypasses caused by malfunctions or failures of the sewer system infrastructure.

The program shall include an inspection program designed to identify all potential and actual unauthorized discharges. Plans and programs to meet this requirement shall be described in the Collection System O&M Plan required pursuant to Section D.5. below.

3. Infiltration/Inflow

The permittee shall control infiltration and inflow (I/I) into the sewer system as necessary to prevent high flow related unauthorized discharges from their collection systems and high flow related violations of the wastewater treatment plant's effluent limitations. Plans and programs to control I/I shall be described in the Collection System O&M Plan required pursuant to Section D.5. below.

4. Collection System Mapping

Within 30 months of the effective date of this permit, the permittee shall prepare a map of the sewer collection system it owns (see page 1 of this permit for the effective date). The map shall be on a street map of the community, with sufficient detail and at a scale to allow easy interpretation. The collection system information shown on the map shall be based on current conditions and shall be kept up to date and available for review by federal, state, or local agencies. Such map(s) shall include, but not be limited to the following:

a. All sanitary sewer lines and related manholes;

b. All combined sewer lines, related manholes, and catch basins;

c. All combined sewer regulators and any known or suspected connections between the sanitary sewer and storm drain systems (e.g. combination manholes);

d. All outfalls, including the treatment plant outfall(s), CSOs, and any known or suspected SSOs, including stormwater outfalls that are connected to combination manholes;

e. All pump stations and force mains;

f. The wastewater treatment facility(ies);

g. All surface waters (labeled);

h. Other major appurtenances such as inverted siphons and air release valves;

i. A numbering system which uniquely identifies manholes, catch basins, overflow points, regulators and outfalls;

j. The scale and a north arrow; and

k. The pipe diameter, date of installation, type of material, distance between manholes, and the direction of flow.

5. Collection System O&M Plan

The permittee shall develop and implement a Collection System O&M Plan.

a. Within six (6) months of the effective date of the permit, the permittee shall submit to EPA and MassDEP

(1) A description of the collection system management goals, staffing, information management, and legal authorities;
(2) A description of the collection system and the overall condition of the collection system including a list of all pump stations and a description of recent studies and construction activities; and
(3) A schedule for the development and implementation of the full Collection System O&M Plan including the elements in paragraphs b.1. through b.8. below.

b. The full Collection System O&M Plan shall be completed, implemented and submitted to EPA and MassDEP within twenty-four (24) months from the effective date of this permit. The Plan shall include:

(1) The required submittal from paragraph 5.a. above, updated to reflect current information;
(2) A preventive maintenance and monitoring program for the collection system;
(3) Description of sufficient staffing necessary to properly operate and maintain the sanitary sewer collection system and how the operation and maintenance program is staffed;
(4) Description of funding, the source(s) of funding and provisions for funding sufficient for implementing the plan;
(5) Identification of known and suspected overflows and back-ups, including manholes. A description of the cause of the identified overflows and back-ups, corrective actions taken, and a plan for addressing the overflows and back-ups consistent with the requirements of this permit;
(6) A description of the permittee's programs for preventing I/I related effluent violations and all unauthorized discharges of wastewater, including overflows and by-passes and the ongoing program to identify and remove sources of I/I. The program shall include an inflow identification and control program that focuses on the disconnection and redirection of illegal sump pumps and roof down spouts; and
(7) An educational public outreach program for all aspects of I/I control, particularly private inflow.
(8) An <u>Overflow Emergency Response Plan</u> to protect public health from overflows and unanticipated bypasses or upsets that exceed any effluent limitation in the permit.

6. Annual Reporting Requirement

The permittee shall submit a summary report of activities related to the implementation of its Collection System O&M Plan during the previous calendar year. The report shall be submitted to EPA and MassDEP annually by March 31. The summary report shall, at a minimum, include:

a. A description of the staffing levels maintained during the year;

b. A map and a description of inspection and maintenance activities conducted and corrective actions taken during the previous year;

c. Expenditures for any collection system maintenance activities and corrective actions taken during the previous year;

d. A map with areas identified for investigation/action in the coming year;

e. If treatment plant flow has reached 80% of its design flow [0.864 MGD] based on the annual average flow during the reporting year, or there have been capacity related overflows, submit a calculation of the maximum daily, weekly, and monthly infiltration and the maximum daily, weekly, and monthly inflow for the reporting year; and

f. A summary of unauthorized discharges during the past year and their causes and a report of any corrective actions taken as a result of the unauthorized discharges reported pursuant to the Unauthorized Discharges section of this permit.

E. ALTERNATE POWER SOURCE

In order to maintain compliance with the terms and conditions of this permit, the permittee shall provide an alternative power source(s) sufficient to operate the portion of the publicly owned treatment works[1] it owns and operates.

F. INDUSTRIAL USERS

1. The Permittee shall submit to EPA and MassDEP the name of any Industrial User (IU) subject to Categorical Pretreatment Standards under 40 C.F.R. § 403.6 and 40 C.F.R. Chapter I, Subchapter N (§§ 405-415, 417-436, 439-440, 443, 446-447, 454-455, 457-461, 463-469, and 471 as amended) who commences discharge to the POTW after the effective date of this permit.

   This reporting requirement also applies to any other IU who discharges an average of 25,000 gallons per day or more of process wastewater into the POTW (excluding sanitary, noncontact cooling and boiler blowdown wastewater); contributes a process wastewater which makes up five (5) percent or more of the average dry weather hydraulic or organic capacity of the POTW; or is designated as such by the Control Authority as defined in 40 C.F.R. § 403.12(a) on the basis that the industrial user has a reasonable potential to adversely affect the wastewater treatment facility's operation, or for violating any pretreatment standard or requirement (in accordance with 40 C.F.R. § 403.8(f)(6)).

2. In the event that the Permittee receives reports (baseline monitoring reports, 90-day compliance reports, periodic reports on continued compliance, etc.) from industrial users subject to Categorical Pretreatment Standards under 40 C.F.R. § 403.6 and 40 C.F.R. Chapter I, Subchapter N (§§ 405-415, 417-436, 439-440, 443, 446-447, 454-455, 457-461, 463-469,

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[1] As defined at 40 CFR §122.2, which references the definition at 40 CFR §403.3

and 471 as amended), the Permittee shall forward all copies of these reports within ninety (90) days of their receipt to EPA and MassDEP.

G. SLUDGE CONDITIONS

1. The permittee shall comply with all existing federal and state laws and regulations that apply to sewage sludge use and disposal practices, including EPA regulations promulgated at 40 CFR Part 503, which prescribe "Standards for the Use or Disposal of Sewage Sludge" pursuant to Section 405(d) of the CWA, 33 U.S.C. § 1345(d).

2. If both state and federal requirements apply to the permittee's sludge use and/or disposal practices, the permittee shall comply with the more stringent of the applicable requirements.

3. The requirements and technical standards of 40 CFR Part 503 apply to the following sludge use or disposal practices.

   a. Land application - the use of sewage sludge to condition or fertilize the soil

   b. Surface disposal - the placement of sewage sludge in a sludge only landfill

   c. Sewage sludge incineration in a sludge only incinerator

4. The requirements of 40 CFR Part 503 do not apply to facilities which dispose of sludge in a municipal solid waste landfill. 40 CFR § 503.4. These requirements also do not apply to facilities which do not use or dispose of sewage sludge during the life of the permit but rather treat the sludge (e.g., lagoons, reed beds), or are otherwise excluded under 40 CFR § 503.6.

5. The 40 CFR Part 503 requirements including the following elements:

   - General requirements
   - Pollutant limitations
   - Operational Standards (pathogen reduction requirements and vector attraction reduction requirements)
   - Management practices
   - Record keeping
   - Monitoring
   - Reporting

   Which of the 40 CFR Part 503 requirements apply to the permittee will depend upon the use or disposal practice followed and upon the quality of material produced by a facility. The EPA Region 1 Guidance document, "EPA Region 1 - NPDES Permit Sludge Compliance Guidance" (November 4, 1999), may be used by the permittee to assist it in determining the applicable requirements.[2]

6. The sludge shall be monitored for pollutant concentrations (all Part 503 methods) and pathogen reduction and vector attraction reduction (land application and surface disposal) at the following frequency. This frequency is based upon the volume of sewage sludge generated at the facility in dry metric tons per year.

less than 290	1/ year
290 to less than 1,500	1 /quarter
1,500 to less than 15,000	6 /year
15,000 +	1 /month

Sampling of the sewage sludge shall use the procedures detailed in 40 CFR § 503.8.

7. Under 40 CFR § 503.9(r), the permittee is a "person who prepares sewage sludge" because it "is … the person who generates sewage sludge during the treatment of domestic sewage in a treatment works …." If the permittee contracts with *another* "person who prepares sewage sludge" under 40 CFR § 503.9(r) – i.e., with "a person who derives a material from sewage sludge" – for use or disposal of the sludge, then compliance with Part 503 requirements is the responsibility of the contractor engaged for that purpose. If the permittee does not engage a "person who prepares sewage sludge," as defined in 40 CFR § 503.9(r), for use or disposal, then the permittee remains responsible to ensure that the applicable requirements in Part 503 are met. 40 CFR § 503.7. If the ultimate use or disposal method is land application, the permittee is responsible for providing the person receiving the sludge with notice and necessary information to comply with the requirements of 40 CFR Part 503 Subpart B.

8. The permittee shall submit an annual report containing the information specified in the 40 CFR Part 503 requirements (§ 503.18 (land application), § 503.28 (surface disposal), or § 503.48 (incineration)) by **February 19** (*see also* "EPA Region 1 - NPDES Permit Sludge Compliance Guidance"). Reports shall be submitted electronically using EPA's Electronic Reporting tool ("NeT") (see "Monitoring and Reporting" section below).

H. MONITORING AND REPORTING

The monitoring program in the permit specifies sampling and analysis, which will provide continuous information on compliance and the reliability and effectiveness of the installed pollution abatement equipment. The approved analytical procedures found in 40 CFR Part 136 are required unless other procedures are explicitly required in the permit. The permittee is obligated to monitor and report sampling results to EPA and the MassDEP within the time specified within the permit.

Unless otherwise specified in this permit, the permittee shall submit reports, requests, and information and provide notices in the manner described in this section.

1. Submittal of DMRs Using NetDMR

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[2] This guidance document is available upon request from EPA Region 1 and may also be found at: http://www.epa.gov/region1/npdes/permits/generic/sludgeguidance.pdf

The permittee shall continue to submit its monthly monitoring data in discharge monitoring reports (DMRs) to EPA and MassDEP no later than the 15th day of the month electronically using NetDMR. When the permittee submits DMRs using NetDMR, it is not required to submit hard copies of DMRs to EPA or MassDEP. NetDMR is accessed from the internet at http://www.epa.gov/netdmr.

2. Submittal of Reports as NetDMR Attachments

Unless otherwise specified in this permit, the permittee shall electronically submit all reports to EPA as NetDMR attachments rather than as hard copies. Because the due dates for reports described in this permit may not coincide with the due date for submitting DMRs (which is no later than the 15^{th} day of the month), a report submitted electronically as a NetDMR attachment shall be considered timely if it is electronically submitted to EPA using NetDMR with the next DMR due following the particular report due date specified in this permit.

3. Submittal of Biosolids/Sewage Sludge Reports

By February 19 of each year, the permittee must electronically report their annual Biosolids/Sewage Sludge Report for the previous calendar year using EPA's NPDES Electronic Reporting Tool ("NeT") found on the internet at https://www.epa.gov/compliance/npdes-ereporting.

4. Submittal of Requests and Reports to EPA/OEP

The following requests, reports, and information described in this permit shall be submitted to the EPA/OEP NPDES Applications Coordinator in the EPA Office Ecosystem Protection (OEP).

a. Transfer of Permit notice
b. Request for changes in sampling location
c. Request for reduction in testing frequency
d. Request for reduction in WET testing requirement
e. Report on unacceptable dilution water / request for alternative dilution water for WET testing
f. Notification of proposal to add or replace chemicals and bio-remedial agents including microbes

These reports, information, and requests shall be submitted to EPA/OEP electronically at R1NPDES.Notices.OEP@epa.gov or by hard copy mail to the following address:

U.S. Environmental Protection Agency
Office of Ecosystem Protection
EPA/OEP NPDES Applications Coordinator
5 Post Office Square - Suite 100 (OEP06-03)
Boston, MA 02109-3912

6. Submittal of Reports in Hard Copy Form

The following notifications and reports shall be submitted as hard copy with a cover letter describing the submission. These reports shall be signed and dated originals submitted to EPA.

a. Written notifications required under Part II
b. Notice of unauthorized discharges, including Sanitary Sewer Overflow (SSO) reporting

This information shall be submitted to EPA/OES at the following address:

U.S. Environmental Protection Agency
Office of Environmental Stewardship (OES)
Water Technical Unit
5 Post Office Square, Suite 100 (OES04-SMR)
Boston, MA 02109-3912

7. State Reporting

Duplicate signed hard copies of all WET test reports shall be submitted to the Massachusetts Department of Environmental Protection, Division of Watershed Management, at the following address:

Massachusetts Department of Environmental Protection
Bureau of Water Resources
Division of Watershed Management
8 New Bond Street
Worcester, Massachusetts 01606

8. Verbal Reports and Verbal Notifications

Any verbal reports or verbal notifications, if required in Parts I and/or II of this permit, shall be made to both EPA and to MassDEP. This includes verbal reports and notifications which require reporting within 24 hours. (As examples, see Part II.B.4.c. (2), Part II.B.5.c. (3), and Part II.D.1.e.) Verbal reports and verbal notifications shall be made to

EPA's Office of Environmental Stewardship at: 617-918-1510

and to

MassDEP's Emergency Response at 888-304-1133.

I. STATE PERMIT CONDITIONS

1. This authorization to discharge includes two separate and independent permit authorizations. The two permit authorizations are (i) a federal National Pollutant Discharge Elimination

System permit issued by the U.S. Environmental Protection Agency (EPA) pursuant to the Federal Clean Water Act, 33 U.S.C. §§ 1251 et seq.; and (ii) an identical state surface water discharge permit issued by the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP) pursuant to the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53, and 314 C.M.R. 3.00. All of the requirements contained in this authorization, as well as the standard conditions contained in 314 CMR 3.19, are hereby incorporated by reference into this state surface water discharge permit.

2. This authorization also incorporates the state water quality certification issued by MassDEP under § 401(a) of the Federal Clean Water Act, 40 C.F.R. § 124.53, M.G.L. c. 21, § 27 and 314 CMR 3.07. All of the requirements (if any) contained in MassDEP's water quality certification for the permit are hereby incorporated by reference into this state surface water discharge permit as special conditions pursuant to 314 CMR 3.11.

3. Each agency shall have the independent right to enforce the terms and conditions of this permit. Any modification, suspension or revocation of this permit shall be effective only with respect to the agency taking such action, and shall not affect the validity or status of this permit as issued by the other agency, unless and until each agency has concurred in writing with such modification, suspension or revocation. In the event any portion of this permit is declared invalid, illegal or otherwise issued in violation of state law such permit shall remain in full force and effect under federal law as a NPDES Permit issued by the U.S. Environmental Protection Agency. In the event this permit is declared invalid, illegal or otherwise issued in violation of federal law, this permit shall remain in full force and effect under state law as a permit issued by the Commonwealth of Massachusetts.

ATTACHMENT A

USEPA REGION 1 FRESHWATER ACUTE TOXICITY TEST PROCEDURE AND PROTOCOL

I. GENERAL REQUIREMENTS

The permittee shall conduct acceptable acute toxicity tests in accordance with the appropriate test protocols described below:

- **Daphnid (Ceriodaphnia dubia) definitive 48 hour test.**
- **Fathead Minnow (Pimephales promelas) definitive 48 hour test.**

Acute toxicity test data shall be reported as outlined in Section VIII.

II. METHODS

The permittee shall use 40 CFR Part 136 methods. Methods and guidance may be found at:

http://water.epa.gov/scitech/methods/cwa/wet/disk2_index.cfm

The permittee shall also meet the sampling, analysis and reporting requirements included in this protocol. This protocol defines more specific requirements while still being consistent with the Part 136 methods. If, due to modifications of Part 136, there are conflicting requirements between the Part 136 method and this protocol, the permittee shall comply with the requirements of the Part 136 method.

III. SAMPLE COLLECTION

A discharge sample shall be collected. Aliquots shall be split from the sample, containerized and preserved (as per 40 CFR Part 136) for chemical and physical analyses required. The remaining sample shall be measured for total residual chlorine and dechlorinated (if detected) in the laboratory using sodium thiosulfate for subsequent toxicity testing. (Note that EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection.) Grab samples must be used for pH, temperature, and total residual chlorine (as per 40 CFR Part 122.21).

Standard Methods for the Examination of Water and Wastewater describes dechlorination of samples (APHA, 1992). Dechlorination can be achieved using a ratio of 6.7 mg/L anhydrous sodium thiosulfate to reduce 1.0 mg/L chlorine. If dechlorination is necessary, a thiosulfate control (maximum amount of thiosulfate in lab control or receiving water) must also be run in the WET test.

All samples held overnight shall be refrigerated at 1- 6^{o}C.

IV. DILUTION WATER

A grab sample of dilution water used for acute toxicity testing shall be collected from the receiving water at a point immediately upstream of the permitted discharge's zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. In the case where an alternate dilution water has been agreed upon an additional receiving water control (0% effluent) must also be tested.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable, an alternate standard dilution water of known quality with a hardness, pH, conductivity, alkalinity, organic carbon, and total suspended solids similar to that of the receiving water may be substituted **AFTER RECEIVING WRITTEN APPROVAL FROM THE PERMIT ISSUING AGENCY(S)**. Written requests for use of an alternate dilution water should be mailed with supporting documentation to the following address:

Director
Office of Ecosystem Protection (CAA)
U.S. Environmental Protection Agency-New England
5 Post Office Sq., Suite 100 (OEP06-5)
Boston, MA 02109-3912

and

Manager
Water Technical Unit (SEW)
U.S. Environmental Protection Agency
5 Post Office Sq., Suite 100 (OES04-4)
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

See the most current annual DMR instructions which can be found on the EPA Region 1 website at http://www.epa.gov/region1/enforcement/water/dmr.html *for further important details on alternate dilution water substitution requests.*

It may prove beneficial to have the proposed dilution water source screened for suitability prior to toxicity testing. EPA strongly urges that screening be done prior to set up of a full definitive toxicity test any time there is question about the dilution water's ability to support acceptable performance as outlined in the 'test acceptability' section of the protocol.

V. TEST CONDITIONS

The following tables summarize the accepted daphnid and fathead minnow toxicity test conditions and test acceptability criteria:

EPA NEW ENGLAND EFFLUENT TOXICITY TEST CONDITIONS FOR THE DAPHNID, CERIODAPHNIA DUBIA 48 HOUR ACUTE TESTS[1]

1.	Test type	Static, non-renewal
2.	Temperature (^oC)	20 $\pm$ 1^oC or 25 $\pm$ 1^oC
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hour light, 8 hour dark
5.	Test chamber size	Minimum 30 ml
6.	Test solution volume	Minimum 15 ml
7.	Age of test organisms	1-24 hours (neonates)
8.	No. of daphnids per test chamber	5
9.	No. of replicate test chambers per treatment	4
10.	Total no. daphnids per test concentration	20
11.	Feeding regime	As per manual, lightly feed YCT and Selenastrum to newly released organisms while holding prior to initiating test
12.	Aeration	None
13.	Dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q^R or equivalent deionized water and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	$\geq$ 0.5, must bracket the permitted RWC
15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution

		series.
16.	Effect measured	Mortality-no movement of body or appendages on gentle prodding
17.	Test acceptability	90% or greater survival of test organisms in dilution water control solution
18.	Sampling requirements	For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples must first be used within 36 hours of collection.
19.	Sample volume required	Minimum 1 liter

Footnotes:

1. Adapted from EPA-821-R-02-012.
2. Standard prepared dilution water must have hardness requirements to generally reflect the characteristics of the receiving water.

EPA NEW ENGLAND TEST CONDITIONS FOR THE FATHEAD MINNOW (PIMEPHALES PROMELAS) 48 HOUR ACUTE TEST[1]

1.	Test Type	Static, non-renewal
2.	Temperature (^oC)	$20 \pm 1\ ^o$ C or 25 ± 1^oC
3.	Light quality	Ambient laboratory illumination
4.	Photoperiod	16 hr light, 8 hr dark
5.	Size of test vessels	250 mL minimum
6.	Volume of test solution	Minimum 200 mL/replicate
7.	Age of fish	1-14 days old and age within 24 hrs of each other
8.	No. of fish per chamber	10
9.	No. of replicate test vessels per treatment	4
10.	Total no. organisms per concentration	40
11.	Feeding regime	As per manual, lightly feed test age larvae using concentrated brine shrimp nauplii while holding prior to initiating test
12.	Aeration	None, unless dissolved oxygen (D.O.) concentration falls below 4.0 mg/L, at which time gentle single bubble aeration should be started at a rate of less than 100 bubbles/min. (Routine D.O. check is recommended.)
13.	dilution water[2]	Receiving water, other surface water, synthetic water adjusted to the hardness and alkalinity of the receiving water (prepared using either Millipore Milli-Q[R] or equivalent deionized and reagent grade chemicals according to EPA acute toxicity test manual) or deionized water combined with mineral water to appropriate hardness.
14.	Dilution series	$\geq$ 0.5, must bracket the permitted RWC

15.	Number of dilutions	5 plus receiving water and laboratory water control and thiosulfate control, as necessary. An additional dilution at the permitted effluent concentration (% effluent) is required if it is not included in the dilution series.
16.	Effect measured	Mortality-no movement on gentle prodding
17.	Test acceptability	90% or greater survival of test organisms in dilution water control solution
18.	Sampling requirements	For on-site tests, samples must be used within 24 hours of the time that they are removed from the sampling device. For off-site tests, samples are used within 36 hours of collection.
19.	Sample volume required	Minimum 2 liters

Footnotes:

1. Adapted from EPA-821-R-02-012
2. Standard dilution water must have hardness requirements to generally reflect characteristics of the receiving water.

VI. CHEMICAL ANALYSIS

At the beginning of a static acute toxicity test, pH, conductivity, total residual chlorine, oxygen, hardness, alkalinity and temperature must be measured in the highest effluent concentration and the dilution water. Dissolved oxygen, pH and temperature are also measured at 24 and 48 hour intervals in all dilutions. The following chemical analyses shall be performed on the 100 percent effluent sample and the upstream water sample for each sampling event.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3]	x		0.02
Alkalinity	x	x	2.0
pH	x	x	--
Specific Conductance	x	x	--
Total Solids	x		--
Total Dissolved Solids	x		--
Ammonia	x	x	0.1
Total Organic Carbon	x	x	0.5
Total Metals			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

Notes:

1. Hardness may be determined by:
   - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
     - Method 2340B (hardness by calculation)
     - Method 2340C (titration)
2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
   - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
     - Method 4500-CL E Low Level Amperometric Titration
     - Method 4500-CL G DPD Colorimetric Method
3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing.

VII. TOXICITY TEST DATA ANALYSIS

LC50 Median Lethal Concentration (Determined at 48 Hours)

Methods of Estimation:

- Probit Method
- Spearman-Karber
- Trimmed Spearman-Karber
- Graphical

See the flow chart in Figure 6 on p. 73 of EPA-821-R-02-012 for appropriate method to use on a given data set.

No Observed Acute Effect Level (NOAEL)

See the flow chart in Figure 13 on p. 87 of EPA-821-R-02-012.

VIII. TOXICITY TEST REPORTING

A report of the results will include the following:

- Description of sample collection procedures, site description
- Names of individuals collecting and transporting samples, times and dates of sample collection and analysis on chain-of-custody
- General description of tests: age of test organisms, origin, dates and results of standard toxicant tests; light and temperature regime; other information on test conditions if different than procedures recommended. Reference toxicant test data should be included.
- All chemical/physical data generated. (Include minimum detection levels and minimum quantification levels.)
- Raw data and bench sheets.
- Provide a description of dechlorination procedures (as applicable).
- Any other observations or test conditions affecting test outcome.

ATTACHMENT B

FRESHWATER CHRONIC
TOXICITY TEST PROCEDURE AND PROTOCOL
USEPA Region 1

I. GENERAL REQUIREMENTS

The permittee shall be responsible for the conduct of acceptable chronic toxicity tests using three fresh samples collected during each test period. The following tests shall be performed as prescribed in Part 1 of the NPDES discharge permit in accordance with the appropriate test protocols described below. (Note: the permittee and testing laboratory should review the applicable permit to determine whether testing of one or both species is required).

- **Daphnid (Ceriodaphnia dubia) Survival and Reproduction Test.**
- **Fathead Minnow (Pimephales promelas) Larval Growth and Survival Test.**

Chronic toxicity data shall be reported as outlined in Section VIII.

II. METHODS

Methods to follow are those recommended by EPA in: Short Term Methods For Estimating The Chronic Toxicity of Effluents and Receiving Water to Freshwater Organisms, Fourth Edition. October 2002. United States Environmental Protection Agency. Office of Water, Washington, D.C., EPA 821-R-02-013. The methods are available on-line at http://www.epa.gov/waterscience/WET/ . Exceptions and clarification are stated herein.

III. SAMPLE COLLECTION AND USE

A total of three fresh samples of effluent and receiving water are required for initiation and subsequent renewals of a freshwater, chronic, toxicity test. The receiving water control sample must be collected immediately upstream of the permitted discharge's zone of influence. Fresh samples are recommended for use on test days 1, 3, and 5. However, provided a total of three samples are used for testing over the test period, an alternate sampling schedule is acceptable. The acceptable holding times until initial use of a sample are 24 and 36 hours for on-site and off-site testing, respectively. A written waiver is required from the regulating authority for any hold time extension. All test samples collected may be used for 24, 48 and 72 hour renewals after initial use. All samples held for use beyond the day of sampling shall be refrigerated and maintained at a temperature range of 0-6^{o} C.

All samples submitted for chemical and physical analyses will be analyzed according to Section VI of this protocol.

Sampling guidance dictates that, where appropriate, aliquots for the analysis required in this protocol shall be split from the samples, containerized and immediately preserved, or analyzed as per 40 CFR Part 136. EPA approved test methods require that samples collected for metals analyses be preserved immediately after collection. Testing for the presence of total residual chlorine (TRC) must be analyzed immediately or as soon as possible, for all effluent samples, prior to WET testing. TRC analysis may be performed on-site or by the toxicity testing laboratory and the samples must be dechlorinated, as necessary, using sodium thiosulfate prior to sample use for toxicity testing.

If any of the renewal samples are of sufficient potency to cause lethality to 50 percent or more of the test organisms in any of the test treatments for either species or, if the test fails to meet its permit limits, then chemical analysis for total metals (originally required for the initial sample only in Section VI) will be required on the renewal sample(s) as well.

IV. DILUTION WATER

Samples of receiving water must be collected from a location in the receiving water body immediately upstream of the permitted discharge’s zone of influence at a reasonably accessible location. Avoid collection near areas of obvious road or agricultural runoff, storm sewers or other point source discharges and areas where stagnant conditions exist. EPA strongly urges that screening for toxicity be performed prior to the set up of a full, definitive toxicity test any time there is a question about the test dilution water's ability to achieve test acceptability criteria (TAC) as indicated in Section V of this protocol. The test dilution water control response will be used in the statistical analysis of the toxicity test data. All other control(s) required to be run in the test will be reported as specified in the Discharge Monitoring Report (DMR) Instructions, Attachment F, page 2,Test Results & Permit Limits.

The test dilution water must be used to determine whether the test met the applicable TAC. When receiving water is used for test dilution, an additional control made up of standard laboratory water (0% effluent) is required. This control will be used to verify the health of the test organisms and evaluate to what extent, if any, the receiving water itself is responsible for any toxic response observed.

If dechlorination of a sample by the toxicity testing laboratory is necessary a “sodium thiosulfate” control, representing the concentration of sodium thiosulfate used to adequately dechlorinate the sample prior to toxicity testing, must be included in the test.

If the use of an alternate dilution water (ADW) is authorized, in addition to the ADW test control, the testing laboratory must, for the purpose of monitoring the receiving water, also run a receiving water control.

If the receiving water diluent is found to be, or suspected to be toxic or unreliable an ADW of known quality with hardness similar to that of the receiving water may be substituted. Substitution is species specific meaning that the decision to use ADW is made for each species and is based on the toxic response of that particular species. Substitution to an ADW is authorized in two cases. The first is the case where repeating a test due to toxicity in the site dilution water requires an **immediate decision** for ADW use be made by the permittee and toxicity testing laboratory. The second is in the case where two of the most recent documented incidents of unacceptable site dilution water toxicity requires ADW use in future WET testing.

For the second case, written notification from the permittee requesting ADW use **and** written authorization from the permit issuing agency(s) is required **prior to** switching to a long-term use of ADW for the duration of the permit.

Written requests for use of ADW must be mailed with supporting documentation to the following addresses:

Director
Office of Ecosystem Protection (CAA)
U.S. Environmental Protection Agency, Region 1
Five Post Office Square, Suite 100
Mail Code OEP06-5
Boston, MA 02109-3912

and

Manager
Water Technical Unit (SEW)
U.S. Environmental Protection Agency
Five Post Office Square, Suite 100
Mail Code OES04-4
Boston, MA 02109-3912

Note: USEPA Region 1 retains the right to modify any part of the alternate dilution water policy stated in this protocol at any time. Any changes to this policy will be documented in the annual DMR posting.

See the most current annual DMR instructions which can be found on the EPA Region 1 website at http://www.epa.gov/region1/enforcementandassistance/dmr.html for further important details on alternate dilution water substitution requests.

V. TEST CONDITIONS AND TEST ACCEPTABILITY CRITERIA

Method specific test conditions and TAC are to be followed and adhered to as specified in the method guidance document, EPA 821-R-02-013. If a test does not meet TAC the test must be repeated with fresh samples within 30 days of the initial test completion date.

V.1. Use of Reference Toxicity Testing

Reference toxicity test results and applicable control charts must be included in the toxicity testing report.

If reference toxicity test results fall outside the control limits established by the laboratory for a specific test endpoint, a reason or reasons for this excursion must be evaluated, correction made and reference toxicity tests rerun as necessary.

If a test endpoint value exceeds the control limits at a frequency of more than one out of twenty then causes for the reference toxicity test failure must be examined and if problems are identified corrective action taken. The reference toxicity test must be repeated during the same month in which the exceedance occurred.

If two consecutive reference toxicity tests fall outside control limits, the possible cause(s) for the exceedance must be examined, corrective actions taken and a repeat of the reference toxicity test must take place immediately. Actions taken to resolve the problem must be reported.

V.1.a. Use of Concurrent Reference Toxicity Testing

In the case where concurrent reference toxicity testing is required due to a low frequency of testing with a particular method, if the reference toxicity test results fall slightly outside of laboratory established control limits, but the primary test met the TAC, the results of the primary test will be considered acceptable. However, if the results of the concurrent test fall well outside the established **upper** control limits i.e. $\geq$3 standard deviations for IC25 values and $\geq$ two concentration intervals for NOECs, and even though the primary test meets TAC, the primary test will be considered unacceptable and must be repeated.

V.2. For the *C. dubia* test, the determination of TAC and formal statistical analyses must be performed using only the first three broods produced.

V.3. Test treatments must include 5 effluent concentrations and a dilution water control. An additional test treatment, at the permitted effluent concentration (% effluent), is required if it is not included in the dilution series.

VI. CHEMICAL ANALYSIS

As part of each toxicity test's daily renewal procedure, pH, specific conductance, dissolved oxygen (DO) and temperature must be measured at the beginning and end of each 24-hour period in each test treatment and the control(s).

The additional analysis that must be performed under this protocol is as specified and noted in the table below.

Parameter	Effluent	Receiving Water	ML (mg/l)
Hardness[1, 4]	x	x	0.5
Total Residual Chlorine (TRC)[2, 3, 4]	x		0.02
Alkalinity[4]	x	x	2.0
pH[4]	x	x	--
Specific Conductance[4]	x	x	--
Total Solids [6]	x		--
Total Dissolved Solids [6]	x		--
Ammonia[4]	x	x	0.1
Total Organic Carbon [6]	x	x	0.5
Total Metals [5]			
Cd	x	x	0.0005
Pb	x	x	0.0005
Cu	x	x	0.003
Zn	x	x	0.005
Ni	x	x	0.005
Al	x	x	0.02
Other as permit requires			

Notes:

1. Hardness may be determined by:

- APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
  - -Method 2340B (hardness by calculation)
  - -Method 2340C (titration)

2. Total Residual Chlorine may be performed using any of the following methods provided the required minimum limit (ML) is met.
   - APHA Standard Methods for the Examination of Water and Wastewater , 21st Edition
     - -Method 4500-CL E Low Level Amperometric Titration
     - -Method 4500-CL G DPD Colorimetric Method
   - USEPA 1983. Manual of Methods Analysis of Water and Wastes
     - -Method 330.5
3. Required to be performed on the sample used for WET testing prior to its use for toxicity testing
4. Analysis is to be performed on samples and/or receiving water, as designated in the table above, from all three sampling events.
5. Analysis is to be performed on the initial sample(s) only unless the situation arises as stated in Section III, paragraph 4
6. Analysis to be performed on initial samples only

VII. TOXICITY TEST DATA ANALYSIS AND REVIEW

A. Test Review

1. Concentration / Response Relationship

A concentration/response relationship evaluation is required for test endpoint determinations from both Hypothesis Testing and Point Estimate techniques. The test report is to include documentation of this evaluation in support of the endpoint values reported. The dose-response review must be performed as required in Section 10.2.6 of EPA-821-R-02-013. Guidance for this review can be found at http://water.epa.gov/scitech/methods/cwa/ . In most cases, the review will result in one of the following three conclusions: (1) Results are reliable and reportable; (2) Results are anomalous and require explanation; or (3) Results are inconclusive and a retest with fresh samples is required.

2. Test Variability (Test Sensitivity)

This review step is separate from the determination of whether a test meets or does not meet TAC. Within test variability is to be examined for the purpose of evaluating test sensitivity. This evaluation is to be performed for the sub-lethal hypothesis testing endpoints reproduction and growth as required by the permit. The test report is to include documentation of this evaluation to support that the endpoint values reported resulted from a toxicity test of adequate sensitivity. This evaluation must be performed as required in Section 10.2.8 of EPA-821-R-02-013.

To determine the adequacy of test sensitivity, USEPA requires the calculation of test percent minimum significant difference (PMSD) values. In cases where NOEC determinations are made based on a non-parametric technique, calculation of a test PMSD value**,** for the sole purpose of assessing test sensitivity, shall be calculated using a comparable parametric statistical analysis technique. The calculated test PMSD is then compared to the upper and lower PMSD bounds shown for freshwater tests in Section 10.2.8.3, p. 52, Table 6 of EPA-821-R-02-013. The comparison will yield one of the following determinations.

- The test PMSD exceeds the PMSD upper bound test variability criterion in Table 6, the test results are considered highly variable and the test may not be sensitive enough to determine the presence of toxicity at the permit limit concentration (PLC). If the test results indicate that the discharge is not toxic at the PLC, then the test is considered insufficiently sensitive and must be repeated within 30 days of the initial test completion using fresh samples. If the test results indicate that the discharge is toxic at the PLC, the test is considered acceptable and does not have to be repeated.

- The test PMSD falls below the PMSD lower bound test variability criterion in Table 6, the test is determined to be very sensitive. In order to determine which treatment(s) are statistically significant and which are not, for the purpose of reporting a NOEC, the relative percent difference (RPD) between the control and each treatment must be calculated and compared to the lower PMSD boundary. See *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program*, EPA 833-R-00-003, June 2002, Section 6.4.2. The following link: Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the NPDES Program can be used to locate the USEPA website containing this document. If the RPD for a treatment falls below the PMSD lower bound, the difference is considered statistically insignificant. If the RPD for a treatment is greater that the PMSD lower bound, then the treatment is considered statistically significant.

- The test PMSD falls within the PMSD upper and lower bounds in Table 6, the sub-lethal test endpoint values shall be reported as is.

B. Statistical Analysis

1. General - Recommended Statistical Analysis Method

Refer to general data analysis flowchart, EPA 821-R-02-013, page 43

For discussion on Hypothesis Testing, refer to EPA 821-R-02-013, Section 9.6

For discussion on Point Estimation Techniques, refer to EPA 821-R-02-013, Section 9.7

2. *Pimephales promelas*

Refer to survival hypothesis testing analysis flowchart, EPA 821-R-02-013, page 79

Refer to survival point estimate techniques flowchart, EPA 821-R-02-013, page 80

Refer to growth data statistical analysis flowchart, EPA 821-R-02-013, page 92

3. *Ceriodaphnia dubia*

Refer to survival data testing flowchart, EPA 821-R-02-013, page 168

Refer to reproduction data testing flowchart, EPA 821-R-02-013, page 173

VIII. TOXICITY TEST REPORTING

A report of results must include the following:

- Test summary sheets (2007 DMR Attachment F) which includes:
  - Facility name
  - NPDES permit number
  - Outfall number
  - Sample type
  - Sampling method
  - Effluent TRC concentration
  - Dilution water used
  - Receiving water name and sampling location
  - Test type and species
  - Test start date
  - Effluent concentrations tested (%) and permit limit concentration
  - Applicable reference toxicity test date and whether acceptable or not
  - Age, age range and source of test organisms used for testing
  - Results of TAC review for all applicable controls
  - Test sensitivity evaluation results (test PMSD for growth and reproduction)
  - Permit limit and toxicity test results
  - Summary of test sensitivity and concentration response evaluation

In addition to the summary sheets the report must include:

- A brief description of sample collection procedures
- Chain of custody documentation including names of individuals collecting samples, times and dates of sample collection, sample locations, requested analysis and lab receipt with time and date received, lab receipt personnel and condition of samples upon receipt at the lab(s)
- Reference toxicity test control charts
- All sample chemical/physical data generated, including minimum limits (MLs) and analytical methods used
- All toxicity test raw data including daily ambient test conditions, toxicity test chemistry, sample dechlorination details as necessary, bench sheets and statistical analysis
- A discussion of any deviations from test conditions
- Any further discussion of reported test results, statistical analysis and concentration-response relationship and test sensitivity review per species per endpoint

NPDES PART II STANDARD CONDITIONS
(April 26, 2018)[1]

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[1] Updated July 17, 2018 to fix typographical errors.

A. GENERAL REQUIREMENTS

1. Duty to Comply

The Permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA or Act) and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

a. The Permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants and with standards for sewage sludge use or disposal established under Section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, or standards for sewage sludge use or disposal, even if the permit has not yet been modified to incorporate the requirement.

b. Penalties for Violations of Permit Conditions: The Director will adjust the civil and administrative penalties listed below in accordance with the Civil Monetary Penalty Inflation Adjustment Rule (83 Fed. Reg. 1190-1194 (January 10, 2018) and the 2015 amendments to the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. § 2461 note. See Pub. L.114-74, Section 701 (Nov. 2, 2015)). These requirements help ensure that EPA penalties keep pace with inflation. Under the above-cited 2015 amendments to inflationary adjustment law, EPA must review its statutory civil penalties each year and adjust them as necessary.

(1) Criminal Penalties

(a) *Negligent Violations.* The CWA provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to criminal penalties of not less than $2,500 nor more than $25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than $50,000 per day of violation or by imprisonment of not more than 2 years, or both.

(b) *Knowing Violations.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than $100,000 per day of violation, or imprisonment of not more than 6 years, or both.

(c) *Knowing Endangerment.* The CWA provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 303, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he or she is placing another person in imminent danger of death or serious bodily injury shall upon conviction be subject to a fine of not more than $250,000 or by imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than $500,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the Act, shall, upon conviction of violating the imminent danger provision, be subject to a fine of not more than $1,000,000 and can be fined up to $2,000,000 for second or subsequent convictions.

(d) *False Statement.* The CWA provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both. The Act further provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

(2) *Civil Penalties*. The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed the maximum amounts authorized by Section 309(d) of the Act, the 2015 amendments to the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. § 2461 note, and 40 C.F.R. Part 19. *See* Pub. L.114-74, Section 701 (Nov. 2, 2015); 83 Fed. Reg. 1190 (January 10, 2018).

(3) *Administrative Penalties*. The CWA provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty as follows:

(a) *Class I Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(A) of the Act, the 2015 amendments to the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. § 2461 note, and 40 C.F.R. Part 19. *See* Pub. L.114-74, Section 701 (Nov. 2, 2015); 83 Fed. Reg. 1190 (January 10, 2018).

(b) *Class II Penalty.* Not to exceed the maximum amounts authorized by Section 309(g)(2)(B) of the Act the 2015 amendments to the Federal Civil Penalties Inflation Adjustment Act of 1990, 28 U.S.C. § 2461 note, and 40 C.F.R. Part 19. *See* Pub. L.114-74, Section 701 (Nov. 2, 2015); 83 Fed. Reg. 1190 (January 10, 2018).

2. <u>Permit Actions</u>

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any permit condition.

3. Duty to Provide Information

The Permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

4. Oil and Hazardous Substance Liability

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the Permittee from responsibilities, liabilities or penalties to which the Permittee is or may be subject under Section 311 of the CWA, or Section 106 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA).

5. Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege.

6. Confidentiality of Information

   a. In accordance with 40 C.F.R. Part 2, any information submitted to EPA pursuant to these regulations may be claimed as confidential by the submitter. Any such claim must be asserted at the time of submission in the manner prescribed on the application form or instructions or, in the case of other submissions, by stamping the words "confidential business information" on each page containing such information. If no claim is made at the time of submission, EPA may make the information available to the public without further notice. If a claim is asserted, the information will be treated in accordance with the procedures in 40 C.F.R. Part 2 (Public Information).

   b. Claims of confidentiality for the following information will be denied:

      (1) The name and address of any permit applicant or Permittee;
      (2) Permit applications, permits, and effluent data.

   c. Information required by NPDES application forms provided by the Director under 40 C.F.R. § 122.21 may not be claimed confidential. This includes information submitted on the forms themselves and any attachments used to supply information required by the forms.

7. Duty to Reapply

If the Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the Permittee must apply for and obtain a new permit. The Permittee shall submit a new application at least 180 days before the expiration date of the existing permit, unless permission for a later date has been granted by the Director. (The Director shall not grant permission for applications to be submitted later than the expiration date of the existing permit.)

8. State Authorities

Nothing in Parts 122, 123, or 124 precludes more stringent State regulation of any activity covered by the regulations in 40 C.F.R. Parts 122, 123, and 124, whether or not under an approved State program.

9. Other Laws

The issuance of a permit does not authorize any injury to persons or property or invasion of other private rights, or any infringement of State or local law or regulations.

B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of back-up or auxiliary facilities or similar systems which are installed by a Permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

2. Need to Halt or Reduce Not a Defense

It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

3. Duty to Mitigate

The Permittee shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

4. Bypass

a. Definitions

(1) *Bypass* means the intentional diversion of waste streams from any portion of a treatment facility.

(2) *Severe property damage* means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. *Bypass not exceeding limitations*. The Permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of paragraphs (c) and (d) of this Section.

c. Notice

(1) *Anticipated bypass*. If the Permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass. As of December 21, 2020 all notices submitted in compliance with this Section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 C.F.R. § 127.2(b), in compliance with this Section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit or if required to do so by state law.

(2) *Unanticipated bypass*. The Permittee shall submit notice of an unanticipated bypass as required in paragraph D.1.e. of this part (24-hour notice). As of December 21, 2020 all notices submitted in compliance with this Section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 C.F.R. § 127.2(b), in compliance with this Section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit or required to do so by law.

d. *Prohibition of bypass.*

(1) Bypass is prohibited, and the Director may take enforcement action against a Permittee for bypass, unless:

(a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventative maintenance; and

(c) The Permittee submitted notices as required under paragraph 4.c of this Section.

(2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed above in paragraph 4.d of this Section.

5. <u>Upset</u>

a. *Definition*. *Upset* means an exceptional incident in which there is an unintentional and temporary noncompliance with technology based permit effluent limitations because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. *Effect of an upset.* An upset constitutes an affirmative defense to an action brought for noncompliance with such technology based permit effluent limitations if the requirements of paragraph B.5.c. of this Section are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.

c. *Conditions necessary for a demonstration of upset.* A Permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:

(1) An upset occurred and that the Permittee can identify the cause(s) of the upset;
(2) The permitted facility was at the time being properly operated; and
(3) The Permittee submitted notice of the upset as required in paragraph D.1.e.2.b. (24-hour notice).
(4) The Permittee complied with any remedial measures required under B.3. above.

d. *Burden of proof.* In any enforcement proceeding the Permittee seeking to establish the occurrence of an upset has the burden of proof.

C. MONITORING REQUIREMENTS

1. <u>Monitoring and Records</u>

a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

b. Except for records of monitoring information required by this permit related to the Permittee's sewage sludge use and disposal activities, which shall be retained for a period of at least 5 years (or longer as required by 40 C.F.R. § 503), the Permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. This period may be extended by request of the Director at any time.

c. Records of monitoring information shall include:

(1) The date, exact place, and time of sampling or measurements;
(2) The individual(s) who performed the sampling or measurements;
(3) The date(s) analyses were performed;
(4) The individual(s) who performed the analyses;
(5) The analytical techniques or methods used; and
(6) The results of such analyses.

d. Monitoring must be conducted according to test procedures approved under 40 C.F.R. § 136 unless another method is required under 40 C.F.R. Subchapters N or O.

e. The Clean Water Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment is a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or both.

2. Inspection and Entry

The Permittee shall allow the Director, or an authorized representative (including an authorized contractor acting as a representative of the Administrator), upon presentation of credentials and other documents as may be required by law, to:

a. Enter upon the Permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;

b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and

d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Clean Water Act, any substances or parameters at any location.

D. REPORTING REQUIREMENTS

1. Reporting Requirements

a. *Planned Changes*. The Permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 C.F.R. § 122.29(b); or

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements at 40 C.F.R. § 122.42(a)(1).

(3) The alteration or addition results in a significant change in the Permittee's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan.

b. *Anticipated noncompliance*. The Permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

c. *Transfers*. This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the Permittee and incorporate such other requirements as may be necessary under the Clean Water Act. *See* 40 C.F.R. § 122.61; in some cases, modification or revocation and reissuance is mandatory.

d. *Monitoring reports*. Monitoring results shall be reported at the intervals specified elsewhere in this permit.

(1) Monitoring results must be reported on a Discharge Monitoring Report (DMR) or forms provided or specified by the Director for reporting results of monitoring of sludge use or disposal practices. As of December 21, 2016 all reports and forms submitted in compliance with this Section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 C.F.R. § 127.2(b), in compliance with this Section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to report electronically if specified by a particular permit or if required to do so by State law.

(2) If the Permittee monitors any pollutant more frequently than required by the permit using test procedures approved under 40 C.F.R. § 136, or another method required for an industry-specific waste stream under 40 C.F.R. Subchapters N or O, the results of such monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Director.

(3) Calculations for all limitations which require averaging or measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

e. *Twenty-four hour reporting.*

(1) The Permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Permittee becomes aware of the circumstances. A written report shall also be provided within 5 days of the time the Permittee becomes aware of the circumstances. The written report shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports must include the data described above (with the exception of time of discovery) as well as the type of event (combined sewer overflows, sanitary sewer overflows, or bypass events), type of sewer overflow structure (e.g., manhole, combined sewer overflow outfall), discharge volumes untreated by the treatment works treating domestic sewage, types of human health and environmental impacts of the sewer overflow event, and whether the noncompliance was related to wet weather. As of December 21, 2020 all

reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 C.F.R. § 127.2(b), in compliance with this Section and 40 C.F.R. Part 3 (including, in all cases Subpart D to Part 3), § 122.22, and 40 C.F.R. Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit or if required to do so by state law. The Director may also require Permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section.

(2) The following shall be included as information which must be reported within 24 hours under this paragraph.

(a) Any unanticipated bypass which exceeds any effluent limitation in the permit. *See* 40 C.F.R. § 122.41(g).
(b) Any upset which exceeds any effluent limitation in the permit.
(c) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in the permit to be reported within 24 hours. *See* 40 C.F.R. § 122.44(g).

(3) The Director may waive the written report on a case-by-case basis for reports under paragraph D.1.e. of this Section if the oral report has been received within 24 hours.

f. *Compliance Schedules.* Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.

g. *Other noncompliance.* The Permittee shall report all instances of noncompliance not reported under paragraphs D.1.d., D.1.e., and D.1.f. of this Section, at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph D.1.e. of this Section. For noncompliance events related to combined sewer overflows, sanitary sewer overflows, or bypass events, these reports shall contain the information described in paragraph D.1.e. and the applicable required data in Appendix A to 40 C.F.R. Part 127. As of December 21, 2020 all reports related to combined sewer overflows, sanitary sewer overflows, or bypass events submitted in compliance with this section must be submitted electronically by the Permittee to the Director or initial recipient, as defined in 40 C.F.R. § 127.2(b), in compliance with this Section and 40 C.F.R. Part 3 (including, in all cases, Subpart D to Part 3), §122.22, and 40 C.F.R. Part 127. Part 127 is not intended to undo existing requirements for electronic reporting. Prior to this date, and independent of Part 127, Permittees may be required to electronically submit reports related to combined sewer overflows, sanitary sewer overflows, or bypass events under this section by a particular permit or if required to do so by state law. The Director may also require Permittees to electronically submit reports not related to combined sewer overflows, sanitary sewer overflows, or bypass events under this Section.

h. *Other information.* Where the Permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

i. *Identification of the initial recipient for NPDES electronic reporting data*. The owner, operator, or the duly authorized representative of an NPDES-regulated entity is required to electronically submit the required NPDES information (as specified in Appendix A to 40 C.F.R. Part 127) to the appropriate initial recipient, as determined by EPA, and as defined in 40 C.F.R. § 127.2(b). EPA will identify and publish the list of initial recipients on its Web site and in the FEDERAL REGISTER, by state and by NPDES data group (see 40 C.F.R. § 127.2(c) of this Chapter). EPA will update and maintain this listing.

2. Signatory Requirement

a. All applications, reports, or information submitted to the Director shall be signed and certified. *See* 40 C.F.R. §122.22.

b. The CWA provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.

3. Availability of Reports.

Except for data determined to be confidential under paragraph A.6. above, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the State water pollution control agency and the Director. As required by the CWA, effluent data shall not be considered confidential. Knowingly making any false statements on any such report may result in the imposition of criminal penalties as provided for in Section 309 of the CWA.

E. DEFINITIONS AND ABBREVIATIONS

1. General Definitions

For more definitions related to sludge use and disposal requirements, see EPA Region 1's NPDES Permit Sludge Compliance Guidance document (4 November 1999, modified to add regulatory definitions, April 2018).

Administrator means the Administrator of the United States Environmental Protection Agency, or an authorized representative.

Applicable standards and limitations means all, State, interstate, and federal standards and limitations to which a "discharge," a "sewage sludge use or disposal practice," or a related activity is subject under the CWA, including "effluent limitations," water quality standards, standards of performance, toxic effluent standards or prohibitions, "best management practices," pretreatment standards, and "standards for sewage sludge use or disposal" under Sections 301, 302, 303, 304, 306, 307, 308, 403 and 405 of the CWA.

Application means the EPA standard national forms for applying for a permit, including any additions, revisions, or modifications to the forms; or forms approved by EPA for use in "approved States," including any approved modifications or revisions.

Approved program or *approved State* means a State or interstate program which has been approved or authorized by EPA under Part 123.

Average monthly discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month.

Average weekly discharge limitation means the highest allowable average of "daily discharges" over a calendar week, calculated as the sum of all "daily discharges" measured during a calendar week divided by the number of "daily discharges" measured during that week.

Best Management Practices ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of "waters of the United States." BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Bypass see B.4.a.1 above.

C-NOEC or *"Chronic (Long-term Exposure Test) – No Observed Effect Concentration" means* the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specified time of observation.

Class I sludge management facility is any publicly owned treatment works (POTW), as defined in 40 C.F.R. § 501.2, required to have an approved pretreatment program under 40 C.F.R. § 403.8 (a) (including any POTW located in a State that has elected to assume local program responsibilities pursuant to 40 C.F.R. § 403.10 (e)) and any treatment works treating domestic sewage, as defined in 40 C.F.R. § 122.2, classified as a Class I sludge management facility by the EPA Regional Administrator, or, in the case of approved State programs, the Regional Administrator in conjunction with the State Director, because of the potential for its sewage sludge use or disposal practice to affect public health and the environment adversely.

Contiguous zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone.

Continuous discharge means a "discharge" which occurs without interruption throughout the operating hours of the facility, except for infrequent shutdowns for maintenance, process changes, or similar activities.

CWA means the Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Public Law 92-500, as amended by Public Law 95-217, Public Law 95-576, Public Law 96-483and Public Law 97-117, 33 U.S.C. 1251 *et seq*.

CWA and regulations means the Clean Water Act (CWA) and applicable regulations promulgated thereunder. In the case of an approved State program, it includes State program requirements.

Daily Discharge means the "discharge of a pollutant" measured during a calendar day or any other 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Direct Discharge means the "discharge of a pollutant."

Director means the Regional Administrator or an authorized representative. In the case of a permit also issued under Massachusetts' authority, it also refers to the Director of the Division of Watershed Management, Department of Environmental Protection, Commonwealth of Massachusetts.

Discharge

(a) When used without qualification, *discharge* means the "discharge of a pollutant."

(b) As used in the definitions for "interference" and "pass through," *discharge* means the introduction of pollutants into a POTW from any non-domestic source regulated under Section 307(b), (c) or (d) of the Act.

Discharge Monitoring Report ("DMR") means the EPA uniform national form, including any subsequent additions, revisions, or modifications for the reporting of self-monitoring results by Permittees. DMRs must be used by "approved States" as well as by EPA. EPA will supply DMRs to any approved State upon request. The EPA national forms may be modified to substitute the State Agency name, address, logo, and other similar information, as appropriate, in place of EPA's.

Discharge of a pollutant means:

(a) Any addition of any "pollutant" or combination of pollutants to "waters of the United States" from any "point source," or

(b) Any addition of any pollutant or combination of pollutants to the waters of the "contiguous zone" or the ocean from any point source other than a vessel or other floating craft which is being used as a means of transportation.

This definition includes additions of pollutants into waters of the United States from: surface runoff which is collected or channeled by man; discharges through pipes, sewers, or other conveyances owned by a State, municipality, or other person which do not lead to a treatment works; and discharges through pipes, sewers, or other conveyances, leading into privately owned treatment works. This term does not include an addition of pollutants by any "indirect discharger."

Effluent limitation means any restriction imposed by the Director on quantities, discharge rates, and concentrations of "pollutants" which are "discharged" from "point sources" into "waters of the United States," the waters of the "contiguous zone," or the ocean.

Effluent limitation guidelines means a regulation published by the Administrator under section 304(b) of CWA to adopt or revise "effluent limitations."

Environmental Protection Agency ("EPA") means the United States Environmental Protection

Agency.

Grab Sample means an individual sample collected in a period of less than 15 minutes.

Hazardous substance means any substance designated under 40 C.F.R. Part 116 pursuant to Section 311 of CWA.

Incineration is the combustion of organic matter and inorganic matter in sewage sludge by high temperatures in an enclosed device.

Indirect discharger means a nondomestic discharger introducing "pollutants" to a "publicly owned treatment works."

Interference means a discharge (see definition above) which, alone or in conjunction with a discharge or discharges from other sources, both:

(a) Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

(b) Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resources Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to Subtitle D of the SDWA), the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Landfill means an area of land or an excavation in which wastes are placed for permanent disposal, and that is not a land application unit, surface impoundment, injection well, or waste pile.

Land application is the spraying or spreading of sewage sludge onto the land surface; the injection of sewage sludge below the land surface; or the incorporation of sewage sludge into the soil so that the sewage sludge can either condition the soil or fertilize crops or vegetation grown in the soil.

Land application unit means an area where wastes are applied onto or incorporated into the soil surface (excluding manure spreading operations) for agricultural purposes or for treatment and disposal.

LC_{50} means the concentration of a sample that causes mortality of 50% of the test population at a specific time of observation. The LC_{50} = 100% is defined as a sample of undiluted effluent.

Maximum daily discharge limitation means the highest allowable "daily discharge."

Municipal solid waste landfill (MSWLF) unit means a discrete area of land or an excavation that receives household waste, and that is not a land application unit, surface impoundment, injection well, or waste pile, as those terms are defined under 40 C.F.R. § 257.2. A MSWLF unit also may receive other types of RCRA Subtitle D wastes, such as commercial solid waste, nonhazardous sludge, very small quantity generator waste and industrial solid waste. Such a landfill may be publicly or privately owned. A MSWLF unit may be a new MSWLF unit, an existing MSWLF unit or a lateral expansion. A construction and demolition landfill that receives residential lead-based paint waste and does not receive any other household waste is not a MSWLF unit.

Municipality

(a) When used without qualification *municipality* means a city, town, borough, county, parish, district, association, or other public body created by or under State law and having jurisdiction over disposal of sewage, industrial wastes, or other wastes, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under Section 208 of CWA.

(b) As related to sludge use and disposal, *municipality* means a city, town, borough, county, parish, district, association, or other public body (including an intermunicipal Agency of two or more of the foregoing entities) created by or under State law; an Indian tribe or an authorized Indian tribal organization having jurisdiction over sewage sludge management; or a designated and approved management Agency under Section 208 of the CWA, as amended. The definition includes a special district created under State law, such as a water district, sewer district, sanitary district, utility district, drainage district, or similar entity, or an integrated waste management facility as defined in Section 201 (e) of the CWA, as amended, that has as one of its principal responsibilities the treatment, transport, use or disposal of sewage sludge.

National Pollutant Discharge Elimination System means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program."

New Discharger means any building, structure, facility, or installation:

(a) From which there is or may be a "discharge of pollutants;"

(b) That did not commence the "discharge of pollutants" at a particular "site" prior to August 13, 1979;

(c) Which is not a "new source;" and

(d) Which has never received a finally effective NPDES permit for discharges at that "site."

This definition includes an "indirect discharger" which commences discharging into "waters of the United States" after August 13, 1979. It also includes any existing mobile point source (other than an offshore or coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas exploratory drilling rig or a coastal oil and gas developmental drilling rig) such as a seafood processing rig, seafood processing vessel, or aggregate plant, that begins discharging at a "site" for which it does not have a permit; and any offshore or coastal mobile oil and gas exploratory drilling rig or coastal mobile oil and gas developmental drilling rig that commences the discharge of pollutants after August 13, 1979, at a "site" under EPA's permitting jurisdiction for which it is not covered by an individual or general permit and which is located in an area determined by the Director in the issuance of a final permit to be in an area of biological concern. In determining whether an area is an area of biological concern, the Director shall consider the factors specified in 40 C.F.R. §§ 125.122 (a) (1) through (10).

An offshore or coastal mobile exploratory drilling rig or coastal mobile developmental drilling rig will be considered a “new discharger” only for the duration of its discharge in an area of biological concern.

New source means any building, structure, facility, or installation from which there is or may be a “discharge of pollutants,” the construction of which commenced:

(a) After promulgation of standards of performance under Section 306 of CWA which are applicable to such source, or

(b) After proposal of standards of performance in accordance with Section 306 of CWA which are applicable to such source, but only if the standards are promulgated in accordance with Section 306 within 120 days of their proposal.

NPDES means “National Pollutant Discharge Elimination System.”

Owner or operator means the owner or operator of any “facility or activity” subject to regulation under the NPDES programs.

Pass through means a Discharge (see definition above) which exits the POTW into waters of the United States in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW’s NPDES permit (including an increase in the magnitude or duration of a violation).

Pathogenic organisms are disease-causing organisms. These include, but are not limited to, certain bacteria, protozoa, viruses, and viable helminth ova.

Permit means an authorization, license, or equivalent control document issued by EPA or an “approved State” to implement the requirements of Parts 122, 123, and 124. “Permit” includes an NPDES “general permit” (40 C.F.R § 122.28). “Permit” does not include any permit which has not yet been the subject of final agency action, such as a “draft permit” or “proposed permit.”

Person means an individual, association, partnership, corporation, municipality, State or Federal agency, or an agent or employee thereof.

Person who prepares sewage sludge is either the person who generates sewage sludge during the treatment of domestic sewage in a treatment works or the person who derives a material from sewage sludge.

pH means the logarithm of the reciprocal of the hydrogen ion concentration measured at 25° Centigrade or measured at another temperature and then converted to an equivalent value at 25° Centigrade.

Point Source means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff (see 40 C.F.R. § 122.3).

Pollutant means dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. 2011 *et seq*.)), heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water. It does not mean:

(a) Sewage from vessels; or

(b) Water, gas, or other material which is injected into a well to facilitate production of oil or gas, or water derived in association with oil and gas production and disposed of in a well, if the well is used either to facilitate production or for disposal purposes is approved by the authority of the State in which the well is located, and if the State determines that the injection or disposal will not result in the degradation of ground or surface water resources.

Primary industry category means any industry category listed in the NRDC settlement agreement (*Natural Resources Defense Council et al. v. Train*, 8 E.R.C. 2120 (D.D.C. 1976), *modified* 12 E.R.C. 1833 (D.D.C. 1979)); also listed in Appendix A of 40 C.F.R. Part 122.

Privately owned treatment works means any device or system which is (a) used to treat wastes from any facility whose operator is not the operator of the treatment works and (b) not a "POTW."

Process wastewater means any water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, byproduct, or waste product.

Publicly owned treatment works (POTW) means a treatment works as defined by Section 212 of the Act, which is owned by a State or municipality (as defined by Section 504(4) of the Act). This definition includes any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage or industrial wastes of a liquid nature. It also includes sewers, pipes and other conveyances only if they convey wastewater to a POTW Treatment Plant. The term also means the municipality as defined in Section 502(4) of the Act, which has jurisdiction over the indirect discharges to and the discharges from such a treatment works.

Regional Administrator means the Regional Administrator, EPA, Region I, Boston, Massachusetts.

Secondary industry category means any industry which is not a "primary industry category."

Septage means the liquid and solid material pumped from a septic tank, cesspool, or similar domestic sewage treatment system, or a holding tank when the system is cleaned or maintained.

Sewage Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal waste water or domestic sewage. Sewage sludge includes, but is not limited to, solids removed during primary, secondary, or advanced waste water treatment, scum, septage, portable toilet pumpings, type III marine sanitation device pumpings (33 C.F.R. Part 159), and sewage sludge products. Sewage sludge does not include grit or screenings, or ash generated during the incineration of sewage sludge.

Sewage sludge incinerator is an enclosed device in which only sewage sludge and auxiliary fuel are fired.

Sewage sludge unit is land on which only sewage sludge is placed for final disposal. This does not include land on which sewage sludge is either stored or treated. Land does not include waters of the United States, as defined in 40 C.F.R. § 122.2.

Sewage sludge use or disposal practice means the collection, storage, treatment, transportation, processing, monitoring, use, or disposal of sewage sludge.

Significant materials includes, but is not limited to: raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substance designated under Section 101(14) of CERCLA; any chemical the facility is required to report pursuant to Section 313 of title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag and sludge that have the potential to be released with storm water discharges.

Significant spills includes, but is not limited to, releases of oil or hazardous substances in excess of reportable quantities under Section 311 of the CWA (see 40 C.F.R. §§ 110.10 and 117.21) or Section 102 of CERCLA (*see* 40 C.F.R. § 302.4).

Sludge-only facility means any "treatment works treating domestic sewage" whose methods of sewage sludge use or disposal are subject to regulations promulgated pursuant to section 405(d) of the CWA, and is required to obtain a permit under 40 C.F.R. § 122.1(b)(2).

State means any of the 50 States, the District of Columbia, Guam, the Commonwealth of Puerto Rico, the Virgin Islands, American Samoa, the Commonwealth of the Northern Mariana Islands, the Trust Territory of the Pacific Islands, or an Indian Tribe as defined in the regulations which meets the requirements of 40 C.F.R. § 123.31.

Store or storage of sewage sludge is the placement of sewage sludge on land on which the sewage sludge remains for two years or less. This does not include the placement of sewage sludge on land for treatment.

Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage.

Storm water discharge associated with industrial activity means the discharge from any conveyance that is used for collecting and conveying storm water and that is directly related to manufacturing, processing, or raw materials storage areas at an industrial plant.

Surface disposal site is an area of land that contains one or more active sewage sludge units.

Toxic pollutant means any pollutant listed as toxic under Section 307(a)(1) or, in the case of "sludge use or disposal practices," any pollutant identified in regulations implementing Section 405(d) of the CWA.

Treatment works treating domestic sewage means a POTW or any other sewage sludge or waste water treatment devices or systems, regardless of ownership (including federal facilities), used in the storage, treatment, recycling, and reclamation of municipal or domestic sewage, including land dedicated for the disposal of sewage sludge. This definition does not include septic tanks or similar devices.

For purposes of this definition, "domestic sewage" includes waste and waste water from humans or household operations that are discharged to or otherwise enter a treatment works. In States where there is no approved State sludge management program under Section 405(f) of the CWA, the Director may designate any person subject to the standards for sewage sludge use and disposal in 40 C.F.R. Part 503 as a "treatment works treating domestic sewage," where he or she finds that there is a potential for adverse effects on public health and the environment from poor sludge quality or poor sludge handling, use or disposal practices, or where he or she finds that such designation is necessary to ensure that such person is in compliance with 40 C.F.R. Part 503.

Upset see B.5.a. above.

Vector attraction is the characteristic of sewage sludge that attracts rodents, flies, mosquitoes, or other organisms capable of transporting infectious agents.

Waste pile or *pile* means any non-containerized accumulation of solid, non-flowing waste that is used for treatment or storage.

Waters of the United States or waters of the U.S. means:

(a) All waters which are currently used, were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;

(b) All interstate waters, including interstate "wetlands;"

(c) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, "wetlands", sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds the use, degradation, or destruction of which would affect or could affect interstate or foreign commerce including any such waters:

  (1) Which are or could be used by interstate or foreign travelers for recreational or other purpose;

  (2) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or

  (3) Which are used or could be used for industrial purposes by industries in interstate commerce;

(d) All impoundments of waters otherwise defined as waters of the United States under this definition;

(e) Tributaries of waters identified in paragraphs (a) through (d) of this definition;

(f) The territorial sea; and

(g) "Wetlands" adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) through (f) of this definition.

Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 C.F.R. § 423.11(m) which also meet the criteria of this definition) are not waters of the United States. This exclusion applies only to manmade bodies of water which neither were originally created in waters of the United States (such as disposal area in wetlands) nor resulted from the impoundment of waters of the United States. Waters of the United States do not include prior converted cropland.

Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

Wetlands means those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Whole Effluent Toxicity (WET) means the aggregate toxic effect of an effluent measured directly by a toxicity test.

*Zone of Initial Dilution (*ZID) means the region of initial mixing surrounding or adjacent to the end of the outfall pipe or diffuser ports, provided that the ZID may not be larger than allowed by mixing zone restrictions in applicable water quality standards.

2. Commonly Used Abbreviations

BOD	Five-day biochemical oxygen demand unless otherwise specified
CBOD	Carbonaceous BOD
CFS	Cubic feet per second
COD	Chemical oxygen demand
Chlorine	
Cl_2	Total residual chlorine
TRC	Total residual chlorine which is a combination of free available chlorine (FAC, see below) and combined chlorine (chloramines, etc.)
TRO	Total residual chlorine in marine waters where halogen compounds are present
FAC	Free available chlorine (aqueous molecular chlorine, hypochlorous acid, and hypochlorite ion)
Coliform	
Coliform, Fecal	Total fecal coliform bacteria
Coliform, Total	Total coliform bacteria
Cont.	Continuous recording of the parameter being monitored, i.e. flow, temperature, pH, etc.
Cu. M/day or M^3/day	Cubic meters per day
DO	Dissolved oxygen

kg/day	Kilograms per day
lbs/day	Pounds per day
mg/L	Milligram(s) per liter
mL/L	Milliliters per liter
MGD	Million gallons per day
Nitrogen	
Total N	Total nitrogen
NH_3-N	Ammonia nitrogen as nitrogen
NO_3-N	Nitrate as nitrogen
NO_2-N	Nitrite as nitrogen
NO_3-NO_2	Combined nitrate and nitrite nitrogen as nitrogen
TKN	Total Kjeldahl nitrogen as nitrogen
Oil & Grease	Freon extractable material
PCB	Polychlorinated biphenyl
Surfactant	Surface-active agent
Temp. °C	Temperature in degrees Centigrade
Temp. °F	Temperature in degrees Fahrenheit
TOC	Total organic carbon
Total P	Total phosphorus
TSS or NFR	Total suspended solids or total nonfilterable residue
Turb. or Turbidity	Turbidity measured by the Nephelometric Method (NTU)
µg/L	Microgram(s) per liter
WET	"Whole effluent toxicity"
ZID	Zone of Initial Dilution

RESPONSE TO COMMENTS
NPDES PERMIT NO. MA0100919
SPENCER WASTEWATER TREATMENT PLANT
SPENCER, MASSACHUSETTS

From February 26, 2018 through March 28, 2018, the U.S. Environmental Protection Agency Region 1 (EPA New England[1]) and the Massachusetts Department of Environmental Protection (MassDEP) (collectively, the "agencies") solicited public comments on the draft National Pollutant Discharge Elimination System (NPDES) permit to be reissued to the Spencer Wastewater Treatment Plant (WWTP) in Spencer, MA.

EPA New England and MassDEP received written comments from the following parties:

- Wright-Pierce on behalf of the Town of Spencer, Massachusetts,
- Connecticut Department of Energy and Environmental Protection (CT DEEP),
- James P. Vander Salm on behalf of Quaboag Quacumquasit Lake Association (QQLA),
- Chicopee 4Rivers Watershed Council (C4R),
- Connecticut River Conservancy (CRC),
- Connecticut Fund for the Environment (CFE),
- The Town of Sturbridge, Massachusetts,
- Carl D. Nielsen,
- Lynn Eckhert,
- Bob Shields,
- Leland Moulton,
- Jeff Clark,
- William Bonney,
- Doris Smith,
- Sandra and Martin Bannish,
- Stephen Marshall,
- Donald Taft,
- Carl F. Nielsen,
- Carol Neill,
- Ed Perlak,

[1] EPA New England is also referred to in the text as "EPA."

- Louis Fazen,
- Howard Ser,
- Constance Montross,
- Bill Seabourne,
- Doug Vizard
- John Vacon,
- Meg Noyes,
- Sheila Goodwin,
- Marita Tasse,
- Randy Weiss, and
- Curtis Fazen.

EPA also held a public hearing in the Town of Spencer on March 26, 2018 during which the following persons presented oral comments: Kevin Olson, Meg Noyes, Carl D. Nielsen, James Vander Salm, Randy Weiss, and Larry Dufault.

The following are responses by the agencies to those comments and descriptions of any changes made to the public-noticed permit because of those comments.

Although the agencies' knowledge of the facility has benefited from the various comments and additional information submitted, the information and arguments presented did not raise any substantial new questions concerning the permit that warranted the agencies exercising discretion to reopen the public comment period. The agencies do, however, make certain clarifications in response to comments. These improvements and changes are explained in this document and reflected in the Final Permit. Below, the agencies provide a summary of the changes made in the Final Permit. The analyses underlying these changes are contained in the responses to individual comments that follow.

A copy of the Final Permit and this response to comments document will be posted on the EPA Region 1 web site: http://www.epa.gov/region1/npdes/permits_listing_ma.html.

A copy of the Final Permit may also be obtained by writing or calling Robin Johnson, United States Environmental Protection Agency, 5 Post Office Square, Suite 100 (Mail Code: OEP06-1), Boston, Massachusetts 02109-3912; Telephone (617) 918-1045.

Table of Contents

I. Changes to the Permit

A. COVER PAGE

- Because the agencies received comments, they removed the following language: "* Pursuant to 40 CFR 124.15(b)(3), if no comments requesting a change to the draft permit are received, the permit will become effective upon the date of signature."

- The agencies changed the title for Lealdon Langley from "Director, Massachusetts Wastewater Management Program" to "Director, Division of Watershed Management."

B. PART I.A.

- In Part I.A.1., the agencies changed the beginning of the warm season phosphorus limits from May 1 to April 1. Accordingly, the end date for the cold season phosphorus limit changed from April 30 to March 31 (see Response C2).
- In Part I.A.1., the agencies added the footnote "4", which pertains to calculating monthly and weekly averages, to the Average Weekly column head on page 2.
- In Part I.A.1., the agencies modified Footnotes 2 and 3 with updated standard language regarding sufficiently sensitive methods.

C. PART I.B.

- In Part I.B.2.a., the agencies added clarifying language that the interim phosphorus load limits are based on the flow rate through Outfall 001 (see Response A4).
- In Part I.B.2.b., the agencies changed the deadline from December 31, 2018, to December 31, 2019 (see Response A8).
- In Part I.B.2.c., the agencies changed the deadline from July 31, 2020, to July 31, 2021 (see Response A9).
- In Part I.B.2.d., the agencies changed the deadline from May 1, 2021, to June 30, 2022 (see Response A10).
- In Part I.B.2.f., the agencies added requirements that the Annual Compliance Schedule Report a) describe activities taken during the previous year directed at achieving compliance with the final total phosphorus limits, b) identify related plans and deliverables, c) describe planned activities for the next year, d) identify potential areas of non-compliance, and e) describe plans for the wetland beds (see Response C5).

- In Part I.B.2.g., the agencies added a requirement that the Town post the Annual Compliance Schedule Report on the Town website (see Response C5).

D. PART I.H.

- Under Part I.H.2., Submittal of Reports as NetDMR Attachments, the agencies deleted the following text: "permittees shall continue to send hard copies of reports other than DMRs to MassDEP until further noticed from MassDEP" (see Response A13).

- Under Part I.H.7., State Reporting, the agencies changed the instructions for submitting hard copy reports to MassDEP to state that only Whole Effluent Toxicity Test reports shall be submitted to MassDEP in hard copy (see Response A13).

II. Written Comments

A. COMMENTS SUBMITTED MARCH 27, 2018 BY WRIGHT-PIERCE ON BEHALF OF THE TOWN OF SPENCER

Comment A1: Outfall Location

Part 1 cover page – Outfall location is Cranberry River, not the Seven Mile River. As discussed in previous meetings with EPA and DEP, the Town would prefer to change the outfall location to the Seven Mile River in the future upgrade. Will changing the outfall as part of the future upgrade require a new permit?

Response A1

Like the Draft Permit, the Final Permit authorizes discharge to the Cranberry River. A change in outfall location to a different receiving water could require a modification or, if requested after the five-year permit term has run, a re-issued permit. In either case, the public participation requirements of 40 CFR § 124 would apply. In addition, differences between the two receiving waters—for instance, in ambient pollutant concentrations and available dilution—could lead to new or revised permit limits, conditions, or both.

Comment A2: Outfall Relocation

b. Draft Permit – The 7-day, 10-year low flow (7Q10) in the draft permit is based on a Seven Mile River gage upstream of the WWTP that has a drainage area of 8.81 sq. mi. The Cranberry River drainage area (6.52 sq. mi.) is used for dilution/loading calculations, where the Spencer WWTP outfall is located. Would changing the outfall location to the Seven Mile River in the future upgrade change the permit limits based on a new dilution factor?

Response A2

In the Draft Permit, EPA estimated the 7Q10 for the Cranberry River upstream of the WWTP outfall using a flow factor derived from data for a gage on the Sevenmile River upstream of its confluence with the Cranberry River, for the reasons given in the Fact Sheet. Relocating the outfall to the Sevenmile River could affect three effluent limitations in the permit that are based on dilution factors, which are copper, winter ammonia, and whole effluent toxicity. A changed dilution factor would not, however, affect other effluent limits that are based on Total Maximum Daily Loads (TMDLs), (nitrogen and phosphorus), secondary treatment standards (BOD_5 and TSS), or that do not account for dilution (pH, E. coli, dissolved oxygen).

Below, EPA calculates a revised dilution factor for those pollutants whose limits are based on dilution, using data for the same period as the 7Q10 calculation in the Fact Sheet for the Cranberry River.

7Q10 at USGS 01175670 - Sevenmile River near Spencer, MA 10/10/1986 – 10/10/2016 (30 years) = 0.165 cubic feet per second (cfs)

Drainage Area = 8.81 square miles

Flow factor for USGS 01175670 = 0.165 cfs / 8.81 square miles = 0.0187 cfs/sq. mi.

Drainage Area at Presumed Relocated Outfall = 31.5 square miles

Using a low-flow factor of 0.0187 cfs per square mile yields a receiving water 7Q10 flow of about 0.59 cfs.

7Q10 upstream of Spencer WWTP Outfall = 0.0187 cfs/sq. mi x 31.5 sq. mi. = 0.59 cfs

Spencer WWTP design flow = 1.08 MGD x 1.55 cfs/MGD = 1.67 cfs

Dilution Factor = (Facility Flow + 7Q10)/Facility Flow

Dilution Factor = (1.67 cfs + 0.59 cfs)/1.67 cfs = 1.35

The 7Q10 (0.59 cfs) in the Sevenmile River near the Spencer WWTP for this period is higher than the Cranberry River (0.122 cfs). *See* FS at 13-14. Consequently, the Spencer WWTP discharge's contribution to flow in the Sevenmile River during the 7Q10 would be lower than to the Cranberry. In both cases, however, the Spencer WWTP would still contribute a sizeable proportion of the flow in the respective waterbody during the 7Q10. These facts, taken together, but without more, suggest that limits for copper, winter ammonia, and whole effluent toxicity *might* be less stringent, though likely only slightly less stringent. It is important to note, however, that EPA has no data for upstream pollutant concentrations in the Sevenmile, which are important in calculating reasonable potential and resultant water quality-based effluent limits. Thus, it really is difficult to determine whether, and by how much, the limits would differ.

Comment A3: BOD or CBOD Limit
Part 1 A.1 - BOD limit – Has EPA considered changing to a CBOD limit?

Response A3
The effluent limits for 5-day biochemical oxygen demand (BOD_5) in the Draft Permit are based on a 1981 Chicopee River Basin Water Quality Management Plan prepared by the Massachusetts Department of Environmental Quality Engineering. The purpose of BOD_5 and $CBOD_5$ limits is to prevent oxygen depletion in the aquatic environment due to discharges of wastewater effluent.

Secondary treatment requirements are based on reducing oxygen demand due to the carbonaceous component of the organic material in the effluent. In 1984, EPA introduced the $CBOD_5$ (five-day carbonaceous biochemical oxygen demand) as an alternative to BOD_5. At the time, some newer secondary treatment facilities were experiencing higher than expected BOD_5 results due to the presence of ammonia and nitrifying bacteria in the discharge, causing nitrogenous oxygen demand (NOD). Some operators were manipulating secondary treatment to eliminate the influence of NOD to meet secondary treatment requirements in a way that improved compliance with BOD_5 limits but led to poorer effluent quality (49 FR 36988, September 20, 1984).

Thus far, EPA has received no data from the permittee suggesting that a $CBOD_5$ limit would be a more appropriate technology-based limit for the Spencer WWTP. Spencer WWTP has violated the BOD_5 limits only three times between 2011 and 2016. Two of the violations were in April 2014 and one was in September 2015. There does not appear to be a pattern of noncompliance with the BOD_5 limits in the 2007 permit or any other information available to recommend a change to a $CBOD_5$ limit.

The permittee, if it wishes, may collect data showing that $CBOD_5$ would be a more representative measure of the oxygen demand related to organic matter in the Spencer WWTP effluent than BOD_5. If the permittee submits that information with an application for a permit modification or with their application for permit reissuance, then EPA will consider changing the technology-based limits from BOD_5 to $CBOD_5$.

There is no change to the Final Permit because of this comment.

Comment A4: Mass-based Phosphorus Limits
Part 1 A.1 – Total Phosphorous – To stay consistent with the other permit limits listed within the draft Spencer permit, EPA should use the 1.08 MGD design flow in the mass loading calculations for total phosphorous. Using the 0.1 mg/L and 0.2 mg/L concentration limits (for the different seasons) at the 1.08 MGD design flow results in mass loading limits for total phosphorous of 0.90 lbs./day and 1.80 lbs./day, respectively. The permit limits for total phosphorous mass loadings should be changed to the numbers shown above (0.90 lbs./day and 1.80 lbs./day, respectively).

Response A4
The phosphorus limits in the NPDES permit must be consistent with the assumptions and requirements of any available wasteload allocation for the discharge in an applicable TMDL. *See* 40 CFR § 122.44(d)(1)(vii)(B). The TMDL of Total Phosphorus for Quaboag and Quacumquasit Ponds (QQ TMDL) sets wasteload allocations for total phosphorus from the Spencer WWTP Outfall 001 of 0.79 lb/day from May through October and 1.19 lb/day from November through April. Fact Sheet ("FS") at 23-24; *see also* QQ TMDL at 42, Table 10. The mass loading limits requested in the comment are higher than the wasteload allocations for the Spencer WWTP established in the QQ TMDL and are thus inconsistent with 40 CFR § 122.44(d)(1)(vii)(B).

While the agencies therefore decline to make the change to the final limits requested in the comment, we take the opportunity here to clarify the interim limits. As explained in the Fact Sheet, the Final Permit establishes concentration-based and mass-based limits for phosphorus that are more stringent than the corresponding limits in the 2007 permit. FS at 24-25. The agencies determined that the facility cannot immediately comply with the more stringent phosphorus limits and will have to undergo an upgrade to remove enough phosphorus to meet them. FS at 25. For this reason, the Draft Permit proposed a compliance schedule, which established a deadline of December 31, 2024, for meeting the phosphorus limits. Draft Permit Part I.B.2.e; FS at 25. The agencies have not changed this deadline in the Final Permit. *See* Part I.B.2.e.

The Draft Permit also proposed interim limits applicable before December 31, 2024, that are numerically identical to the limits for total phosphorus in the 2007 permit. Draft Permit Part I.B.2.a.; FS at 24. While we received no comments substantively addressing these interim limits, the agencies noticed, while considering Comment A4, that Part I.B.2.a. does not specify the method for calculating compliance with the mass-based interim limits and that there could potentially be confusion once these interim limits became applicable. To avoid confusion (and because the permittee cannot immediately comply with the more stringent limits in the Final Permit), the agencies have amended Part I.B.2.a. to clarify that compliance with the mass-based interim limits for total phosphorus are to be calculated using the plant's effluent flow rate. In other words, the interim limits for phosphorus in the Final Permit are equivalent to the phosphorus limits in the 2007 permit.

Comment A5: Sample Locations
Part 1 A.1, Table Footnote and Footnote 1 - Table footnote on page 2 through 4 declares effluent sample location to be the outfall, whereas the footnote 1 on page 5 says samples should be taken at a location that yields data representative of the discharge. Currently the composite sample is taken at the UV tank and grab samples are taken at the outfall.

Response A5
If the permittee uses sampling locations that provide representative samples of the discharge for the parameter of interest, they are in compliance with the permit.

Comment A6: Calculation of Total Nitrogen Benchmark
Special Conditions, Part B.1 – Total Nitrogen - Request Total Nitrogen load calculations to be based on 12-month rolling average of 0.77 MGD and the average TN concentration from WWTP data (2011-2016) of 14.3 mg/L. New mass load would be 0.77 MGD x 14.30 mg/L x 8.34 = 91.8 lbs/day instead of the 86.2 lbs/day in the permit.

Response A6
Although the updated baseline nitrogen load was increased to include the total wastewater flow through the WWTP, the updated baseline is still reflective of the 2004-2005 nitrogen loading.

To calculate the updated baseline load, EPA used the reported 2004-2005 influent total nitrogen concentration from the Spencer WWTP. *See also* Response B3.

Comment A7: Request for AO
Special Conditions, Part B.2 – Total Phosphorous – The Town requests consideration for the compliance schedule to be removed from the NPDES permit and instead negotiate a separate Administrative Order (AO) with EPA to establish the compliance requirements.

Response A7
EPA has the discretion to include compliance schedules in NPDES permits, *see* 40 CFR § 122.47(a), and included a schedule for compliance with the concentration-based effluent limits for total phosphorus in the Draft Permit for the Spencer WWTP, *see* Draft Permit Part I.B.2., as EPA has done in many other recent Draft Permits issued for publicly owned treatment works (POTWs) in Massachusetts, *see, e.g.*, MWRA-Clinton WWTP, Brockton AWRF, Adams WWTP. The comment does not provide a rationale for its request to break with EPA's practice in this case and remove the schedule from the Final Permit. Including the compliance schedule in the permit rather than in a separate administrative order is reasonable and makes sense from the standpoint of administrative efficiency. The public has had an opportunity to comment on the permit, inclusive of a compliance schedule. Considering this and the level of public interest in the WWTP upgrade schedule, EPA has decided to retain the compliance schedule in the permit, with some minor changes, *see* Responses A8, A9, and C9).

Comment A8: Schedule
Special Conditions, Part B.2.b – Total Phosphorous – Requires Town to submit a conceptual design report for phosphorous removal upgrade by 12/31/18. This schedule is not reasonable nor achievable by the Town. The Town requests this requirement be moved to at least December 31, 2019. This allows the Town to appropriate funds for the design of the upgrade at the 2019 Annual Town Meeting (first Thursday in May).

Response A8
Because the Town needs to wait until the 2019 Town Meeting to approve funding for the upgrade design, the agencies have moved the interim requirement for a conceptual design report to December 31, 2019.

Comment A9: Design Plan Deadline
Special Conditions, Part B.2.c – Total Phosphorous – Requires Town to submit complete design plans and specifications for phosphorous removal upgrade by July 31, 2020. This schedule may not be achievable by the Town. The Town requests this schedule requirement be moved to at least Spring of 2021. This allows the Town to appropriate construction funds for the upgrade at the Annual Town Meeting in May 2021 and apply for SRF loan funding by October 15, 2021.

> **Response A9**
> The agencies have moved the interim requirement for submitting complete design plans to July 31, 2021. This will give the Town enough time to evaluate design alternatives and complete design of the chosen phosphorus removal alternative.

Comment A10: Construction Deadline
Special Conditions, Part B.2.d – Total Phosphorous – Requires Town to start construction for phosphorous removal upgrade by May 1, 2021. This schedule may not be achievable by the Town. The Town requests this requirement be moved to the end of June 2022. This is also the deadline required by projects funded through the SRF loan program.

> **Response A10**
> The agencies have moved the interim requirement to start construction to June 30, 2022. Given that the deadline for submitting complete design documents has been moved to July 31, 2021, it is reasonable to allow about a year for bidding and contractor selection before construction begins. Moreover, this change and those noted in Responses A8 and A9 relate to the timing for interim requirements only. They do not change the deadline for compliance with the final effluent limits for total phosphorus, which remains December 31, 2024.

Comment A11: Compliance Deadline
Special Conditions, Part B.2.e – Total Phosphorous – Requires Town to attain compliance for phosphorous limits by December 31, 2024. This date may be attainable for the Town, but it is dependent on many variables, including Town votes for fund appropriation, SRF acceptance, design and permitting, and bidding/construction schedules for contractors.

> **Response A11**
> The comment is noted for the record.

Comment A12: Alternate Power Source
Alternate Power Source, Part E - What does the Town have to provide for this section? Clarification regarding this item is requested. The WWTP currently has two backup power generators. Critical process equipment is powered by one generator and the blowers are powered by the second generator.

> **Response A12**
> This requirement is intended to ensure that the WWTP can continue to operate and comply with permit limits and conditions in the event of a power outage. From the comment, it appears that the Spencer WWTP is meeting the requirement.

Additional information regarding alternate power sources can be found in the Power Resilience Guide for Water and Wastewater Utilities (EPA 800-R-15-004). This guide is available for download at https://www.epa.gov/sites/production/files/2016-03/documents/160212-powerresilienceguide508.pdf

More generally, EPA provides information on resilience for water utilities at https://www.epa.gov/waterresilience.

Comment A13: E-filing to MassDEP
Monitoring and Reporting, Part H.2 - Hardcopy annual reports to DEP are required. The Town requests they be able to e-file to DEP for reports as they currently do for DMRs. Remove the hardcopy requirements.

Response A13
The comment is correct that MassDEP now accepts electronic reports. The hard copy requirement has been removed from the permit for everything except WET test reports.

B. COMMENTS SUBMITTED MARCH 21, 2018 BY THE CONNECTICUT DEPARTMENT OF ENERGY AND ENVIRONMENTAL PROTECTION

Comment B1: LIS TMDL History
The Connecticut Department of Energy and Environmental Protection (CTDEEP) is providing comment on the draft NPDES permit for the Spencer Wastewater Treatment Plant (WWTP) discharge. The draft permit authorizes discharges of treated wastewater to Cranberry River, a tributary of the Sevenmile and Connecticut Rivers, which subsequently flows through Connecticut to Long Island sound (LIS).

As a downstream state, Connecticut has a keen interest in sources of pollutants that can impact both the Connecticut River and LIS. LIS is affected by hypoxic conditions, which occur naturally in the summer. Hypoxia in LIS has been well documented to result from excessive amounts of nitrogen. Discharges from WWTPs contribute to the nitrogen loading to LIS.

In response to hypoxic conditions in LIS, Connecticut and New York jointly developed a Total Maximum Daily Load (TMDL) for nitrogen. This TMDL was approved by the Federal Environmental Protection Agency (EPA) in April, 2001. Please update the permit fact sheet to more accurately reflect this information relative to the LIS TMDL, as page 20 of the fact sheet suggests that only CT DEP completed the TMDL.

Response B1
EPA acknowledges the clarification that the Total Maximum Daily Load to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound ("2000 TMDL") was a collaboration among Connecticut, New York, and EPA. Since the agencies generally do not modify the Fact Sheet upon issuance of the Final Permit, this Response to Comments document serves as clarification for the administrative record.

Comment B2: TMDL Baseline Load Was Too High
In addition to a number of the nitrogen reduction efforts required of Connecticut and New York, the TMDL specifies a 25% reduction in the estimated baseline nitrogen load from states upstream of Connecticut (MA, NH, and VT). Because the baseline load was determined using an average discharge concentration (15 mg/L) and design flows (monitoring data was not available at that time), the baseline load was grossly overestimated. As a result, Massachusetts met the 25% reduction in 2005, however, little if any actual nitrogen removal efforts were implemented. We would like to point out that EPA does not allow such "credits" regarding nitrogen load reductions to LIS where Connecticut and New York are concerned.

Response B2
As noted in the comment, and as explained in the Fact Sheet, the 2000 TMDL estimated an aggregate baseline loading of nitrogen from all wastewater treatment plants in Massachusetts, New Hampshire, and Vermont (so-called out-of-basin sources) to the Connecticut River watershed. FS at 20-21. The 2000 TMDL then allocated a 25 percent reduction from this estimated loading. FS at 21. It also allocated a 58.5% nitrogen reduction to in-basin sources (with a 10% reduction allocated to nonpoint sources and the remainder assigned to point sources) and identified actions and schedules to reduce nitrogen from out-of-basin nonpoint sources (a 10% reduction) and atmospheric sources (an 18% reduction). *See* 2000 TMDL at 26. As also referenced in the comment and explained in the Fact Sheet, a review of 2004-2005 DMR data for out-of-basin sources indicated an approximately 36% reduction from the 2000 TMDL estimate. FS at 21. In other words, the 2000 TMDL estimated a baseline load based on the available information and set a WLA that required an aggregate percent reduction that the later review determined was being met. In contrast, in-basin sources in Connecticut and New York were assigned individual WLAs in the TMDL, which were expressed as mass loadings, not as percent reductions. *See* 2000 TMDL, App. C. Although it is not clear to EPA what is meant by the comment that "EPA does not allow such 'credits' regarding nitrogen load reductions to LIS where Connecticut and New York are concerned," EPA highlights these differences in the WLAs, which, again, set specific individual mass loadings for each in-basin source versus an aggregate percent reduction from all out-of-basin sources.

Nonetheless, EPA agrees that, despite the progress that has been made, EPA and the states need to continue to identify and implement programs and policies to address the adverse impacts in LIS caused by nitrogen loading and to attain water quality standards. In this permit (and considering the 36% reduction from the baseline estimate), EPA has concluded that setting a benchmark for this out-of-basin treatment facility and establishing a requirement to evaluate optimization sufficient to ensure that the aggregate 25% reduction is maintained or increased are consistent with implementing the 2000 TMDL. Furthermore, EPA recognizes that it will need to continue to assess nitrogen impacts in LIS from all sources through the Long Island Sound Nitrogen Strategy, which will include establishing thresholds for Western Long Island Sound and several coastal embayments, including the mouth of the Connecticut River. Upon completion of establishing thresholds, areas where nitrogen watershed loading results in exceedances of thresholds will be identified, and allocations of total nitrogen loadings will be made if further reductions are necessary. EPA will use the technical information developed through the Long Island Sound Nitrogen Strategy to inform its permitting activities in the upstream states where it issues permits. If further reductions are identified as necessary for the Spencer discharge, a water quality-based limit will be added in a future permit action.

Comment B3: Spencer Benchmark Is Higher Than Current Load

EPA has decided to allow a greater cap than the baseline due to the "fact" that attenuation of nitrogen through the wetland was not considered when the baseline was determined. EPA reviewed influent and effluent nitrogen data through the onsite wetland system in order to justify a new larger nitrogen discharge of 86.2 pounds per day. However, EPA used an average concentration of 13.6 mg/L. It is common to use an average estimate where data does not exist, however, the fact sheet states that data for the spencer WWTP was collected and in fact, reviewed by EPA for the 2011-2016 time frame. This data is included in [Fact Sheet] Appendix A of the supporting information. Based on five years of data, the spencer wastewater treatment plant actually discharges an average nitrogen load of 26.73 pounds/day. This is less than the original (2004-2005) baseline cap of 63.5 pounds/day, CTDEEP questions why EPA is proposing to allow a much greater nitrogen load than the permittee can maintain based on actual data.

We would also like to remind EPA of its Enhanced Implementation Plan (EIP). Allow[ing] a nitrogen discharge greater than the baseline cap from the Spencer WWTP violates this EIP. In 2011, the five watershed states (CT, NH, MA, NH, VT) and EPA agreed upon an EIP. The plan requires EPA and the tributary states to implement a tributary state wastewater treatment plant (WWTP) permitting strategy with a goal of essentially capping existing WWTP total nitrogen loads at or near existing levels until agreement is reached on final allocations and how they will be achieved.

Response B3

Pointing to Appendix A from the Fact Sheet, the comment asserts that the agencies should have set the nitrogen benchmark for the Spencer WWTP at 26.73 lbs/day, based on 2011-2016 data. By comparison, EPA previously calculated the 2004-2005 baseline to be 63.5 lbs/day and corrected it in the Draft Permit to 86.2 lbs/day. According to the commenter, both the previously calculated baseline and the corrected baseline are too high because they are much greater than the facility's current load, which violates the Enhanced Implementation Plan ("EIP").

First, the 2011-2016 nitrogen mass load of 26.73 lbs/day in Fact Sheet Appendix A was calculated based on effluent flow rate. Thus, it is not representative of the full load from the Spencer WWTP, as explained in the Fact Sheet (and below). Second, effluent flow at the facility was lower in 2011-2016 than it was in 2004-2005, while influent flow stayed roughly the same. The average daily effluent flow from 2003-2005 was 0.55 MGD, while the same figure is 0.28 MGD for the years 2011–2016. In contrast, influent flow remained steady, at around 0.75 MGD. Thus, the current total load from the facility is not 26.73 lbs/day.

The comment also states that EPA based the corrected 2004-2005 baseline for the Spencer WWTP on attenuation of nitrogen, which is incorrect. As stated in the Fact Sheet, the 2004-2005 estimated loading for the Spencer WWTP did not account for nitrogen loading from the facility that likely enters the Cranberry River via the facility's wetland beds. FS at 21-22. In other words, the facility's nitrogen contribution to the river in 2004-2005 was likely much higher than 63.5 lbs/day, meaning that the 2004-2005 baseline was incorrect. The Fact Sheet included no statement or assumption as to whether any nitrogen lost in the wetland beds is attenuated before entering the Cranberry River. EPA corrected the 2004-2005 baseline nitrogen load for the Spencer WWTP to more accurately portray the actual 2004-2005 nitrogen loading from the Spencer WWTP by using influent flow data rather than effluent flow data. *Id.*[2] EPA has not raised the "baseline cap" or decided to allow a "new larger nitrogen discharge." Rather, EPA corrected an oversight in the calculation of the 2004-2005 baseline load with respect to the Spencer WWTP to account for the actual nitrogen load from the facility for that period.

The purpose behind the 2004-2005 analysis was to compare the level of nitrogen loading from the out-of-basin sources during that period to the 2000 TMDL's total estimate of the loading for these sources. The TMDL called for a 25% overall reduction, and the 2004-2005 analysis determined that out-of-basin sources were, by 2005, collectively contributing nitrogen at a level 36% below the loading estimated in the TMDL. EPA's strategy in this permit and others in the Connecticut River watershed in Massachusetts and New Hampshire (the states for which EPA is the NPDES permitting authority) has been to ensure that the 2005 reductions below the 2000 TMDL baseline are at the very least maintained, while Connecticut, Massachusetts, New Hampshire, New York, Vermont, and EPA collaborate on various studies pursuant to the LIS Strategy. *See* FS at 21; *see also* Response B2. This strategy is consistent with the EIP referenced in the comment, which, as the commenter notes, embraces a "goal of essentially capping existing WWTP total nitrogen loads at or near existing levels until agreement is reached on final allocations and how they will be achieved." In sum, and contrary to the comment, the agencies have not set the benchmark at a level much greater than the facility can maintain based on the 2011-2016 data,[3] but rather have established a benchmark that is consistent with the 2000 TMDL, the 2004-2005 analysis, and the EIP.

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[2] In the Fact Sheet, EPA used influent flow data for the period 2011-2016 to calculate the corrected baseline. FS at 21. It did not have influent flow data for the period 2004-2005. In responding to this comment, EPA sought and acquired influent flow data that show average influent flows in 2004-2005 at a comparable level (0.78 MGD).

[3] By comparison, using the 2011-2016 data in Fact Sheet Appendix A for both influent flow and nitrogen concentration yields a total nitrogen load of 89.4 lbs/day (that is, 0.75 MGD x 14.3 mg/L x 8.34).

Comment B4: Optimization Requirement
Finally, the draft permit requires the WWTP to optimize in order to achieve the greatest performance of nitrogen removal. However, the permittee has demonstrated greater nitrogen removal capabilities and as such, the WWTP is already poised to comply with this condition. In essence, the WWTP will be permitted to discharge more nitrogen than it is capable of removing upon issuance of this draft permit.

Response B4
EPA does not agree that the Spencer "WWTP will be permitted to discharge more nitrogen than it is capable of removing." *See* Response B3. Moreover, as the comment recognizes, and as EPA stated in the Fact Sheet, the permit requires the facility to evaluate alternative methods of operating the existing wastewater treatment facility to optimize the removal of nitrogen. FS at 21. The Fact Sheet continues:

> This evaluation is required to be completed and submitted to EPA and MassDEP within one year of the effective date of the permit, along with a description of past and ongoing optimization efforts. The permit also requires implementation of optimization methods, which will be evaluated based on the benchmark of 86.2 lbs/day to ensure that there is no increase in total nitrogen compared to the baseline average daily load. The permit requires annual reports to be submitted that summarize progress and activities related to optimizing nitrogen removal efficiencies, document the annual nitrogen discharge load from the facility to the wetland treatment units, and track trends relative to previous years. The draft permit includes a requirement for the facility to be operated in such a way that discharges of total nitrogen are minimized.

Id. EPA has not changed the optimization requirements in the Final Permit.

Furthermore, EPA's approach in this permitting action is consistent with the permitting strategy set forth in the EIP, to which the commenter suggests EPA should adhere. *See* Response B3. In addition to calling for caps on the out-of-basin upstream state WWTPs at or near existing total nitrogen loads, the EIP also called for permits to include a similar optimization requirement as EPA included in the Spencer WWTP. *See* EIP at 1.b ("Consistent with the 2000 TMDL [footnote omitted], EPA and the tributary states will implement a tributary state wastewater treatment plant (WWTP) permitting strategy with a goal of essentially capping existing WWTP total nitrogen loads at or near existing levels until agreement is reached on final allocations and how they will be achieved [footnote omitted].").

Comment B5: Upstream States' Nitrogen Contribution
A study of nitrogen loadings trends to LIS from New England states found that approximately 50% of the nitrogen load to LIS comes from areas north of Connecticut (Mullany and Schwarz, 2013). This study was based on 10 years (1999-2009) of data and compared computed nitrogen

loads from four gaging stations located along the Connecticut-Massachusetts border to the total nitrogen load computed from gages (and estimates) within Connecticut. As Connecticut continues to achieve greater nitrogen reductions at its WWTPs, the load from Massachusetts and other upstream states (New Hampshire and Vermont) consequently, becomes a greater portion of the load and warrants full attention. In addition, very little to no attenuation occurs in the Connecticut River (Smith et al. 2008) so this entire total nitrogen load from upper basin states is essentially transported directly to LIS.

We would also like to take this opportunity to call attention to EPA's effort to advance a nitrogen reduction strategy for LIS (see December 23, 2015 letter from the EPA Regional Administrator). You may already be aware of this effort as EPA recently accepted technical comments from stakeholders for Subtasks F & G (Application of Technical Approach for Establish Nitrogen Thresholds and Allowable Loads for Three LIS Watershed Groupings: Embayments, Large riverine Systems, and Western LIS). As noted in CTDEEP's comment letter "We continue to support moving all three watershed groupings forward simultaneously and anticipated that any further work with these initial thresholds will include all three watershed groupings."

We feel this permit is important for EPA to demonstrate its commitment to 'lead through example'. Following years of nitrogen monitoring and demonstration of the Spencer WWTP's performance (26.73 pounds/day in [Fact Sheet] Appendix A), EPA can now include an enforceable nitrogen limit in Section I.A.1. of the permit. The WWTP has already demonstrated that meeting such a limit is achievable, and as such, a performance-based nitrogen permit limit is warranted. We recognize that EPA and Massachusetts may implement other nitrogen reduction strategies in the future. Upon development of such other strategies, the permit may be modified as necessary. CT DEEP has successfully implemented a nitrogen trading program, as a well as limit for all small dischargers (<20 pound N/day). We would be happy to discuss our efforts with EPA.

Response B5

The nitrogen conditions in the permit are a reasonable means to implement the 2000 TMDL and control nitrogen discharges from the relatively small Spencer WWTP because they are consistent with the WLA for out-of-basin sources in the 2000 TMDL, which allocates loading for out-of-basin states by focusing on the aggregate loading totals rather than setting hard limits for each facility.[4] This approach recognizes that nitrogen loads are commingled in the Connecticut, Thames, and Housatonic Rivers before reaching Long Island Sound and that the aggregate load reduction is the most meaningful way to assess compliance with the TMDL.

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[4] The aggregate WLA has been met and surpassed. The 2000 TMDL estimated the total nitrogen load from out-of-basin wastewater facilities to the Connecticut River at 21,672 lbs/day and set an aggregate WLA of a 25% reduction, or 16,254 lbs/day. FS at 21, Table 3. By 2004-2005, the total load for the River was estimated to be 13,836 lbs/day—a 36% reduction. *Id.* By comparison, the Final Permit sets a benchmark for the Spencer WWTP of 86.2 lbs/day—or 0.62% of the 2004-2005 baseline load for the Connecticut River.

In addition, as noted earlier, the reference to the facility's total nitrogen load as 26.73 lbs/day is incomplete, and the approach EPA has taken in this permit with respect to nitrogen is consistent with the EIP. See Responses B3 and B4.

Finally, as EPA explained in the Fact Sheet, *see* FS at 21-22; *see also* Response B2, EPA's permitting approach for the Spencer WWTP is further reasonable in light of the Long Island Sound Nitrogen Strategy, which includes the development of technical studies to determine appropriate thresholds for nitrogen in various portions of the Sound and the identification of areas where nitrogen watershed loading results in exceedances of thresholds. The Subtasks F & G Memorandum to which the comment refers are steps in the process to reaching these goals. EPA will use the technical information developed through the Long Island Sound Nitrogen Strategy to inform its future permitting activities for this and other WWTPs. If further reductions are identified as necessary for the Spencer WWTP, EPA will include a water quality-based limit in a future permit action.

See also Response F1.

C. COMMENTS SUBMITTED MARCH 19, 2018 BY JAMES P. VANDER SALM ON BEHALF OF THE QUABOAG QUACUMQUASIT LAKE ASSOCIATION

As you know, QQLA is a non-profit organization dedicated to the protection and restoration of water quality in Quaboag and Quacumquasit Ponds[1], which are downstream of the Facility. QQLA's membership consists of nearly 200 families who reside and recreate around these ponds. Since its founding in 1996, QQLA has worked diligently with its municipal and private partners throughout the Quaboag-Quacumquasit watershed to combat the pollution of the region's waters, and to advocate for water protection more broadly. It has directed and sponsored numerous educational and scientific initiatives designed to spread awareness and adoption of sound pollution prevention practices and technologies in the watershed, investing thousands of hours of its members' time as well as substantial amounts of money in the process. A longstanding concern of QQLA has been phosphorus pollution, which has degraded water quality, promoted the extensive growth of weeds and algae, and severely impaired the public's recreational and aesthetic enjoyment of Quaboag and Quacumquasit Ponds.

QQLA has a number of comments regarding the Draft Permit's proposed new effluent limits for phosphorus, as set forth below.

Comment C1: The Proposed New Phosphorus Limits Must Be Lower to Comply with the Facility's TMDL Wasteload Allocation.
As stated in the Draft Permit's Fact Sheet (at Part 5.1.8.3), the Facility's effluent limitations for total phosphorus must be low enough to comply with the Facility's TMDL wasteload allocation ("WLA"). See 40 CFR § I22.44(d)(I)(vii)(B). QQLA is pleased that the Agencies now recognize the need to use the Facility's design flow (1.08 MGD) rather than its average outfall flow (0.47 MGD) for purposes of calculating the effluent limitations necessary for such compliance. See Draft Permit, Part I.A.1. & n.6; Fact Sheet, Part 5.1.8.3. This is clearly necessary, as a high

percentage of the Facility's influent is passing through its unlined wetland beds into groundwater (and from there to Cranberry and Sevenmile Rivers[2]) rather than discharging at its outfall, thus rendering the outfall flow an invalid basis upon which to determine the Facility's wasteload. However, the new phosphorus limits proposed in the Draft Permit (0.1 mg/L for May-October, 0.2 mg/L for November-April) are not in fact consistent with the Facility's WLA.

The Facility's WLA is 0.79 lb/day for May-October-in metric terms, 0.36 kg/day, or 360,000 mg/day. To determine the per-liter concentration necessary to comply with this WLA, 360,000 mg must be divided by 4.09 million liters (that is, the metric equivalent of 1.08 million gallons, the Facility's assumed daily effluent flow in the Draft Permit). The result of this calculation is 0.09 mg/L, rather than the 0.1 mg/L effluent limit proposed in the Draft Permit. Meanwhile, the Facility's WLA for the November-April period is 1.19 lb/day (0.54 kg/day, or 540,000 mg/day). Dividing 540,000 mg by 4.09 million liters, one gets 0.13 mg/L. Thus, the Draft Permit's proposed effluent limit for the winter period, 0.2 mg/L, is over 50% greater than the Facility's WLA will allow.

In short, the Draft Permit's effluent limits for total phosphorus must be lowered. Pursuant to 40 CFR § I22.44(d)(I)(vii)(B), these limits must be no greater than 0.09 mg/L for the growing season (currently May-October) and no greater than 0.13 mg/L for the winter period (currently November-April).

[1] These comments will refer to Quaboag and Quacumquasit "Ponds" to be consistent with the Draft Permit's Fact Sheet. These waters are alternatively known as Quaboag and Quacumquasit "Lakes" and (respectively) "North Pond" and "South Pond."

[2]The Draft Permit refers to "Cranberry River," whereas the current permit refers to "Cranberry Brook." To be consistent with the Draft Permit, these comments will refer to "Cranberry River." phosphorus limits that divides the year into equal six-month periods.

Response C1

The thrust of the comment is that the concentration-based phosphorus limits in the permit are inconsistent with the Waste Load Allocation ("WLA") for the Spencer WWTP in the phosphorus TMDL for Quaboag and Quacumquasit Ponds. The comment overlooks, however, that the permit includes concentration-based <u>and</u> mass-based limits for phosphorus. The inclusion of both types of limits in the permit means that both limits apply at the same time. Moreover, the mass limits in the permit are based on the WLA in the phosphorus TMDL, meaning that the permitted phosphorus load from facility will be consistent with the WLA.

The mass load to the receiving water is the product of the flow (MGD), the concentration (mg/L), and a conversion factor of 8.34.

Mass load (lb/day) = Flow (MGD) * Concentration (mg/L) * 8.34

Thus, the comment is correct that when the influent flow is 1.08 MGD, the mass loading limit means that the average total phosphorus concentration must be 0.09 mg/L or lower to meet the 0.79 lb/day loading limit. This fact conflicts with neither the WLA nor the summer total phosphorus limit of 0.1 mg/L, however, because the mass-based limit will also be applicable and because it is consistent with the WLA for the Spencer WWTP.

Conversely, at lower influent flows, such as 0.54 MGD (as occurred in August 2015), the loading limit of 0.79 lb/day could be met with an effluent concentration of 0.18 mg/L total phosphorus. However, this would violate the concentration limit of 0.1 mg/L. The concentration and mass limits will be in effect simultaneously and together ensure that neither the total phosphorus concentration nor mass load will lead to water quality impairments.

Comment C2: The Growing Season Phosphorus Limit Should Apply for Seven Months.
In the Draft Permit, as in the Facility's current permit, the growing season phosphorus limit and winter phosphorus limit apply for six months each-the former from May 1 to October 31, the latter from November 1 to April 30. This is an anomaly. QQLA has reviewed dozens of POTW NPDES permits in Massachusetts, and has not found another permit with seasonally adjusted phosphorus limits that divides the year into equal six-month periods. The vast majority of these permits, if not all of them, divide the year into seven-month and five-month periods—that is, with the growing season limit applying from April 1 to October 31, and the winter limit from November 1 to March 31. See, e.g., Barre (Permit# MA0103152); Belchertown(# MA0102148); Billerica(# MA0101711); Charlton(# MA0101141); Gardner(# MA0100994); Grafton(# MA0101311); Hopedale(# MA0102202); Medfield(# MA0100978); Medway/ Charles River Pollution Control District(# MA0102598); Milford(# MA0100579); Northbridge(# MA0100722); North Brookfield(# MA0101061); Southbridge(# MA0100901); Stockbridge(# MA0101087); Sturbridge(# MA0100421); Templeton(# MA0100340); Upton (# MA0100196); Ware(# MA0100889); Wayland(# MA0039853); Webster(# MA0100439); Westfield(# MA0101800).

QQLA requests that the Facility's permit be aligned with the norm, and that its growing season phosphorus limit be extended to seven months from April 1 through October 31. This will more accurately reflect the true growing season, which is becoming longer due to climate change impacts such as increased water temperature and accelerated ice-off. Additionally, applying the lower phosphorus limit in April will serve to better protect Quacumquasit Pond from phosphorus loading that occurs during spring backflows from Quaboag Pond.

Response C2
EPA has changed the warm weather phosphorus removal period to April through October. The reasons for this change include consistency with state guidance for assessing nutrient impairments and with similar permits in Massachusetts.

Because the total phosphorus limit was based on the QQ TMDL WLA, the Draft Permit used the same seasonal period as that document. To respond to the comment, EPA re-examined the QQ TMDL to determine if there was a compelling reason that it recommended May rather than April as the start of the warm weather phosphorus limits for the Spencer WWTP. The TMDL contains no specific reason for starting the phosphorus summer season in May, but it does state that the annual average hydraulic retention time in Quaboag Pond is 12 days, and goes on to say, "[i]n cases of rapidly flushing (less than 14 days) lakes or impoundments downstream of point sources it may be appropriate to set seasonal limits on phosphorus inputs based on the growing season (May-October)." TMDL at 41.

EPA then consulted the 2018 Massachusetts Consolidated Assessment and Listing Methodology (CALM) Guidance Manual,[5] which describes how the Commonwealth assesses waters for impairments to assist it in making 303(d) listing determinations and, ultimately, in developing TMDLs. CALM Guidance Manual at 1; CWA § 303(d)(1)(C), (D); 33 USC § 1313(d)(1)(C), (D). The CALM Guidance Manual was intended to be used for developing TMDLs and defines the "summer growing season" as April 1 through October 31 for assessing nutrient enrichment. Thus, adjusting the seasonal limit to include April is consistent with the Commonwealth's current views on the period of the growing season for assessing nutrient enrichment and developing TMDLs.

In addition, as the commenter points out, the clear majority, though not all, of growing season phosphorus limits for POTWs in Massachusetts begin in April. In the case of the Spencer WWTP, the absolute difference between the 0.2 mg/L winter limit and the 0.1 mg/L summer limit for one month per year is relatively small. Nevertheless, in the interest of consistency with current Massachusetts' guidance for nutrient TMDL development and with seasonal phosphorus limits in most permits for POTWs in the State, the Agencies have changed the Spencer WWTP warm weather phosphorus limit period in the Final Permit to April through October.

Furthermore, while effluent limits must also be consistent with the assumptions and requirements of any available WLA, they need not be *identical* to the WLAs. *In re City of Moscow*, 10 E.A.D. 135, 148 (EPA Environmental Appeals Board, 2001). EPA concludes that adjusting the growing season limit to include April is consistent with the TMDL's assumption that a "growing season" WLA is appropriate for the Spencer WWTP. In any event, "TMDLs are by definition maximum limits; permit-specific limits [that] are more conservative than the TMDL maxima[] are not inconsistent with those maxima, or the WLA upon which they are based." *Id*.

Comment C3: The Timeline for Compliance with the Proposed New Phosphorus Limits is Unreasonably Long.

QQLA is alarmed by the Draft Permit's compliance timeline, which allows the Town six-plus years, until December 31, 2024, to comply with the new phosphorus limits. See Draft Permit, Part I.B.2. Particularly given the Agencies' recognition that the current limits fail to account for the full volume of water discharged from the Facility, and are thus insufficiently stringent to comport with the Facility's WLA—a situation that has existed now for 11 years—the Town should be given no more time than is necessary to comply with the new limits.

[5] Available at https://www.mass.gov/files/documents/2018/05/07/2018calm.pdf

It is important to note that the impact of the Facility's phosphorus pollution on Quaboag and Quacumquasit Ponds is cumulative. Each year is not a “fresh start.” Rather, internal recycling of previously deposited phosphorus is a major contributor to the ponds’ eutrophy. See 2006 TMDL Report, at 42-43. Thus, to the degree that the new phosphorus limits are delayed, there will be long-term impacts. More phosphorus will settle in the ponds' surficial sediments, causing higher internal phosphorus loading over time than would otherwise have occurred.

The Fact Sheet (at Part 5.1.8.3) is conspicuously vague in justifying the Draft Permit’s lengthy timeline. It states that the Town has applied for financial assistance from the Clean Water State Revolving Fund, and that securing such funds is a “multi-year process” involving planning, design, and construction. It does not, however, offer any explanation as to why this process or any of its phases requires the amount of time allotted in the Draft Permit. Moreover, it does not explain how far along the Town already is in this process.[3] As for the Fact Sheet's second rationale for the lengthy timeline—that sewer fees in Spencer “could rise” from 0.89% to 2.50% of median household income—a clearer explanation should be provided. It is not clear whether and to what extent any financial assistance from the Clean Water State Revolving Fund would obviate the projected sewer fee increase. It is also not clear whether the projected sewer fee increase would be temporary or permanent—that is, whether it reflects one-time costs or ongoing costs necessary to maintain the upgraded Facility. To the degree that the Agencies are justifying their indulgent timeline on the basis of the Town's financial challenges, a more detailed and coherent explanation of these challenges should be provided.

The Agencies should not, in any event, accord the Town special treatment on the basis of financial hardship. The Town has received more than its share of special treatment already. Beside the fact that the current phosphorus limits effectively license the Facility to exceed its WLA, and beside the fact that the current permit has been continued for six years beyond its expiration date, the Facility's unpermitted discharge to groundwater from its wetland beds is in flagrant violation of law. First, it violates MassDEP’s groundwater discharge regulations at 314 CMR 5.00 et seq. Second, it is increasingly clear that the discharge requires NPDES permit authorization, given that it migrates through groundwater to the Cranberry and Sevenmile Rivers. See Hawai ‘i Wildlife Fund v. County of Maui, 881 F.3d 754, 762-765 (9th Cir. 2018) (wastewater treatment plant’s discharge of effluent to groundwater required NPDES permit coverage because the effluent emerged from the ground in U.S. waters). In short, the Agencies should not countenance the status quo at the Facility for any longer than they must. The new permit should impose a rigorous schedule for Facility upgrades, one befitting a facility that is and has been violating the law. It is well past time for the Agencies to prioritize the interests of the environment and of downstream stakeholders such as QQLA, who have borne the cost of the Town’s unlawful pollution for decades.

Specifically, QQLA proposes the following revised deadlines, which should provide the Town with ample time to accomplish the designated tasks:

QQLA requests that the deadline at Part I.B.2.c. for completion of design plans and specifications be moved forward from July 31, 2020 to December 31, 2019.

QQLA requests that the deadline at Part I.B.2.d. for starting construction of necessary upgrades be moved forward from May 1, 2021 to May 1, 2020.

QQLA requests that the deadline at Part I.B.2.e. for attaining compliance with final effluent limits be moved forward from December 31, 2024 to December 31, 2022.

[3] In an email dated October 28, 2016, EPA informed QQLA that to EPA's understanding, the Town had by that time begun planning Facility upgrades applying for Clean Water State Revolving Fund Assistance.

Response C3

Pursuant to EPA and MassDEP regulations, a compliance schedule for a water quality-based effluent limit ("WQBEL") in a NPDES permit must require compliance "as soon as possible." 40 CFR § 122.47(a)(1); 314 CMR 3.11(10). Among the factors the agencies generally consider in their discretion when determining the appropriate length of such a compliance schedule are whether modifications to the WWTP are needed to achieve the WQBEL, how long it will take to complete any such modifications, and the cost of the modifications. *See In re New England Plating Co.*, 9 E.A.D. 726, 739 (EPA Environmental Appeals Board, 2001); Compliance Schedules for Water Quality-Based Effluent Limitations in NPDES Permits (EPA May 10, 2007); Combined Sewer Overflows – Guidance for Financial Capability Assessment and Schedule Development (EPA 1997); Interim Economic Guidance for Water Quality Standards (EPA 1995). The agencies' consideration of these factors is grounded in the EPA Environmental Appeals Board (EAB) caselaw pertaining to compliance schedules, as well as EPA guidance.

The commenter appears to propose that the agencies add another factor into this mix: a history of "special treatment" by the agencies of the Town, for reasons stated in the comment, that it believes would justify shortening the compliance schedule. In the agencies' view, decisions regarding schedule length should be dictated by objective factors relating to planning, design, construction, and operations, and not driven by subjective or punitive considerations. This is especially true where the commenter's allegations of preferential treatment are not substantiated.[6] Moreover, even if a history of "special treatment" were actually at issue in this proceeding, it is unclear how that would bear on or inform the relevant regulatory standard of "as soon as possible." The agencies' consideration of more conventional factors traditionally associated with the process of upgrading a treatment plant is a clearer approach more rationally related to evenhanded implementation of 40 CFR § 122.47(a)(1) and 314 CMR 3.11(10).

While the agencies acknowledge the delay in re-issuing the Final Permit, the length of the schedule for compliance with the total phosphorus limits is appropriate in light of the time needed for the Town to complete a major WWTP upgrade to meet the more stringent limits, including developing a Comprehensive Wastewater Management Plan

[6] We note that the 2007 Permit included seasonal phosphorus limits of 0.2 and 0.3 mg/L, which were among the strictest in Massachusetts at the time of issuance.

("CWMP"), obtaining funding, designing the upgrades, obtaining the necessary construction permitting, bidding the construction, completing the construction, the cost of the upgrades, and, once the upgrades are in place, fine-tuning the system to learn how to operate it best to meet the new phosphorus limits. Moreover, detailed planning and design work for a major upgrade to achieve specific pollutant limits can only proceed so far before the issuance of the permit that sets the pollutants to be controlled and the specific levels of control that will be necessary.[7] In light of these considerations and others discussed below, the agencies decline the invitation to shorten the schedule for the reasons offered in the comment and have determined that the schedule requires compliance with the water quality-based phosphorus limits in the permit "as soon as possible," in accordance with EPA and MassDEP regulations. *See* 40 CFR § 122.47(a)(1); 314 CMR 3.11(10).

Massachusetts regulations require that POTW upgrades go through extensive planning, public review, and design approval. 310 CMR 44.00. With major POTW upgrades such as the one planned for the Spencer WWTP, this is usually accomplished through the development of a CWMP, which is a process whereby current and future wastewater needs are evaluated, wastewater management alternatives are developed that will meet these needs, and a final plan is chosen through careful comparison and evaluation of the alternatives. Massachusetts uses CWMPs to ensure that WWTPs are environmentally sound, cost effective, and account for future growth or climate conditions. Moreover, financial assistance from the Clean Water State Revolving Fund prioritizes projects that are needed for NPDES permit compliance, meaning that projects not required for an NPDES permit are less likely to receive funding. In Massachusetts, a CWMP is also generally required for a project to qualify for an SRF loan at zero percent interest. *See* M.G.L. c. 29C, § 6(d); 310 CMR 44.07.

In 2017, the Town of Spencer was selected to receive an SRF loan to fund the development of a CWMP. The Town and its consultant, Wright-Pierce, submitted Phase I and Phase II of the CWMP to MassDEP in May 2018 and October 2018, respectively. Phase III of the CWMP will consist of a cost evaluation, environmental impact analysis of feasible alternatives, and a recommended plan of action. Once the CWMP is approved by MassDEP and finalized, the Town can begin working on a conceptual design for the upgrades.

While the comment asserts with little explanation that a shorter schedule would provide "ample" time for the facility to comply with the phosphorus limits, the agencies conclude that the scope of the WWTP upgrades planned by the Town justifies the current length of the schedule. The Final Permit reasonably provides one year for the Town to submit a final CWMP to MassDEP and, once the CWMP is approved, to appropriate funds, select

[7] This may be so for many reasons, not least of which include often competing priorities for limited municipal resources, which may weigh against the irretrievable commitment of financial resources to a project whose legal requirements have not yet been finalized. In addition, selecting an appropriate water pollution control technology may in many cases depend upon the pollutants to be controlled and the levels of control required.

a consultant, and complete the conceptual design. Final Permit at Part I.B.2.b. The schedule provides an additional 19 months (by July 31, 2021) for the Town to complete design plans and specifications for the necessary upgrades and to obtain all other permits required to construct the upgrades. *Id.* at Part I.B.2.c. This is a reasonable amount of time because the upgrades to meet the total phosphorus limits also include upgrades to other parts of the WWTP and sewer system that the Town has identified through comprehensive planning. The preliminary list of potential upgrades includes:

- Extensive work on the Solids Handling Building;
- Repurposing 2 existing rectangular clarifiers for septage receiving complete with receiving, fine screening dewatering/compaction, septage pumping and waste sludge pumping;
- Control Building electrical, lighting, mechanical and facility improvements;
- Control Building pump room pumping equipment and piping improvements;
- Aeration Basins structural and process (aeration piping modification, anoxic zone, mixing and recycle for total phosphorus and total nitrogen removal) modifications;
- Removal/replacement of Influent Screw Pumps structure with new Influent Wet/Dry Well Pump Station with fine screen headworks, grit removal and chemical addition;
- Chemical Manhole chemical addition and piping improvements;
- Rapid Mix/Splitter Box mixing improvements;
- Clarification improvements by adding a second 60' +/- diameter covered final clarifier;
- Construction of tertiary treatment for P, TN, aluminum and copper removal;
- Relocation of the effluent flow meter & Ultra Violet (UV) Chamber system & UV Building from Cranberry Brook to the end of Tertiary Treatment;
- Relocation of the effluent outfall from Cranberry Brook to Sevenmile River;
- Construction of new outfall structure2 into the Sevenmile River; and
- Abandon or repurpose wetland bed area, potentially for renewable energy solar array project.

In addition, the Final Permit provides less than a year for the Town to complete the bidding for the construction of the upgrades, select a contractor, and start the actual construction. Final Permit at Part I.B.2.d. The schedule provides only two-and-a-half years for the Town to complete construction and learn how to operate the system most effectively to achieve the necessary phosphorus reductions. This period is appropriate because the Town will be constructing an entirely new tertiary treatment system that will require new permanent structures on the site. Moreover, the Town has indicated that the upgrades may include removing the wetland beds, which would affect the overall construction time. Furthermore, in the agencies' experience, the fine-tuning period for nutrient removal upgrades often takes many months of running the system to arrive at operating procedures that reliably meet permit limits. The agencies are also aware of the uncertainty inherent in estimating the time required for planning, financing, designing, and completing significant upgrades to a WWTP.

EPA has also examined updated affordability information and estimates the average household cost of the phosphorus upgrades to result in sewer rates at around 1.5% of median household income (MHI) if the Town receives an SRF loan at zero percent interest. [8] *See* Affordability Memo dated February 19, 2019. If the Town does not receive a zero percent interest loan, the average household cost would be higher. EPA guidance suggests that, if preliminary screening indicates an impact between 1.0 and 2.0% of MHI, a community could incur a mid-range economic impact. *See id.* The schedule provided in the Final Permit is consistent with that recommended in EPA Guidance for such an economic impact. *Id.*

The comment recognizes that a compliance schedule is necessary and appropriate but asserts that it should be shortened by two years for several reasons, including that each year of delay extends the long-term impacts of internal recycling of phosphorus and that alleged violations justify a shorter schedule. EPA is aware of the internal phosphorus recycling that occurs in ponds and impoundments downstream from POTWs. It is because of this recycling that recent permits for POTWs with downstream impoundments include stringent, year-round phosphorus limits, rather than seasonal limits. It is also because of internal recycling that EPA no longer distinguishes between particulate and dissolved forms of phosphorus in POTW discharges. *See* Response D1. Accordingly, the permit includes year-round limits and does not distinguish between forms of phosphorus.

Furthermore, although the Spencer WWTP was historically “a major source of nutrients” to both ponds—making up an estimated 45% of the load to Quaboag Pond in the 1980s—by the time of the development of the QQ TMDL, its contribution was estimated to have been cut significantly. *See* QQ TMDL at 15, 17. According to the TMDL, other sources currently account for most of the total phosphorus to the ponds. *Id.* at 15, 17; *see also id.* at 42 (noting that “the plant contributes a minor portion of the nutrient load to either pond during the summer”). While the Spencer WWTP’s contribution of total phosphorus to the receiving waters is nonetheless significant, these considerations—including that the plant’s relative contribution is low, that it will still be subject to year-round low interim limits during the period of the compliance schedule, *see* Final Permit at Part I.b.2.a, that a major upgrade is necessary to meet the final limits, and the affordability of the upgrade—factor into the agencies’ decision not to shorten the compliance schedule.

While the commenter posits that the agencies should truncate the schedule because of the permittee’s use of the wetland beds, we conclude that the considerations discussed above counsel against shortening the schedule by two years. Completing the upgrade will still

[8] The figure calculated here is slightly different from that presented in the Fact Sheet because of updates to several variables, including the capital cost of the project and the Census estimate of median household income. Johnson, Updated Affordability Memo, February 19, 2019.

require finalizing the CWMP, financing the project, developing conceptual and final designs, bidding, additional permitting, construction, and generally some period of fine-tuning the system—all of which impact the time needed to comply with the new permit limits. *See* 40 CFR § 122.47(a) (providing that a schedule "shall require compliance as soon as possible"). Furthermore, the practical difference between the two schedules is that the commenter's schedule would have the plant meet summer and winter limits of 0.1 mg/L and 0.2 mg/L, respectively, in 2023 and 2024, whereas the compliance schedule in the permit will require the facility to meet already fairly stringent summer and winter limits of 0.2 mg/L and 0.3 mg/L, respectively, during those two years and then the lower limits thereafter. Finally, uncertainties regarding affordability remain, but as noted above, the upgrades could necessitate an increase in sewer fees to 1.5% of MHI.

For all these reasons, the agencies have decided not to shorten the schedule by two years to require Spencer to comply with its phosphorus limits by 12/31/2022.

Comment C4: The Phosphorus Timeline Should Be More Specific.
The Draft Permit's compliance timeline for the new phosphorus limits is ambiguous in several respects. It is critical that the timeline be as precise as possible to avoid any confusion as to what the Town must do by each deadline. QQLA therefore proposes the following amendments, which it assumes reflect the unstated intention of the Agencies:

- Part I.B.2.b. now states that the Town shall "complete a conceptual design to meet the total phosphorus limit" by December 31, 2018. QQLA requests that this language be amended to "complete a 25% conceptual design to meet the total phosphorus limit."

- Part I.B.2.c. now states that the Town shall "[c]omplete design plans and specifications for necessary upgrades" no later than July 31, 2020. QQLA requests that this language be amended to "[c]omplete design plans and specifications for necessary upgrades and obtain all permits required to perform such upgrades."

- Part I.B.2.e. now states that the Town shall "[a]ttain compliance with the final effluent limits for total phosphorus" no later than December 31, 2024. QQLA requests that this language be amended to "[c]omplete construction of necessary upgrades, including removal of the constructed wetlands[5], and attain compliance with the final effluent limits for total phosphorus."

[5] The Fact Sheet (at Part 5.1.8.3) states, "It is understood that [upgrades to the Facility] will include removal of the constructed wetlands, and once the upgrades are complete, all effluent flow will be through the effluent pipe." QQLA assumes that the absence of an explicit requirement in the Draft Permit that the Town remove the constructed wetlands is an oversight.

Response C4:
EPA has used the milestones in the Draft Permit in other permits actions and believes that they are sufficiently precise.

EPA has also not added the language requiring removal of the constructed wetlands in Part I.B.2.b.e. Although EPA has determined that more stringent phosphorus limits are necessary and understands the upgrades will include removal of the wetland beds, EPA does not generally prescribe the means a facility must employ to meet its permit limits. Moreover, the comment does not explain the need for the requested language. The permit requires compliance with the phosphorus limits (with or without the wetland beds). EPA sets water quality-based limits without regard to the technology needed to achieve them. *See* CWA § 301(b)(1)(C); *NRDC v. EPA*, 804 F.3d 149, 157 (2nd Cir. 2015); *NRDC v. EPA*, 859 F.2d 156, 208 (DC Cir. 1988).

Comment C5: The Phosphorus Timeline Should Require Both a Detailed Annual Progress Report and an Annual Public Presentation Regarding the Town's Progress.

Part I.B.2.f. of the Draft Permit requires that the Town "submit reports to EPA and MassDEP no later than December 31 of each year summarizing progress for that calendar year." QQLA believes that this provision is important but inadequate. The permit should include provisions ensuring that the Agencies and the public are regularly apprised in detail (rather than in summary) concerning the Town's progress. Absent such transparency, and absent close scrutiny from both the Agencies and stakeholders such as QQLA, the Town is likely to fall behind on its obligations. QQLA therefore proposes the following:

- An amendment to Part I.B.2.f., such that it provides, "Until the limit is achieved, the Town shall submit reports ("Annual Report") to EPA and MassDEP no later than December 31 of each year detailing its progress for that calendar year, and detailing its plans for the subsequent calendar year. The Annual Report shall include, without limitation, a registered professional engineer's detailed description of all planning, design, and construction activities performed or scheduled to be performed during the past or subsequent calendar year. Dates during which such activities have been performed, or are scheduled to be performed, shall be specified. Any problems or delays encountered or anticipated in the performance of such activities shall be explained in detail. The Annual Report shall be made available to the public through the Town's website simultaneously with the submission of the report to EPA and MassDEP."

- The addition of a paragraph to Part 1.B.2. that provides, "The Annual Report described in Part I.B.2.f. shall specify a time and place for a live public presentation concerning the report. The date of the presentation shall be between February 1 and February 15 of the year following the year in which the Annual Report is required to be submitted to EPA and MassDEP. The presentation shall take place after business hours at the Spencer Public Library or another venue in the Town that is open to the public. The author(s) of the Annual Report, the Spencer Board of Sewer Commissioners, and the Superintendent of the Facility shall be present. The author(s) of the Annual Report shall describe in detail its contents, and shall answer any question from any member of the public, whether or not a resident of the Town, regarding those contents."

Response C5:
NPDES regulations do not require permittees to engage in community outreach and education to the extent requested. However, EPA has changed the Final Permit to require the following details in the Compliance Schedule Annual Report:

- Describe the activities undertaken during the calendar year directed at achieving compliance with the final total phosphorus limit;
- Identify all plans, reports, and other deliverables related to the compliance schedule completed and submitted during the calendar year;
- Describe the expected activities to be taken during the next calendar year to achieve compliance with the total phosphorus limit;
- Identify any anticipated or potential areas of noncompliance with this Compliance Schedule;
- Describe the Town's plans with respect to the wetland beds. The report shall describe whether the Town plans to abandon, line, deposit material into, or build over the wetland beds. The report shall describe whether the town plans to cease directing wastewater flow to the wetland beds and if so, the timeline for ceasing the flow of wastewater to the wetland beds.
- Post the Compliance Schedule Annual Report on the Town website simultaneously with the submission of the report to EPA and MassDEP.

If members of the public wish to discuss the Compliance Schedule Annual Report or other compliance matters with the Town, a suitable venue may be the monthly public meetings of the Spencer Board of Sewer Commissioners. The meetings are held on the second Wednesday of every month at 5:00 pm at the Town of Spencer Utilities and Facilities Office at 3 Old Meadow Road, Spencer, Massachusetts.

Comment C6: The Agencies Should Appoint a Third-Party Reviewer of the Town's Progress.
To ensure that the Facility's planned upgrades are in fact adequate to satisfy the new phosphorus limits, and to ensure that these plans are executed faithfully, the Agencies should appoint a third-party engineering firm to review the Town's progress. Specifically, QQLA proposes the addition of the following paragraph to Part 1.B.2.:

"The Agencies shall appoint a third-party engineering firm ("Reviewing Engineer") to review the Town's progress in complying with Part 1.B.2., at the Town's expense. The Reviewing Engineer shall review each Annual Report submitted by the Town pursuant to Part I.B.2.f., and shall inspect the Facility once each January in connection with such review. The Reviewing Engineer shall present a written opinion ("Third-Party Review") to the Agencies and the Town by January 31 of each year, which shall assess the Town's progress in complying with the requirements of Part 1.B.2. The Third-Party Review shall be made available to the public through the Town's website within 24 hours of its receipt by the Town. Depending upon the phase of design or construction that coincides with the Third-Party Review, the Third-Party Review shall include an assessment of the fitness of any conceptual or complete designs to achieve the permit's final effluent limits for phosphorus, and/or an assessment of the Town's progress in executing such designs."

Response C6:
It is not clear from the comment the specific purpose that would be served by requiring independent review and interpretation of the Compliance Schedule Annual Reports. The comment presumes such a requirement is necessary to "ensure that the Facility's planned upgrades are in fact adequate to satisfy the new phosphorus limits, and to ensure that these plans are executed faithfully," but the comment offers no explanation or support for these assumptions. It is not clear to EPA that the significant additional expense of such a requirement is reasonable or warranted in this case.

First, the Region is not aware of any other NPDES permit for a POTW in Massachusetts that includes such a condition. Second, it is not the Region's practice to prescribe the specific upgrades a facility uses to satisfy new permit limits or to second-guess those that it has chosen, as explained in the Response C4. *See* CWA § 301(b)(1)(C); *NRDC v. EPA*, 804 F.3d 149, 157 (2nd Cir. 2015); *NRDC v. EPA*, 859 F.2d 156, 208 (DC Cir. 1988). Rather, the Region establishes a reasonable schedule that sets the date for compliance with Final Permit limits, including, where appropriate, interim requirements and dates for their achievement; the permittee determines the means to achieve final limits within the specified timeframes, given the specifics of its circumstances. Third, Spencer has indicated that it intends to upgrade the facility to meet the phosphorus limits in the Final Permit, and it has taken steps to accomplish that, including applying to the Clean Water State Revolving Fund for assistance to finance the upgrades. *See* FS at 25. The Town is also reportedly close to submitting its final Comprehensive Wastewater Management Plan to MassDEP—a required step in securing funds from the CWSRF. *See* Response C3. Finally, other incentives exist to encourage the permittee to design and implement upgrades sufficient to comply with the new limits within the time allotted in the schedule. For instance, noncompliance with permit limits could subject the facility to enforcement action, as noted below. *See* Response C7. For all these reasons, EPA sees no basis to justify imposing the expense of a third-party reviewer requirement, and the comment offers none.

In addition, information and reports submitted by the permittee to EPA related to the phosphorus upgrades will generally be available to the public. The Final Permit currently requires the permittees to provide EPA and MassDEP with discharge monitoring reports ("DMRs") and other mandatory reports (including Compliance Schedule Annual Reports and Toxicity Test Results) on a timely basis. Data submitted to NetDMR are automatically incorporated into EPA's Enforcement and Compliance History Online ("ECHO") website, which highlights violations for viewing. Further, in the instance of certain violations defined in Part II of the permits, the permittees are required to notify EPA within specified timeframes for certain conditions.

EPA and MassDEP evaluate compliance through inspections of the facility and review of the submitted monitoring data and other reports and routinely coordinate compliance and enforcement activities. Additionally, agency staff field inquiries from the public regarding compliance issues, and any person may report suspected environmental violations to EPA and to MassDEP.

Comment C7: There Should Be Specified Consequences for Failing to Comply with the Phosphorus Timeline.

Absent a credible and substantial threat of adverse consequences if it misses its deadlines, the Town will have little incentive to adhere to the Part 1.B.2. timeline. QQLA recognizes that the Agencies may not wish to commit prospectively to imposing certain consequences for permit violations. However, specifying potential consequences will serve a valuable purpose in underscoring the Agencies' enforcement resolve. The Town should be put on clear notice that the Agencies are contemplating enforcement of the Part 1.B.2. timeline from the start of this process. QQLA therefore requests the addition of the following paragraph to Part 1.B.2.:

"In the event that the Town violates this permit by failing to meet any deadline or take any action required by Part 1.B.2., EPA and/or MassDEP intend to take prompt enforcement action. Enforcement action may include, without limitation, the imposition of financial penalties for each day that a violation persists, a freeze on further connections to the Town's sewer system, and a prohibition on the Facility's receipt of transported septage or other waste from persons or entities not connected to the sewer system."

Response C7:

Failure to adhere to a final deadline in a compliance schedule by violating Final Permit limits is a permit violation enforceable by the agencies and by citizen suit, depending on the circumstances. In addition, NPDES permittees are subject to the duty to comply:

> The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Clean Water Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application.

40 CFR § 122.41(a). Further, the Act provides for monetary and criminal penalties in the event of non-compliance. *See, e.g.*, CWA § 309; 40 CFR § 122.41(a)(2), (3). Thus, EPA disagrees with the comment's premise that the Town "will have little incentive to adhere" to the phosphorus compliance schedule in the permit. No changes have been made to the Final Permit because of this comment.

D. COMMENTS SUBMITTED MARCH 27, 2018 BY CHICOPEE 4RIVERS WATERSHED COUNCIL

The Chicopee 4Rivers watershed Council, C4R, a river stewardship group serving the rivers and river users of the entire Chicopee River Watershed, (the Quaboag is a major tributary) is pleased to provide our comments concerning the Spencer WWTP draft permit. We have reviewed the draft permit as well as comments of other groups concerned with water quality in the Quaboag River system and feel the draft is an improvement over the past, but more needs to be done to improve water quality as impacted the Spencer WWTP discharge. C4R encourages river stewardship and exploration and we are launching a "Blue Trail" on the waters of the Quaboag River, beginning in E Brookfield (possibly extending up to Spencer), all the way to Warren. Prime water quality is an important component to a healthy river system as well as for healthy recreation. The health of Quaboag Pond and beyond is directly impacted by what flows into it, thus a strong update and timely implementation of the new permit for the Spencer WWTP is needed.

Our main points of concern are:

Comment D1: Nutrient removal optimization:
Phosphorous is a leading nutrient pollutant that can affect a river's health. Quaboag Pond has seen algal blooms in recent years. Therefore, C4R recommends that the phosphorous limit be lowered in the draft permit. Our review of the draft, literature, and comments brings us to support the points made by the QQLA to set the limit to 0.09 mg/l in the growing season, and 0.13 mg/l in the off season (based on design flow). Meeting the noted TMDL is vital to river health. Additionally, limiting orthophosphorus in the winter is recommended.

Response D1
Please see Response C1, which addresses the phosphorus limits in the permit and consistency with the TMDL Waste Load Allocations.

EPA does not agree that a winter orthophosphate limit is necessary. In the early 2000s, it was EPA's understanding that dissolved phosphorus would pass downstream in winter, meaning that winter phosphorus limits should target the particulate form. However, a 2008 study of the total phosphorus in sediments in the Assabet River indicated that winter phosphorus loadings do accumulate in sediments, and that reductions in wintertime total phosphorus loading contribute significantly to the reduction in sediment phosphorus flux, even when the proportion of non-particulate orthophosphate is relatively high. Given that both dissolved and particulate phosphorus contribute to water quality impairments, EPA has determined that total phosphorus is the appropriate focus and sees insufficient reason to require monitoring or include a permit limit for orthophosphate in the wintertime.

Comment D2: Seasonal Limits
Season: C4R concurs that the growing season should be April 1 to October 31 to at least match the regional norm. Climate change influences further support the need for this schedule.

Response D2
Please see Response C2.

Comment D3: Schedule
Implementation: C4R recommends that actions to implement the improved nutrient removal and water quality enhancements be done as promptly as possible. The 2024 deadline seems unnecessarily far off. We feel it is quite possible and reasonable to set a deadline much earlier by at least 2 years. Putting off improvements, puts off protecting and restoring healthy water quality and threatens river users health. Once the upgrade is in place, a robust regimen of area stream and effluent monitoring is recommended to ensure compliance.

Certainly the new permit should be accompanied by a clear and monitored timetable for implementation. As with any project that must achieve its goal, there is a need to measure performance regularly and on a defined schedule: this assures positive and timely results. The delays and past track record here seem to urge the need for monitoring and firm deadlines. The goal here is a healthy river, healthy waters, and consistent public health.

C4R sincerely appreciates your considerations on these comments. We offer them to encourage actions to promote benefits for all in the region, benefits for the environment, but also the wider communities' economic health. Thank you.

Response D3
EPA agrees with the commenter that effluent monitoring is required to ensure compliance with the effluent limits in the permit and has included these in the permit; *see* Part I.A of the Permit). The effluent limits in the permit, and associated monitoring requirements, are intended to ensure that the discharge does not cause or contribute to a violation of WQS and to be consistent with facility waste load allocation proscribed in the TMDL. "Area stream" monitoring, while useful to assess the condition of waters in the area, is not necessary to measure whether effluent limits are being met.

The permit includes a compliance schedule with defined dates for completing implementation milestones and a requirement to submit annual progress reports. Like the effluent limits, this is an enforceable part of the permit.

Please also see Response C3.

E. COMMENTS SUBMITTED MARCH 28, 2019 BY THE CONNECTICUT RIVER CONSERVANCY

I am submitting comments on the draft National Pollutant Discharge Elimination System (NPDES) permit for the Spencer Wastewater Treatment Plant (WWTP) on behalf of the Connecticut River Conservancy, formerly the Connecticut River Watershed Council. The facility discharges to the Cranberry River, which discharges to the Sevenmile River, which flows to Quaboag Pond, then to the Quaboag River, to the Chicopee River, and then the Connecticut River. Quaboag Pond is also connected to Quacumquasit Pond. Cranberry River and Sevenmile

River are not known to be water-quality impaired, but there is a Phosphorus TMDL for Quaboag and Quacumquasit Ponds (MassDEP report MA36130-2005-1, CN 216.1) dated May 2006. All permits in the Connecticut River watershed fall under the Long Island Sound Nitrogen TMDL. We are interested in improving water quality in the Connecticut River and its tributaries such that they can all one day meet Class B water quality standards.

CRC attended the public meeting and hearing held at the public library in Spencer on Monday, March 26, 2018. At the time, we asked several questions but did not present comments. We obtained a copy of the Potential Plant Upgrade Process Flow Diagram at the meeting. Our comments are below.

Comment E1: 7Q10 and Dilution Factor
The 7Q10 and dilution ratio may not be conservative enough. EPA has calculated the 7Q10 (lowest observed mean river flow for 7 consecutive days, recorded over a 10-year recurrence interval) for the ungauged Cranberry River on extrapolated data from the most recent 30 years at a station in the nearby Sevenmile River in Spencer. EPA has considered topography, drainage area, land uses, proximity, and nearby water supply wells, and considers the drainage areas qualitatively similar enough. CRC consulted with MassDEP's interactive online map built as part of the Sustainable Water Management Initiative (SWMI). According to this tool (linked at *https://www.mass.gov/guides/sustainable-water-management-swmi-technical-resources*), the Cranberry River watershed is in the pink groundwater category (category 4) and is >25-50% flow impacted. The Sevenmile River watershed upstream of the Cranberry River is yellow (category 3), and is >10-25% flow impacted. Cranberry River sub-basin is coded as a "yes" for >25 groundwater depletion, whereas Sevenmile River is not. For fluvial fish, the Cranberry River basin is the highest category of alteration, 5, and is >65% impacted. Sevenmile River is category 4, or >25-65% altered.

Using the Sevenmile River flows as a surrogate for the Cranberry River may not be conservative enough, and CRC recommends that some kind of calculation be developed to account for the Cranberry River's higher level of impact from groundwater withdrawals. This would potentially then impact permit limits.

Response E1
The comment seeks a more complex 7Q10 calculation without proposing any particular method. EPA used the best available streamflow data to calculate the 7Q10 at the Spencer WWTP outfall, which is an ungaged site. FS at 13. While it is preferable to use a USGS gaging station that is on the same river as the ungaged site, in this case there are no USGS gaging stations on Cranberry River. Rather, the draft permit uses a USGS gaging station on a nearby river in the same watershed. The USGS recommends using this method if the drainage area for the ungaged site is between 0.3 and 1.5 times the drainage area of the USGS gaging station.[9] In the case of the draft Spencer WWTP

[9] Ries, Kernell G. III and Paul J. Friesz, 2000. Methods for Estimating Low-Flow Statistics for Massachusetts Streams. USGS. Available online at https://pubs.er.usgs.gov/publication/wri004135.

permit, the drainage area ratio between the outfall and USGS 01175670 (Sevenmile River at Spencer, MA) is 0.74. *See* FS at 13-14.

EPA also notes that a lower dilution factor would have no impact on most of the limits in the permit and only a limited impact on two permit limits. More specifically, the dilution factor used in the Draft Permit is already fairly low (1.07) and cannot be lower than 1.00.[10] A dilution factor of 1.00, if applied to the Spencer WWTP, would change the wintertime ammonia limit from 6.3 mg/L to 5.9 mg/L and the Whole Effluent Toxicity chronic limit from 93% effluent to 100% effluent (i.e. a sample composed of 100% effluent must not cause chronic toxicity to test organisms over a 7-day period). The other effluent limits would not be affected because they are based on TMDLs (nitrogen and phosphorus), the 1981 Water Quality Management Plan (dissolved oxygen, warm weather limits for BOD_5, TSS, and ammonia), secondary treatment standards (cold weather BOD_5 and TSS), or do not change based on dilution in general (pH, E. coli) or on this change in dilution in particular (copper). *See* FS at 27. The results of the reasonable potential analyses for aluminum, cadmium, lead, nickel, and zinc would likewise be unchanged. *See* FS at 27-28.

To summarize, the data to revise the 7Q10 analysis are not available, and the limits would not change appreciably with a lower dilution factor. Furthermore, the Spencer WWTP anticipates moving the outfall to the Sevenmile River, further limiting the value of a more detailed hydrologic investigation. For these reasons, EPA has not changed the 7Q10 calculation used in the Draft Permit.

Comment E2: Additional Sampling
Additional sampling should be required to ensure permit limits are met. Given the high volume of seepage through the wetland beds (~50% or more influent lost), additional sampling should be required to ensure that permit limits are met for this unusual facility. The effluent should be sampled as is required in the current and proposed permit. But sampling should also be required upstream of the facility on Cranberry Brook, and just upstream of the confluence with the Sevenmile River, ideally on a weekly basis. Should the potential facility upgrade be constructed, this requirement could be eliminated.

Response E2
As part of the permit reissuance, EPA collected phosphorus data in 2015, upstream and downstream of the Spencer WWTP during low flow conditions. The study was limited in nature but found that while the Spencer WWTP did contribute phosphorus to the Cranberry River and Sevenmile River, neither the phosphorus concentrations nor visual observations indicated an impairment to either river. The results of this study are included as Appendix A to this RTC.

[10] The lowest possible dilution factor is 1.00, in which a discharge has no dilution in the receiving water.

Furthermore, the Final Permit (like the Draft Permit) already requires sampling upstream of the facility on the Cranberry River. The facility collects data upstream of the facility on a quarterly basis as part of Whole Effluent Toxicity (WET) Testing. The results of this testing are included in the quarterly WET test reports submitted to EPA and MassDEP. The reports are available on request from either agency.

Comment E3: Total Nitrogen (TN)
The Draft Permit section I.B.1. requires that the permittee complete an evaluation of alternative methods of operating the existing wastewater permit to optimize nitrogen removal, setting the baseline mass loading for the facility at 86.2 lbs/day. The Fact Sheet on page 21 explains that the Long Island Sound Nitrogen TMDL baseline analysis for the Spencer WWTP was 63.5 lbs/day based on an average flow that did not take into account effluent flow lost through the wetland beds. Because of this error, the plant is getting a 36% increase in their loading limit! CRC does not understand why loading limits for TN have been based on current flows and not design flows, as is done for TSS and BOD.

Response E4
To the extent the comment suggests that the 2000 TMDL for Dissolved Oxygen in Long Island Sound includes a 63.5 lbs/day baseline mass loading for the Spencer WWTP, it is incorrect. In addition, the comment asserts that the facility "is getting a 36% increase in their loading limit." While the 2000 TMDL includes an estimate of the then-total nitrogen load attributable to out-of-basin sources—which includes the Spencer WWTP, among many others—and sets an aggregate WLA for those sources of a 25% reduction, it does not include a baseline mass loading specific to the Spencer WWTP.[11] As explained in the Fact Sheet, a baseline loading analysis for out-of-basin sources was conducted several years after EPA's approval of the 2000 TMDL (using 2004-2005 plant-specific data). FS at 20-21. That later analysis estimated the 2004-2005 load from the Spencer WWTP and is the derivation of the 63.5 lbs/day figure. *Id.* As EPA has also explained, the later analysis was based solely on the volume of effluent discharged via the plant's outfall, as determined from DMR data. *Id.* In other words, that analysis failed to account for the nitrogen loading likely reaching the Cranberry River via the wetland beds, meaning that the 2004-2005 baseline estimate for the Spencer WWTP was not an accurate assessment of the plant's nitrogen contribution to the watershed. *See also* Response B3.

The comment appears to suggest, confusingly, that the nitrogen baseline load for the WWTP should be based on design flow, which for the Spencer WWTP is 1.08 MGD. FS at 11. A nitrogen load based on design flow, however, would be much higher, ranging

[11] It is not clear from the TMDL document, but Connecticut DEEP, in its comments on the Draft Permit, claims that, for the TMDL, it estimated the total mass loading from upstream POTWs on the Connecticut River by multiplying each POTW's design flow by an estimated nitrogen concentration of 15 mg/L and then adding all the results together. *See* Comment B2. If that is true, then any baseline estimate for the Spencer WWTP for the 2000 TMDL would have been 135.1 lbs/day.

from 122.5 lbs/day to 128.9 lbs/ day, depending on whether the calculation uses nitrogen concentration effluent data for 2004-2005 or 2011-2016, respectively.[12]

Comment E4: Nitrogen Optimization
CRC recommends that the permit be revised to include two optimization requirements: 1) an optimization study for reducing N in the interim prior to plant upgrade, and 2) N reduction options for the potential plant upgrade presented at the public meeting. There should be two separate due dates established for these efforts. CRC requests that EPA establish annual load limit for TN that is enforceable. CRC supports the proposed ammonia-nitrogen limits, which unlike the TN limit, are appropriately based on design flow.

Response E4
As required by Part I.B.1 of the permit, the Town of Spencer will submit Nitrogen Optimization Reports for its current WWTP until the upgrade goes online.

The information requested by the commenter describing nitrogen optimization for the WWTP upgrade will be included in the Comprehensive Wastewater Management Plan (CWMP). This report, required by the Commonwealth of Massachusetts for major WWTP upgrades, will include an alternatives analysis of treatment processes to comply with nitrogen limits that are expected in future permit reissuances.

Regarding enforceable nitrogen limits, please see Responses B2 and B5.

Comment E5: Total phosphorus (TP)
CRC again does not understand why the TMDL for TP was based on average flows rather than the design flows.

Response E5
This comment does not address, or request any change to, the permit, but rather is focused on the phosphorus TMDL for Quaboag & Quacumquasit Ponds. Therefore, the agencies refer the commenter to the TMDL, and note that it sets a maximum mass load for the Spencer WWTP and that mass load limits do not change as a function of the facility flow.

Comment E6: Enforceable Deadlines
EPA should establish enforceable deadlines to the potential WWTP upgrade, requiring that the upgrade happen in the quickest achievable time frame. This could be accomplished in the permit, or in a separate enforcement order, which would also make it clear that the existing permit authorizes discharge through outfall 001, not the wetland beds.

[12] The nitrogen load in lbs/day is the product of the design flow (1.08 MGD), the nitrogen concentration (13.6 mg/L in 2004-2005 or 14.3 mg/L in 2011-2016), and a conversion factor (8.34).

Response E6

The compliance schedule deadlines in the permit are enforceable and are intended to require compliance as soon as possible. *See also* Response C3. While it is true that the Region could have placed the compliance schedule in a separate administrative order, the Region has opted to keep it in the permit. *See* Response A7. EPA does not mandate or prohibit any specific treatment process, and while the permit does not explicitly prohibit the Town from using the wetland beds, the Town has stated that it plans to abandon the beds as part of the upgrade. *See* Response C6.

Comment E7: Schedule

We agree with the comments dated March 19, 2018, submitted by James P. Vander Salm, attorney for the Quaboag-Quacumquasit Lake Association ("QQLA letter") that the EPA and MassDEP have given the permittee a long time to tackle this already. The 2006 TMDL on page 44 said that a feasibility study to meet the TMDL limits was in the works at that time, 12 years ago. Giving the permittee until 2024, the entire life of the upcoming permit, and 18 years after a feasibility study, is too long a time frame.

Response E7

The TMDL cites a feasibility study "to be submitted within 6 months to evaluate options for meeting the summer 0.2 mg/L (1.8 lb/day) final limit." QQ TMDL at 44. The referenced limits, however, are different from the limits in the Final Permit. The former limits have been achieved for several years at the Spencer WWTP; the limits in the Final Permit are more stringent. To say that the agencies "have given the permittee a long time to tackle this already" and to suggest that the compliance schedule should be shortened as a result, conflates the limits. The agencies have determined that the schedule in the Draft Permit is appropriate. *See* Response C3.

Comment E8: Seasonal TP Limits

CRC concurs with the QQLA letter that the TP seasonal limits should be in place for the period April 1 – October 31.

Response E8

Please see Response C2.

Comment E9: Orthophosphorus

Additionally, we request that dissolved orthophosphorus monitoring be required during the winter months, for the same reason it is required in the Belchertown MA permit.

Response E9

Please see Response D1.

Comment E10: Interim and Final Limits

Typically, interim and final limits are shown separately in the table at 1.A.1. The Draft Permit only lists the new total phosphorus limits, and a reader needs to refer to Section 1.B.2 to find out those limits won't go into effect until the end of 2024.

CRC generally endorses all of the comments in the QQLA letter and those submitted by Chicopee4Rivers Watershed Council.

Response E10
It is standard EPA practice to display Final Permit limits in Table I.A.1., and to add compliance schedule information (including any interim limits) in a footnote and/or Special Conditions.

Comment E11: I/I
Progress to reduce infiltration and inflow (I/I) should be further along

The current 2007 permit required an I/I report due in March 2008, then annual reports. At the public meeting, the permittee described a MassDEP-required I/I report nearing completion. Given that the current permit already required significant I/I work, we can't figure out why there is no mention of the progress made to date in the Fact Sheet. Has the town made sufficient progress to reduce unnecessary inflows in the last 11 years?

Response E11:
The Town has engaged in sewer maintenance activities such as video inspections, cleaning, point repairs, manhole repair, cured-in-place pipe lining, and sewer reconstruction. In 2017, the Town reported that dry weather influent flow (an indication of I/I) decreased by 0.11 MGD since August 2005.

The Town is currently conducting a Sewer System Evaluation Study and plans to request funds from the State Revolving Fund for larger repairs prioritized by the study.

F. COMMENTS SUBMITTED MARCH 20, 2018 BY CONNECTICUT FUND FOR THE ENVIRONMENT

The Connecticut Fund for the Environment and its bi-state programs Save the Sound and The Long Island Sound Soundkeeper, submit the following comments on the Draft National Pollutant Discharge Elimination System (NPDES) Permit for the Town of Spencer Wastewater Treatment Plant ("WWTP").

Comment F1
The Town of Spencer's WWTP discharges into the Cranberry River. The Cranberry River is a tributary to the Sevenmile River, which is a tributary to the Connecticut River. Thus, the discharge from the Spencer WWTP is a discharge from an upstream state's point source that has an impact on the waters of the Connecticut River and ultimately the waters of Long Island Sound. The estimated nitrogen loading for the Spencer WWTP based on a revised baseline analysis indicates a total nitrogen load of 86.2 lb/day, using the average influent flow from 2011 through 2016 of 0.76 MGD.

Despite this and similar to the current draft NPDES permit proposed for the Springfield Water and Sewer Commission, this draft NPDES permit for the Spencer WWTP has no enforceable limit for nitrogen. Rather, the permit requires an evaluation of alternative methods of operating the existing wastewater treatment facility to control total nitrogen levels and, it sets as a "benchmark" that the facility not exceed the TMDL target of a 25% reduction over the 2004-2005 baseline loadings based on the "benchmark" of 86.2 lbs/day. This approach raises serious legal issues such as: What is a benchmark? Is a benchmark enforceable by EPA or is it enforceable by citizens in a citizen suit action under the Clean Water Act? These questions and the legal uncertainty they cause are eliminated if a numerical limit for nitrogen is required in the permit. Therefore, an enforceable limit must be included in the permit.

Response F1

The permitting agencies understand and share the commenter's concern about nitrogen loads to Long Island Sound originating from Massachusetts sources. The 2000 TMDL focusses on the overall loading totals from wastewater facilities in the three upriver states (Massachusetts, New Hampshire, and Vermont), setting an aggregate WLA for these out-of-basin sources of a 25% reduction below the total estimated load rather than setting hard limits for each out-of-basin facility or even each state. As previously discussed, the WLA has been met and surpassed.[13] *See* Response B4; FS at 21. The nitrogen conditions in the Final Permit for the relatively small Spencer WWTP are a reasonable means to implement the 2000 TMDL with respect to Spencer and control nitrogen discharges from the WWTP and are consistent with an aggregate WLA that establishes overall (not facility-specific) reductions for out-of-basin sources.

That said, while the TMDL has resulted in significant reductions and measurable water quality improvement, EPA recognizes that more needs to be done in the Connecticut River watershed and is fast tracking an evaluation of further reductions that may be necessary. It is anticipated that a total nitrogen threshold will consider both the DO effects in Long Island Sound as well as the more localized effects of nitrogen loading in the Connecticut River Estuary. EPA is currently in the process of developing a total nitrogen allowable threshold for the Connecticut watershed. EPA's permitting approach for the Spencer WWTP is further reasonable in light of the LIS Strategy. *See also* Response B5. In the interim, benchmarks can provide a mechanism for encouraging permittees to optimize their treatment processes to reduce pollutant discharges. Benchmarks fit in with EPA's larger LIS Strategy to keep nitrogen loads below the WLA target in the 2000 TMDL, while also providing EPA with facility-specific information that, in concert with information derived through the technical information and tools to be developed under the LIS Strategy, can be used in future permitting action to assess the need for, and levels of, nitrogen effluent limits.

[13] The 2000 TMDL estimated the total nitrogen load from out-of-basin wastewater facilities to the Connecticut River at 21,672 lbs/day and set an aggregate WLA of a 25% reduction, or 16,254 lbs/day. FS at 21, Table 3. By 2004-2005, the total load for the River was estimated to be 13,836 lbs/day—a 36% reduction. *Id.* By comparison, the Final Permit sets a benchmark for the Spencer WWTP of 86.2 lbs/day.

G. COMMENTS SUBMITTED MARCH 26, 2018 BY THE TOWN OF STURBRIDGE, MASSACHUSETTS

Comment G1

The Conservation Commission of the Town of Sturbridge has reviewed the new Draft National Pollution Discharge Permit (NPDES) for the Spencer Wastewater Treatment Plant (SWWTP) to discharge treated domestic and industrial wastewater into the Cranberry River and subsequently into the 7 Mile River. We would like to offer the following comments to the EPA for consideration.

Sturbridge has a unique situation in which high water backflow from Quabaug Pond enters Quacumquasit Pond (South Pond). South Pond has a very slow recharge rate, so any effluent from the Spencer Plant that is entering Quabaug Pond has the potential to impact the water quality in South Pond. South Pond is a Great Pond and this resource has significant ecological value which is compromised by herbatious [sic] growth supported by these effluents. South Pond is mapped Priority Habitat for state-listed species and is home to a pair of nesting bald eagles. We also have reports of a possible second nest site on this pond.

The Town of Sturbridge and Quabaug and Quacumquasit Lakes Association (QQLA) have worked to reduce non-point source discharges to South Pond, in the past.

We recognize that the attainment of water quality standards depends on a dual approach to address both point and non-point sources of pollutants. We will continue to work to make improvements through project review and educational efforts with private landowners who surround South Pond but ask that the SWWTP be held to high standards to reduce and improve their wastewater discharges.

Although the Conservation Commission does not support discharging wastewater into our resource areas, we are in support of the proposed improvements in the NPDES Permit. In particular, the requirements to continue to reduce nutrient loads through innovative add on treatment processes. However, these improvements will only work if the MA Department of Environmental Protection (DEP) and EPA monitor and enforce this. It is imperative that monitoring and reporting requirements are added to the NPDES Permit and enforced by the EPA and DEP.

Response G1

The agencies note that the Final Permit does hold the facility to a higher standard of phosphorus control than the 2007 permit—a standard that will require an upgrade of the Spencer facility. Such an upgrade will reduce the plant's phosphorus input to the ponds, which the QQ TMDL found is already comparatively minor. QQ TMDL at 17-18. Further, the TMDL recommends reducing phosphorus loading to Quacumquasit Pond in particular by increasing the height of the existing backflooding gate between the two ponds by 18 inches *Id.* at 43-44. The agencies understand that this modification has not yet occurred, but encourage the communities to consider it further.

With respect to the request for adding phosphorus monitoring and reporting requirements, the Draft Permit already contained such requirements, and they have been carried through to the Final Permit. In particular, the permittee must monitor effluent phosphorus three times per week from April 1 through October 31 and once per week from November 1 through March 31. *See* Final Permit at Part I.A. The permittee must submit its monthly monitoring data to the agencies in discharge monitoring reports (DMRs). *See id.* Part I.H.

H. COMMENTS SUBMITTED MARCH 28, 2018 BY CARL D. NIELSEN

Comment H1: QQLA Efforts

I am writing on behalf of QQLA to add a few additional comments for the Spencer WWTP Draft Permit beyond those mentioned during the public hearing on 3/26/18. As I had stated during the public hearing, ESS Group, Inc. has been working with QQLA for over 20 years. To provide the lakes with expertise in the assessment and management of both Quaboag (North) and Quacumquasit (South) Ponds. As you may know, there is very little data documenting phosphorus within the lakes themselves over time. However, there is a decent record of water clarity measurements and documentation of algal growth and nuisance aquatic weed growth over many years which are symptoms of eutrophication which is accelerated by a range of anthropomorphic activities within the large watershed.

Phosphorus has been identified as a significant problem in these lakes since before ESS became involved. The phosphorus from the watershed and the SWWTP accumulate in these lakes over time and due to this, the water quality will continue to decline, even as sources to the lakes, such as the SWWTP, continue to make improvements. The TMDL identifies phosphorus as the primary nutrient of concern and recommends that phosphorus be reduced to the ponds to achieve the water quality goals.

For over 20 yrs QQLA has worked to do this with ESS support.

QQLA worked to help pass the phosphorus detergent ban in the state.

ESS worked with QQLA to win a 319 NPS grant to assess and implement storm water BMPs.

We have worked with local residents to implement site-by-site infiltration projects, landscaping projects designed to encourage infiltration, and negotiate community rates for septic pump-outs and maintenance.

We have worked to directly measure the impacts of septic on the lakes by sampling groundwater seepage into the lake. Septic loading was shown to be a very minor source since phosphorus does not travel well through soils and due to the overwhelmingly large load being delivered to the lakes from their large watershed. So although it is convenient for SWWTP to point to septic systems as the problem, this has already been documented to be false in these systems.

ESS has worked with QQLA to manage algal blooms and excessive weed growth in both ponds annually for over 20 years. This work must be done annually to maintain water quality due to the excessive phosphorus loading.

As you can see from the list of actions that have been pursued and implemented by QQLA, it is clear that they are not only focused on the loading from SWWTP. We recognize that this is not the only source of phosphorus in the watershed, but it is the one that is being examined now through the issuance of a new permit and thus it is the focus of attention.

Response H1

The agencies appreciate the efforts of QQLA and others to improve water quality in the two ponds. The agencies expect the phosphorus limits in the permit, which are based on the waste load allocation derived by the state through a detailed study of the watershed, to contribute to further improvement. Please also see Responses C1 through C7.

Comment H2: South Pond Flushing Rate

The following comments are offered in light of the above to further strengthen the permit:

South Pond's flushing rate is slow, at approximately 1.5 to 2 years. Therefore, backflows that this pond receives remain in the lake to fuel algal blooms and add to the internal nutrient recycling within the lake. It will be essential to modify the permit to limit the potential for phosphorus to enter South Pond. One way to do this will be to extend the summer limits to include April, a month when spring backflows are prone to occur.

The gate between the lakes was installed nearly three decades ago to reduce backflows of phosphorus rich water from Quaboag Pond to South Pond that occurs during the annual high spring flows, as well as during many other significant storms throughout the year. The gate is not sufficiently high to stop all backflows during the typical spring flows or during larger storm events. We would recommend that SWWTP be required to fund a study to evaluate the feasibility of raising this gate by the 18" recommended in the TMDL. The gate was designed to accommodate this change, but there are minor local concerns over flooding property along the interbasin connector. The feasibility study should include a hydrologic analysis to evaluate the potential impact of the higher gate on these properties. If this study were successful and allowed for a raising of the gate height, it has been shown by MassDEP that this would eliminate over 90% of the backflows and effectively resolve the external loading issues for South Pond.

Response H2

EPA has changed the Final Permit such that the warm weather phosphorus limits will be applicable in April, as requested in this and QQLA's comments. *See* Response C2.

As for the recommendation that the Final Permit require the Spencer WWTP to fund a study to evaluate the feasibility of raising the height of the gate to overcome "minor" concerns about flooding along the interbasin connector, the agencies respectfully decline to add such a condition. The comment does not identify any provision of federal or state law as requiring such a condition or even a recommendation in the QQ TMDL that the

Spencer WWTP should be required to fund such a study.[14] Moreover, the TMDL found that the phosphorus load to Quacumquasit Pond attributable to backflooding from Quaboag Pond is largely a non-point source phenomenon, rather than a function of the Spencer WWTP. QQ TMDL at 43 and Table 11. In addition, the Draft Permit already proposed more stringent phosphorus limits that would require the WWTP to undertake a costly upgrade to decrease its phosphorus load to both ponds—limits that are consistent with the Waste Load Allocation established in the QQ TMDL and that are carried through to the Final Permit. In other words, the facility's proportion of the total load to Quacumquasit Pond, which the TMDL found was already low, is expected to decrease even further through upgrades that will themselves require Spencer to expend a considerable sum. The comment, meanwhile, offers no estimate of the additional cost to Spencer, no real explanation of the need for the requested study, and no justification—legal or otherwise—for why the permit should require Spencer to pay for it.

For these reasons, the agencies have not added a requirement to the permit to fund the requested study. If further study is nonetheless necessary to overcome the referenced concerns about flooding, it could perhaps be a worthwhile use of QQLA funds, possibly with the assistance of a grant, or in partnership with local municipalities in the watershed, including the three towns bordering the pond (Brookfield, East Brookfield, and Sturbridge).

Comment H3: Move the outfall downstream of the ponds

The backflowing phosphorus load accumulates in South Pond sediments to add to the internal phosphorus load in subsequent years. South Pond is now at a point where an alum treatment is recommended at a cost of over $250,000 to re-set the lake. A similar solution for Quaboag Pond would be less feasible due to the rapid flushing rate, although an alum dosing station at its inlet is being considered at a similar cost. Another alternative that has been considered in the past has been to entirely bypass the lakes with the discharge from SWWTP by piping the discharge directly to the Quaboag River downstream of North Pond. We would recommend that SWWTP fund a feasibility study for these potential solutions and be responsible for funding the implementation of these improvements if SWWTP is unable to achieve the targeted phosphorus

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[14] While the QQ TMDL document recommends raising the gate, it notes that an evaluation of concerns over flooding in the interbasin connector related to raising the gate occurred during the preparation of the TMDL. QQ TMDL at 45. The TMDL document reports that the evaluation concluded that "the problems of flooding the houses are more to do with upstream floodwater and flow restrictions at the Shore Road bridge, rather than backing up water from Quacumquasit gate area into Quaboag Pond as residents suggest." *Id.*; *see also id.* at 58-59 (estimating that raising the gate by 18 inches "could be expected to raise water levels in [Quaboag Pond and the interbasin connector] an amount unlikely to exceed 0.2 feet"), 65 (noting that raising the gate by 18 inches "would only amount to less than 0.2 feet or about 2 ½ inches on top of a typical 2-foot flood"). The only further gate-related study suggested in the TMDL document is "an engineering analysis" to determine whether "the current structure can simply be modified and is strong enough," *id.* at 45, which the commenter suggests is unnecessary. ("The gate was designed to accommodate this change . . . ."). In any event, the comment neither acknowledges these statements from the QQ TMDL nor explains what further flooding study the permit should require or why.

loads specified within the permit by the deadlines recommended by QQLA (which are more expedient than those laid out in the draft permit).

Response H3

The comment does not identify any federal or state requirement for adding a permit provision(s) to require the permittee to move the outfall, conduct alum treatments in one or both lakes, or conduct the requested feasibility studies. As the permit already contains effluent limits and other conditions necessary to ensure that the effluent will not cause or contribute to a violation of water quality standards, there is no basis for such a requirement. The TMDL established a plan for lowering the load to a level needed to achieve water quality standards that does not entail moving the outfall or treating the ponds as requested in the comment.

Comment H4: Remove the Wetland Beds

We would ask that whatever changes are made to redesign or reconfigure or upgrade the SWWTP, the existing wet beds should be removed entirely or removed and lined with impermeable barrier to prevent future leaching from the beds if the wet beds are to continue to receive water from the plant during normal operation or during bypass flows. We do not want these illegal wet beds to continue to be a source of discharge to groundwater, particularly as these wet beds are likely to be heavily saturated with phosphorus and other pollutants.

Response H4

The Final Permit requires the Town of Spencer to provide detailed plans regarding the wetland beds in the Compliance Schedule Annual Report (Annual Report). As of this Response to Comments, the agencies understand that the Town anticipates abandoning the wetland beds and routing all flow through a new tertiary treatment system. The Annual Report requirement will provide public notification regarding the Town's plans for the wetland beds and improve public accountability of the WWTP upgrade process. Please see Response C5.

Also, the Final Permit limits account for phosphorus and other pollutants that are likely entering the Cranberry River from the wetland beds. Thus, removal of the wetland beds, although perhaps preferred, is not a necessity for reducing phosphorus and other pollutant inputs to the watershed. Moreover, EPA does not generally prescribe the means a facility must employ to meet its permit limits. Please see Responses C3, C4, and E6.

Comment H5: Ponds Downstream of POTW is Unique Situation

Finally, we believe that the SWWTP discharge being located upstream of these lake systems is rare, if not unique in the state of Massachusetts. The fact that South Pond is a cold-water fishery which is stocked routinely by Mass F&W with trout speaks to its water quality. However, we believe that continued stress being placed upon this system from SWWTP and other sources of phosphors from the watershed is resulting in the deterioration and continued degradation of these systems. We ask that EPA and MassDEP keep this in mind as they decide how to consider the comments that are received (from all parties) and that these agencies continue to strive to protect the environment and these waterbodies by making the final permit one of the most protective permits that they issue in all of EPA Region 1.

Thank you for the opportunity to review and submit these comments on the SWWTP draft permit. If you have any questions, I can be reached at the contact information below.

Response H5
The situation in the Quaboag and Quacumquasit Lakes, in which a lake or impoundment[15] receives treated municipal wastewater, is neither rare nor unique in Massachusetts. Moreover, the TMDL identified the Spencer WWTP as one of the smaller sources of phosphorus to the ponds. Below is a short list of ponds and impoundments that have suffered nutrient impairments from upstream POTWs. In each of these cases, as with the Quaboag and Quacumquasit Ponds, a TMDL is in place to address phosphorus impairments to which the POTW contributes.

- Gleasondale Impoundment in Stow, MA receives treated wastewater from the Westborough, Marlborough Westerly, and Hudson POTWs.
- The Powdermill Impoundment in Hudson, MA receives treated wastewater from the above POTWs, plus the Maynard POTW.
- Box Pond in Bellingham, MA receives treated wastewater from the Milford POTW.
- Dutton Pond, Greenville Pond, and Rochdale Pond in Leicester, MA receive treated wastewater from the Leicester POTW.
- Texas Pond in Oxford, MA receives treated wastewater from the Oxford-Rochdale POTW.
- Forge Pond and Aldrich Lakes East and West in Granby, MA receive treated wastewater from the Belchertown POTW.

Because phosphorus from POTWs accumulates in downstream impoundments, EPA includes stringent, year-round phosphorus limits for POTWs with downstream impoundments that are nutrient-impaired. The summer total phosphorus limit of 0.1 mg/L and the winter limit of 0.2 mg/L for the Spencer WWTP are among the most protective for POTWs in New England. Moreover, the permit limits are consistent with the WLAs in the TMDLs that the Commonwealth of Massachusetts developed for these two ponds. *See* Response C1.

[15] Quaboag Pond, although naturally formed, functions similarly to a run of the river impoundment. There are dozens of such impoundments in Massachusetts formed by dams.

I. COMMENTS SUBMITTED MARCH 27, 2018 BY LYNN ECKHERT

Comment I1
I write in favor of requiring Spencer MA to cease polluting the waters which are used for recreation. It is sad when the lake is filled with weeds and unattractive for children to learn to swim. It is costly to treat the lake when an efficient and effective waste water treatment plant should be built. The lowest levels of phosphorus should be required.

There should not be any extensions on the time frame. Financial hardship is not a valid reason for extending the time to rebuild the waste treatment plant so as to meet EPA standards. We can no longer allow pollution of the waters which are being polluted by discharge from the plant.

Sincerely

Lynn Eckhert

Lake Quacumquasett Resident

Response I1
The summer total phosphorus limit of 0.1 mg/L and the winter limit of 0.2 mg/L for the Spencer WWTP are among the lowest for POTWs in New England.

The Final Permit includes a reasonable schedule that the agencies have determined requires compliance with the water quality-based phosphorus limits in the permit as soon as possible. *See* Response C3. Moreover, contrary to the assertion in the comment, affordability is an allowable consideration when developing such a schedule. *See, e.g.*, *In re City of Taunton*, 17 E.A.D. 105, 180-83 (EAB 2016) (discussing the EPA's use of affordability information in determining the appropriate length of a compliance schedule). *See also* Responses C1 to C7.

J. COMMENTS SUBMITTED MARCH 27, 2018 BY BOB SHIELDS

Comment J1
My name is Bob Shields, and I own a home at [address redacted].

We own lakefront property on Quacumquasit.

Quacumquasit is a pristine body of water. Its cleanliness is a primary reason we purchased our home there.

We are very concerned about the impact the sewage treatment plant will have on the quality of the water and the many organisms and fish that make Quacumquasit their home.

Since the plant will discharge into the Seven Mile River. the lower limit of phosphorus must be .05 because the discharge is to a river or stream entering a lake, as defined in the EPA's "Gold Book."

The permit to allow Spencer to rebuild the plant is excessive. The permit should have 7 mo (growing season) with the lower amount of phosphorus and only 5 month (winter) of higher phosphorus allowance. (all the other treatment plants have have [sic] a longer growing season).

Spencer is claiming "financial hardships" as an argument while their neighbors property and lifestyles degrade. Its a fallacy. We have to continually raise money to control the weeds caused by high phosphorus. The deposition of phosphorus in the sediment is cumulative and will take thousands of dollars to mitigation [sic].

Algae blooms and invasive weeds will not only impact our ability to enjoy our pristine lake, but will also negatively impact our property value. Who will compensate us for the change in circumstance?

As our lawyer capably argued, we believe

- The proposed new phosphorus limits must be lower to comply with the facility's TMDL wasteload allocation.
- The growing season phosphorus limit should apply for seven months. The timeline for compliance with the proposed new phosphorus limits is unreasonably long.
- The phosphorus timeline should be more specific
- The phosphorus timeline should require both a detailed Annual Progress Report and an Annual Public Presentation regarding the town's progress.
- The agencies should appoint a third-party reviewer of the town's progress.
- There should be specified, stern and unpleasant consequences for failing to comply with the phosphorus timeline.

Response J1

The Gold Book recommends a water quality criterion of 0.05 mg/L for phosphorus in a river entering a lake.[16] This means that, at the point that the river flows into the lake, the ambient total phosphorus concentration of the river should be no higher than 0.05 mg/L as a 4-day average. It does not mean, as the comment implies, that the Spencer WWTP should achieve an effluent phosphorus limit of 0.05 mg/L, simply because it discharges to a river that *ultimately* enters a lake. Rather, EPA developed permit limits for the facility that are consistent with the Gold Book's recommendation of 0.1 mg/L for a stream that

[16] U.S. EPA, Quality Criteria for Water, EPA 440/5-86-001 (May 1, 1986).

does not discharge *directly* to a lake (like the Cranberry River) and with the WLA for the facility in the phosphorus TMDL for the two ponds. *See* FS at 23; *see also In re City of Attleboro*, 14 E.A.D. 398, 434-35 (EAB 2009) (observing that the Gold Book "recommends in-stream phosphorus concentrations not greater than 0.1 mg/l for streams not discharging directly to lakes or impoundments"). For more on this issue and the others raised in the comment, please see Responses C1 to C7, I1, and K1.

K. COMMENTS SUBMITTED MARCH 27, 2018 BY LELAND MOULTON

Comment K1

We live on Quacumquasit Lake in Brookfield, MA. We are very concerned about the weeds and chemicals in our Lake. Much of this is due to the discharge from the Spencer Waste Water Treatment Plant (SWWTP). This is not acceptable! **SWWTP has had years to fix their discharge process that pollutes our Lake, but they have done nothing!**

We look to you to hold the SWWTP accountable, and mandate that they fix this serious problem **now**! Please mandate that they follow strict guidelines including ongoing Lake water testing. Also please monitor them to ensure they are adhering to your guidelines and Lake water testing. Our families and friends swim in our Lake.

Response K1

While the Spencer WWTP was once the largest source of phosphorus to the ponds (estimated at 45% of the total load), its current share of the total phosphorus load is comparatively small, owing in part to the previous upgrades the facility has undertaken to lower its contribution and meet the phosphorus limits in previous iterations of its permit. *See* QQ TMDL at 15. For instance, since 2007, the Spencer WWTP has operated under a permit that, with a 0.2 mg/L warm weather phosphorus limit, was among the strictest in Massachusetts at the time of issuance. The 2007 permit lowered the warm weather limit from 0.3 mg/L to 0.2 mg/L and the cold weather limit from 0.75 mg/L to 0.3 mg/L. The Spencer WWTP meets its phosphorus limits most of the time.

Nevertheless, EPA recognizes that, although the facility has reduced its contribution to the phosphorus load of the two ponds, the Spencer WWTP is still a significant point source in the ponds' watershed. The Final Permit appropriately sets the phosphorus level equal to that of the water quality criterion of 0.1 mg/L from April through October. This limit and the winter limit of 0.2 mg/L are among the lowest for POTWs in New England. *See* Responses C1 to C7.

Finally, the fact that the five-year term of the 2007 permit expired prior to issuance of the Final Permit does not mean that the Spencer WWTP is somehow out of compliance with the Clean Water Act. As EPA stated in the Fact Sheet, the Town filed a timely application to renew its NPDES permit, as required by federal regulations. FS at 4. As a result, the Facility's 2007 permit was administratively continued pursuant to 40 CFR § 122.6(a). *Id.*

L. COMMENTS SUBMITTED MARCH 27, 2018 BY JEFF CLARK

Comment L1

My name is Jeff Clark and I live on Quaboag Pond in Brookfield. I attended the hearing last night in Spencer and want to thank you and Mr. Webster and your colleagues from the state for conducting a very professional and informative hearing. I also understand you need more people to do your job.

I wish to add my agreement to the QQLA attorney comments/points (nine of them).

I firmly believe that since the Town of Spencer has had a lapsed permit for over five years then it should have to proceed at an accelerated construction pace to comply with the lower phosphorus requirements.

Algae growth in our pond has seemed to increase over the last two years and I cannot imagine what it will look like in another six years before the changes are made.

Also believe your enforcement division should be monitoring the Town of Spencer if it is breaking the law by operating effluent to groundwater without a permit.

Response L1

Please see Responses to QQLA Comments and Response K1.

The Massachusetts Water Quality Standards provide that "[a] schedule of compliance shall require compliance at the earliest practicable time, as determined by the Department." 314 CMR 4.03(1)(b). EPA regulations similarly grant EPA the discretion to include a schedule requiring compliance "as soon as possible." 40 CFR § 122.47(a). While the agencies acknowledge the delay in issuing the Final Permit, the schedule for compliance with the total phosphorus limits is appropriate considering the time needed to complete a major WWTP upgrade to meet the more stringent phosphorus limits. *See* Response C3.

It should be noted that the compliance schedule includes calendar dates as deadlines, as opposed to basing the deadlines on time elapsed since the permit effective date. In keeping with this, EPA expects the Town to work diligently to implement the WWTP upgrades as quickly as possible, regardless of the effective date of the permit.

Regarding enforcement, EPA and MassDEP evaluate compliance through inspections of the facility and review of the submitted monitoring data and other reports and routinely coordinate compliance and enforcement activities. Additionally, agency staff field inquiries from the public regarding compliance issues, and any person may report suspected environmental violations to EPA.

M. COMMENTS SUBMITTED MARCH 27, 2018 BY WILLIAM BONNEY

Comment M1

I have lived on the shore of Quaboag Pond, near the SWWTP, for about eight years. During that entire time, year in and year out, the NPDES permit renewal for the SWWTP has been a constant issue.

The SWWTP is clearly out of compliance with the Clean Water Act. It has had many years to renew its permit; I think it has already been given much too much time for this crucial permitting. This environmental debacle cannot continue for more months and years. The permit renewal needs to be effected immediately, so that those of us who live near the lake do not bear any more of the cost to mitigate the algae blooms and invasive weeds that result from the phosphorus deposition.

We see algae blooms and the explosive growth of milfoil and other aquatic invasives every summer. It is the hope of me and my family and neighbors that the EPA will see that this problem is quickly corrected.

Response M1

As EPA stated in the Fact Sheet, the Permittee filed a timely application to renew its NPDES permit, as required by federal regulations. FS at 4. As a result, the Facility's 2007 permit was administratively continued pursuant to 40 CFR § 122.6(a). *Id.* In any event, the Final Permit includes more stringent phosphorus limits than the 2007 permit and an appropriate schedule to meet them. *See* Responses C3, G1, and K1.

N. COMMENTS SUBMITTED MARCH 27, 2018 BY DORIS SMITH

Comment N1

Hello, My name is Doris Smith. My husband, James Smith, and I live on South Pond in Sturbridge, MA. We are very concerned with the run off from the Spencer treatment plant into our lake. We would like to see the EPA put more pressure on the town of Spencer in resolving this issue. This extension of 5 years is not acceptable. Something needs to be done.

Response N1

Please see Response K1.

O. COMMENTS SUBMITTED MARCH 27, 2018 BY SANDRA AND MARTIN BANNISH

Comment O1

Informational Section

My wife and I attended your meeting on Monday, 3/26.

I asked the questions regarding the duration of the permit and the role the EPA plays in the oversight of plans submitted by the permittee.

We have been living full time on Quaboag Pond since December, 2014.

(Although I had been renovating the property part time since April 2011).

We paid $11,000 this February to put in a new septic system with a leach field 100’ away from the lake front.

Comments for the Record

Regarding the statement made yesterday concerning the lakefront homes as a source of nutrients in the lake:

> Yes, there is no doubt that lakefront properties can contribute to the nutrient levels in the lake.
>
> However, I think the impact that was implied by the McMansion comment is overstated.
>
> The lake is one of the least populated lakes in Central Massachusetts.
>
> There have been few (less than 5) new houses built on the lakefront in the last 5 years,
>
> There are at most 2 lakefront homes on the west side of the lake.
>
> Quaboag Street on the north east border of the lake separates the houses from the lakefront.
>
> Many of the homes on the rest of the lakefront have been converted from seasonal to year round residences.
>
> On my street, there are 4 houses. One is seasonal, one is unoccupied, one has a single resident, and only my wife and I live in our house.
>
> Needless to say, there is not a lot of nutrient infiltration coming from these homes.
>
> The most populated street is Pine Lane. Most of the lakefront homes on that street are owned by older residents, and few homes contain more than 2 residents.
>
> One indication that there is a high level of nutrients entering the lake from Seven Mile River is that every summer, the weed bed that grows on the downstream side of the Shore Road bridge is getting larger, and now extends roughly 500’ from the bridge.
>
> No other section of the lake shows that kind of growth.

The property values on the lake are depressed, in part, because of the reputation of the Spencer Waste Treatment plant.

I personally was told by a friend in Western Massachusetts who was looking for lakefront property that he would not purchase on the lake due to the water quality.

Response O1
Please see Response K1.

P. COMMENTS SUBMITTED MARCH 27, 2018 BY STEPHEN MARSHALL

Comment P1
My name is Steve Marshall and I am a longtime summer resident on Quacumquasit (South) pond in Sturbridge. While I am heartened to see the EPA's involvement in cleaning up the phosphorus emissions from the Spencer Waste Water Treatment Plant (SWWTP), I'm concerned that the efforts are neither specific enough nor rapid enough to make a significant difference.

For well over a decade, the SWWTP has dragged its feet on implementing changes. First they denied the existence of a problem, and then they denied they had any culpability in the problem. Once they were faced with overwhelming evidence, they have moved to new arguments to defer taking action, including pleading poverty. I understand these proposed fixes are expensive, but so are the costs of polluting our waters. We always find ways to pay for things that are priorities; stopping contamination from the SWWTP needs to become a priority.

During the time of SWWTP inaction, the algae blooms and invasive weeds have gotten worse and worse in the Quacumquasit and Quabog ponds, and the costs to mitigate these effects have grown. These bodies of water effect a wide swath of the community beyond the property owners around each pond; both ponds have public boat access and Quacumquasit has a public beach, all of which are enjoyed by many people in the wider community.

It is not fair for SWWTP to continue to find ways to delay and defer responsibility for their actions. They need to be held accountable in concrete ways, including a faster and more specific timeline to meet the new phosphorus limit, and specified consequences if they fail to comply.

Please do not allow SWWTP to pollute the waters of its neighbors with impunity. Their continued inaction indicates they will never make cleanup a priority unless they are held accountable by a regulatory agency. Please provide them the consequences and incentives to make SWWTP cleanup a priority.

Response P1
Please see Responses C1 to C7 and K1.

Q. COMMENTS SUBMITTED MARCH 28, 2018 BY DONALD TAFT

Comment Q1
I was unable to attend the public hearing on the SWWTP last night as I am out of town for a couple of weeks. I was, however able to watch it via computer.

I thought that the hearing went very well. I want to thank you for hosting the hearing and for giving us the opportunity to express our concerns and issues. I hope the you will give them serious consideration.

One of my major concerns has always been that the lost water leaves the wet beds and leaches to ground water thru the unlined uncapped dump, which is adjacent to the wet beds. And MA DEP solid waste department admits that because the dump was in operation prior to regulations and they have no clue as to what may in fact be buried on that site. With the plant upgrades being so far away the wet beds will continue to be an issue.

Thank you again for your dedication to the NPDES process in MA.

Response Q1
EPA and MassDEP appreciate the comment. We take this opportunity to assure you that we take public comments seriously and routinely make changes to a Final Permit because of public comments received, as we have done here.

However, the issue raised in this comment, regarding an unlined landfill in the vicinity is outside the scope of this NPDES permit action, which is limited to discharges from the wastewater treatment plant to Cranberry River. The agencies encourage the commenter to follow up with James McQuade, Solid Waste Section Chief for MassDEP's Central Regional Office at 508-767-2759 or at james.mcquade@mass.gov with any concerns about groundwater contamination from the former dump or the nearby landfill.

R. COMMENTS SUBMITTED MARCH 27, 2018 BY CARL F. NIELSEN

Comment R1
My name is Carl F. Nielsen and I am a resident of Sturbridge living on South Pond. I am also a board member of the Quaboag/Quacumquasit Lake Association (QQLA).

I would like to address the artificial wet lands that have been an issue for both of the down stream lakes. These wet lands are not lined and have been constructed on or adjacent to an old abandoned land fill that was never capped (as DEP records show). Any water that enters said wet lands leaches through to ground and then to surface water, then carried to the lakes via. the Seven Mile River.

I understand that the draft permit recognizes this deficiency in the SWWTP operation and is going to mandate that said wet lands will be abandoned in several years. Thank you, the EPA and the DEP for addressing this issue and proposing this mandate.

My question with regards to the artificial Wet Lands is: **When the Artificial Wet Lands are abandoned, will they be capped so as to prevent storm water from leaching through years of accumulated contaminants then into the ground and will the SWWTP be mandated stop discharging bypasses water, during extreme storm events, into said wet lands?**

An extreme weather bypass to the wet beds will continue to be an illegal ground water discharge without a ground water permit with the Massachusetts DEP. I realize that a treatment bypass is not allowed in the permit but we have been told by the SWWTP operators that all treatment plants have to do it in extreme rain events. I understand this and also understand that in Spencer, their I/I issues must be addressed in order to minimize the need to bypass treatment. Until the I/I issues are addressed they will bypass.

Response R1

Regarding the comment that the wetland beds were "constructed on or adjacent to an old abandoned landfill that was never capped," the comment refers to unspecified "DEP records," but does not provide any. *See* Response Q1.

The Spencer WWTP has not reported any bypasses during the 2007 Permit term. Please see Response E11 for details of the Town's activities to reduce I/I.

EPA understands that the Town's preliminary plans for the wetland beds are to abandon them in place and use them as a conservation area. Under such a scenario, the wetlands would no longer receive any secondary effluent. The agencies are not aware of whether the Town may choose to cap the abandoned wetlands, however, the Final Permit requires the Town to report its plans regarding the wetlands in each Compliance Schedule Annual Report. Please see Response C5.

The comment asserts that a bypass to the wetland beds will violate state groundwater discharge permitting requirements. The Final Permit is a NPDES permit issued under the federal Clean Water Act (and implementing regulations) and a state permit issued under the state Clean Waters Act (and implementing regulations). The Final Permit is not issued pursuant to the state's groundwater discharge permitting program and, consequently, does not address the applicability of MassDEP's groundwater discharge regulations.

For the other issues raised in the comment, please see Responses C1 to C7.

S. COMMENTS SUBMITTED MARCH 28, 2018 BY CAROL NEILL

Comment S1

My name is Carol Neill. My husband Thomas Neill and I have lived on South Pond in Sturbridge, MA since 1978. As the years passed by so did the increase in extra monies we have been asked to donate to control the weed growth caused by the high phosphorous content. When we first came here and joined this beautiful lake's Association we paid our yearly dues and that was it. Now annually we are asked to donate to the cause.

Over the years we have both worked tirelessly to have a beautiful home on a beautiful lake so that when we retired we could fully enjoy all that was offered from living on the water. My husband is a great fisherman and loves to be out at the crack of dawn viewing the sunrise from his fishing boat and the beauty of it all. Well, now we are both retired and have seen the weed growth that has been developing over the years. Our income is limited and we resent the fact that we are hit up every year to constantly battle the new growth of weeds that are only increasing if they are not treated. We DO NOT like the use of the chemicals to treat the problem algae blooms and weeds; but what choice is there? After treatment the lake is not usable for fishing or swimming for 2 or 3 days. Notices informing all residents and the public of this has to be posted all around the lake and Public Beach each time by someone, namely lake residents. The notices then have to be removed after completion of treatment. This is now a yearly ritual.

We have nieces and nephews and their families who love to come here and fish and swim. We are so happy to have them. A lot of times they are in the weeds and have to go to a different spot. There is also constant cleaning of the shoreline needed as the weeds are deposited there with each storm and windy days.

Our front yard is everyone's front yard, unlike a non lake resident whose property is their own. This lake is very well known for its incredible fishing; and we have the Public Beach at one end for everyone to use and enjoy. We pay high taxes to live on this amazing lake. We do not want to see our "Front Yard" deteriorate and fill with algae blooms and weeds. We want it to stay clear for recreational boating, swimming and fishing. We do not want to see our property values go down as a result, making it difficult to sell a home if necessary. The fact that the SWWTP is allowed to discharge into the Seven Mile River which ends up in North Pond and then into South Pond makes it imperative that they comply with the guidelines. Spencer has had 10 years of operation on a 5 year permit. Why is Spencer being allowed this amount of time to rebuild and keep operating?

The permit should have a 7 month growing season with the lower amount of phosphorous and only 5 month winter of higher phosphorous allowance. It appears that all other treatment plants have the longer growing season. Why should Spencer be an exception? Spencer should do what is right and follow the same guidelines as every other treatment plant. They are causing their neighboring towns property and lifestyle hardships. This constant accumulation of phosphorous in the sediment will continue to use up thousands of our hard earned dollars every year to control, not even to eliminate, but just to control. More money for the "Lake People" to dish out of their pockets.

Back in 1978 we bought and created our dream home for our retirement and forever. SWWTP needs to comply and operate within all the guidelines for all phosphorous limits, waste load allocation, growing seasons and all other [sic]. The lower limit of phosphorous must be .05 as it is entering our lakes, (our front yards and the public's front yards). This is as specified in your EPA Gold Book. They need to be held accountable for all their actions and should be required to annually compose and disclose their progress. Perhaps an imposed daily fine should be specified for failing to operate properly, and if not, why not.

We are asking and pleading for the EPA's assistance in forcing the SWWTP's compliance in keeping our area watersheds clean and useable for all.

Response S1

Although a significant source of phosphorus to South Pond (aka Quacumquasit Pond), the Spencer WWTP is not the only source; according to the QQ TMDL, it contributes a relatively minor portion of the overall phosphorus load to the pond. *See* QQ TMDL at 42,

43. In any event, the phosphorus limits in the Final Permit are consistent with the WLA in the TMDL and more stringent than those in the 2007 permit. While the agencies acknowledge the delay in issuing the Final Permit, we also note that the new seasonal limits of 0.1 mg/L and 0.2 mg/L are among the lowest for POTWs in New England. *See also* Responses C1 to C7. Regarding the reference to the Gold Book criterion for phosphorus, please see Response J1.

Also, the Final Permit has changed the starting month of the warm weather phosphorus limits from May to April, meaning that the more stringent limit will be in effect for 7 months each year, as requested in the comment. *See* Response C2.

Finally, regarding the comments that the facility should be required to disclose annual progress and that a daily fine should be specified, please see Responses C5 to C7.

T. COMMENTS SUBMITTED MARCH 28, 2018 BY ED PERLAK

Comment T1

Our family has owned property on Quaboag Lake in Brookfield for close to 70 years. Over the past several decades we have witnessed a marked deterioration of the lake condition and the adjacent area.

By now you have heard the evidence and seen the documentation presented by the QQLA regarding the inadequacies of the SWWTP which empties marginally treated plant water into slow water which makes its way into the lake. The impact of this discharge over time has become empirically obvious leading to out of control weed growth, algae blooms and potential groundwater contamination.

Over the years our local towns and residents have expended much energy and tens of thousands of dollars to attempt to mitigate the negative effects on the lakes and surrounding environs because of problems with the SWWTP.

Of great concern is that the lake ecosystem is rapidly approaching a tipping point in its ability to assimilate the pollution coming from the SWWTP. The weeds and algae growth are warning signs that immediate and significant action is needed.

With this in mind, I request you give consideration to:

1. Ensure that the SWWTP meet the highest possible standards for discharge from the plant. That this discharge is going into a slow water stream and then into connected lakes demands the highest level of performance from the plant.

2. We are running out of time. The SWWTP has been operating for at least the past 10 years with these problems on a 5 year permit. The flow drawing presented at the hearing indicates a target completion date of 12/2024. Given that the SWWTP has apparently not been held accountable for its performance over the past 10 years, what incentive does Spencer have to meet its own target date 6 years hence? Furthermore, What is their responsibility to clean up the mess that

they have created? What moral and or ethical justification can there be for one community's actions (or inactions) that result in harm to its neighbors?

3. The SWWTP must be held financially accountable now and during the permit process including project implementation, for the environmental impacts of plant performance, otherwise there is no incentive for Spencer to move with all immediate speed.

4. Holding the SWWTP to the highest operating standards will help protect the local aquifers that provide the water supply for our towns.

Response T1
Please see Responses to Comments C1 to C7 and K1.

U. COMMENTS SUBMITTED MARCH 27, 2018 BY LOUIS FAZEN

Comment U1
I have grown my family on South Pond over the last 37 years. Unfortunately our deep lake has become more and more polluted with chemicals, weeds and less clarity over that time. Yes, there are many reasons for that pollution but the discharge from the Spencer treatment plant is one of the main reasons.

The plant is just not capable to properly treat all the waste water coming in so there is a continuous major disparity between intake volume and treated discharge volume.

High discharge phosphorus levels is one example.

It has taken 10 years to attempt to correct the deficiencies at the Spencer Treatment Plant and yet the major problems still persist. It doesn't meet EPA standards. It is a failed system!

By publicly admitting SWTP has failed should allow for additional emergency opportunities for imperative funding at state and federal levels.

The failed treatment plant approach would allow the best chance for a Win-Win conclusion for both the town of Spencer and all the downstream inhabitants including fish, fowl and resident families.

Response U1
Please see Responses to Comments C1 to C7 and K1.

V. COMMENTS SUBMITTED MARCH 28, 2018 BY HOWARD SER

Comment V1
Hi Robin my name is Dr. Howard Ser and I live at [address redacted] Sturbridge Ma. I am a resident of South Pond and a member of QQLA. I would like to thank you and the other members of the permitting offices for holding the U.S.EPA NPDES permit hearing at the Spencer Mass Public Library on March 26, 2018.

I appreciate the information you shared with me during the intermission break. I was surprised to hear that out of the approximately 600 permits that the district I Boston office oversees that the Spencer WWTP is the only waste water treatment plant that is directly upstream of a large pristine fresh water recreational network of lakes and rivers. My question to you after this revelation was the possibility of fast tracking the SWWTP permitting, that is now eleven years overdue, in order to implement whatever the EPA DEP changes are written into the permitting. I understand that whatever changes are written takes time to become reality. Our association has raised and spent thousands of dollars in an effort to protect these valuable fresh water resources. It wouldn't take much to upset these efforts and to lose the valuable resource many have labored to protect.

I know that your task is a difficult, tedious and science based process that must be fair to all involved. Above all it should be fair to the environment that we all work to protect.

We look forward to your timely decisions concerning the SWWTP permit renewal process.

Response V1
Please see Responses C1 to C7, H5, and K1.

W. COMMENTS SUBMITTED MARCH 28, 2018 BY CONSTANCE MONTROSS

Comment W1
I have lived on South Pond in Sturbridge for 38 years- 35 in my current home. I have been a member of the QQLA and applaud their efforts to keep both North and South Ponds clean. These efforts have included frequent treatments of algae and weeds, which have proliferated in part due to the discharge from the SWWTP. This discharge has continued for years as you know.

I was encouraged by your efforts to draft a fair and timely permit.

Certainly all those whose properties are affected and who care deeply about the quality of these waters for all should be heard. I urge you and all those responsible for the permit to issue a fair permit in a timely manner. It was very disappointing to hear of the very long delays in this process.

Response W1
Please see Responses to Comments C1 to C7.

X. COMMENTS SUBMITTED MARCH 28, 2018 BY BILL SEABOURNE

Comment X1
First let me thank you for your attention to the environment and especially your help over the last 6 years working closely with QQLA. I'm sure it is a bit stressful being between Spencer, your management and QQLA.

Most important to me would be to push the lower phosphorus level suggested, impose them or lowered them if possible. Other plants meet lower levels and they don't have recreational lakes down stream as SWWTP does. And the shift to the more standard winter season/ summer season (5 - 7 month) calendar would contribute to lowering the phosphorus levels being emitted from Spencer plant.

Second on my list is the scheduled proposed by the plant, to take 6 years to meet the levels of phosphorus that will be in this permit. Spencer just had a free ride for 5 or 6 years, operating on an expired permit, surely they could have used that time wisely to move ahead on a redesign that they must have realized they were going to need to meet requirements of their next permit. And the Ground Water permit, did they think that they could operate illegally for ever! They should have that portion done by now to remove the unlined wet beds.

Now if you would Robin consider this rather personal point; I plan to have some of my ashes spread on South Pond after I die. I am 72 years old. I can't wait for ever for the improvements to occur! And I don't want my ashes to reside for ever beneath weeds super charged by the SWWTP phosphorous!!

Response X1
Please see Responses C1 to C7, K1, and R1.

Y. COMMENTS SUBMITTED MARCH 28, 2018 BY DOUG VIZARD

Comment Y1
The QQLA is gratified that the EPA has recognized the significance of the 2006 TMDL study of the lakes downstream of the SWWTP. The recognition of the advanced environmental damage was a good first step in applying appropriate EPA policy to begin the necessary mitigation.

That 2006 study is a 12-year old snapshot of the lakes, which attests to the cumulative and ongoing advanced lake eutrophication. At that time, shore properties were largely developed and there had been much prior redevelopment of older properties with inadequate septic infrastructure. Since that time, more building of modern infrastructure adhering to the best ConComm and BOH criteria has occurred. There has been significant real estate turnover over the past decades wherein Title V upgrades have been applied. The best educational efforts and labors of our communities to mitigate nutrient load have been applied. Fertilizer regulation and public education has been in effect of more than two years. There is every reason to assume that the local residential contribution of nutrients in our lakes has not significantly increased since the 12-year old data was accrued. Unfortunately, the Mass DEP has shown no willingness to update the data that would inform us of any progress that may have occurred in nutrient load in our lakes, nor in the Sevenmile River watershed.

The recent history of SWWTP performance is documented, showing an effort to modestly mitigate nutrient discharge. It was made clear from the Mass DEP 2114 directed measures of the SWWTP monitoring wells that groundwater discharge was problematic. Operational data showed that less than half of the inflow was being fully treated and the lost volume was indeed groundwater discharge. The monitoring well data (although inadequate) stands as the only measures made of groundwater, and suggests phosphorous concentrations that are greater than the fully treated outfall. Absent additional information, the EPA is assuming the ground discharge is similar to the outfall. We are grateful that the EPA recognizes that the application of a total nutrient emission limit must be calculated from the total volume of influent.

However, we must assume that the nutrients discharged by SWWTP are underestimated. We must assume that the combined discharge of surface and subsurface nutrients is underestimated. Any reasonable model of phosphorous retention and exchange in the wet beds and immediately down-stream would suggest a contaminated plume of many (or many hundreds) of acres. We are dismayed that MDEP is not moved to require a ground-water discharge permit that would require that the extent to which the nutrient emissions have impacted the Sevenmile River and down-stream lakes.

It is very clear that SWWTP emissions have been, are, and will continue to be constant source of nutrients. It is likely that our local community efforts have not adversely effected our lakes in recent years, but it clear that SWWTP performance has not improved and its contributed nutrients will not diminish for years according to the scheduled improvements. It was clear to all parties concerned for more than three years that SWWTP needed a serious upgrade, yet SWWTP officials claim they are only in the planning phase of an upgrade. The need for performance improvements in the SWWTP are way past due and the EPA must be much more aggressive a demanding a shortened time frame for performance upgrades.

Response Y1

MassDEP implements a water quality monitoring program in the Commonwealth that recognizes the need for, and resource challenges associated with, monitoring to assess the effectiveness of TMDL implementation. *A Strategy for Monitoring and Assessing the Quality of Massachusetts' Waters to Support Multiple Water Resource Management Objectives*, at 27-29, 32 (MassDEP 2018) (hereinafter, "2016-2025 Monitoring Strategy"). One way that the agency leverages resources to achieve such monitoring is by partnering with citizen watershed groups to collect data meeting appropriate criteria. *Id.* at 2, 31-32, 35, 40. If QQLA has not already done so, it might consider teaming up with MassDEP to collect monitoring data for the lakes to assess progress associated with efforts to reduce nutrient inputs to the lakes.

Please also see Responses C1 to C7, K1, and R1.

Z. COMMENTS SUBMITTED MARCH 28, 2018 BY JOHN VACON

Comment Z1

I am very concerned about the weed and algae that forms from pollutants that enter south pond through North Pond.

Response Z1

EPA shares your concerns about nutrient enrichment to South Pond (aka Quacumquasit Pond). Excessive growth of algae and invasive aquatic plants diminishes the value of a pond to abutters and the public. While it is not clear that the Spencer WWTP is the dominant contributor of phosphorus to South Pond, it is a contributor. In part for this reason, EPA has included phosphorus concentration limits in the Final Permit that are among the most protective in Massachusetts. Please also see Responses C1 to C7.

AA. COMMENTS SUBMITTED MARCH 28, 2018 BY MEG NOYES

Comment AA1

I just want to re-emphasize that the South pond is the only trophy brown trout lake in MA. Quaboag is directly downstream of a plant discharging into the Seven Mile River (as planned) and deserves EPA "gold book" treatment with the lowest possible phosphorus.

We are the only lakes downstream of a WWTP in MA.

Here is a copy of my statement which I failed to leave.

My name is Meg Noyes from the Quaboag Quacumquasit Lake Association. I will to introduce the work of organization [sic], then you will hear from the water Consulting firm ESS. They conducted testing of the waters downstream from the treatment plan [sic] for us. Finally, legal issues presented by our lawyer Jamie Vander Salm,

Donald R. Taft, resident of Brookfield, QQLA BOD member is a co author of this presentation

As member of QQLA for 12 years and board member I speak for a non profit representative organization of 200 families in the watershed who have had an interest in seeing improvements of the SWWTP. This has been for the last 25 years.

However, I should make it perfectly clear that I not only represent QQLA, I speak in part for the communities of Brookfield, East Brookfield, Sturbridge. I also speak for the concerns of those who live, work and play downstream from this facility. We also want to express the concerns we have about economic impact of the facility.

There are other community leaders here to express their own viewpoints. They have all written letters of support which you have received.

On behalf of, QQLA would like to thank the US EPA and MA DEP for holding this public meeting/hearing as required.

The QQLA mission is the protection of the environment, waterways, streams, rivers, wetlands and lakes, just as suggested and mandated by the 1972 Clean Water Act provisions.

We are concerned for the economic and recreational impacts of the SWWTP on lakes and streams, not to mention the protection of East Brookfield and Brookfield Public Water Source wells.

Quaboag (North) and Quacumquasit (South) Ponds are directly downstream from the SWWTP discharge, these two bodies of water are prime recreational bodies of water that are prized warm water and cold water fisheries.

The lakes provide swimming, boating, kayaking, canoeing, and a general enjoyment as a natural resource and environmental treasure. The watershed which numerous species of very special flora and fauna. Including the 2 species of bittern, largest US concentration of very rare Long's bulrush.

The deteriorating water quality has an effect on the economic value of land, waterways, and individuals. And the biggest source of the problem is phosphorus.

We are all collectively responsible.

So what has QQLA done to limit phosphorus in the watershed?

In the non source point area addressed

- Getting ban on phosphates in dishwashing detergents
- Education to limit phosphorus in lawn fertilizers
- Supporting town efforts Title V septic system replacements,
- Secured 319 grants to deal with run off and contaminating infiltration into our waterways,
- Provide trash services at both ponds/ beaches/boat ramps,
- Paid for fall winter and spring coverage of boat ramps with porta potties.
- Hold spring cleanup days,
- Preservation of shoreline trees and vegetation

All this happened thru study fundraising and implementation costing 1000's of hours by hundreds of people.

Throughout our 25 year involvement we have spoken out to improve the SWWTP' [sic]

It is a large point source discharge of contaminants, pollutants and high nutrient load especially phosphorus.

Annually we spend $12,500 dollars to deal with the growth of invasive aquatic plants. The number is small compared to what needs to be dedicated year after year in order to help fend off these plants. That figure doesn't even come close to what it might cost (millions of dollars) to dredge North Pond or funding ($500,000) to provide an alum treatment of South Pond.

In closing I would like to thank the EPA and the NPDES for using our many suggestion [sic]. We applaud the complete reengineering of the plant that answers the entire problem we have documented.

- Please make the process of build out of this new plant happen in the most expeditious time frame possible

- Please allow for annual public information and time for questions so we can follow the timely progress of the plants

- Please recognize the hard work of hundreds of people and minimize the cumulative damage that has been done to lakes

- Help us improve the quality of treasured lakes that benefit a whole community of users.

Response AA1
Please see Responses C1 to C7, H5, J1, and K1.

BB. COMMENTS SUBMITTED MARCH 27, 2018 BY SHEILA GOODWIN

Comment BB1
We are residents on South Pond in Sturbridge.

We are members of QQLA and are Very concerned about the adverse effects that the Spencer Waste Water Treatment Plant (SWWTP) has on our South Pond as well as North Pond and the entire associated watershed.

We want to stress the importance of getting SWWTP in compliance. We are very frustrated with how long the EPA is taking to correct known violations at SWWTP. SWWTP has had 10 years of operation on a 5 year permit.

We have continually donated and raised funds to control the weeds caused by high phosphorus dumped into the watershed by SWWTP. It is not acceptable for Spencer to claim "financial hardships" at the cost of our water quality. Members of QQLA have had to hire a lawyer which would not have been necessary if the EPA was doing their job properly.

We have seen firsthand algae blooms and the continual increase of invasive weeds. We sit on our deck and smell the rancid order [sic] of decaying matter while Spencer continues to dump into Seven Mile River.

The EPA is not fulfilling their responsibilities.

We feel it is important so we are recapping the points presented by our lawyer at the recent meeting.

The Proposed New Phosphorus Limits Must Be Lower to Comply with the Facility's TMDL Wasteload Allocation.

The Growing Season Phosphorus Limit Should Apply for Seven Months.

The Timeline for Compliance with the Proposed New Phosphorus Limits is Unreasonably Long.

The Phosphorus Timeline Should Be More Specific.

The Phosphorus Timeline Should Require Both a Detailed Annual Progress Report and an Annual Public Presentation Regarding the Town's Progress. The Agencies Should Appoint a Third-Party Reviewer of the Town's Progress.

There Should Be Specified Consequences for Failing to Comply with the Phosphorus Timeline.

We realize the tone our letter is not pleasant but we are frustrated, fed up and angry that the EPA has allowed and continues to allow the SWWTP to operate in such a deplorable manner. We never thought this type of pollution would be allowed by the EPA in this day and age!

The deposition of phosphorus in the sediment is cumulative and will take **thousands of dollars** to mitigate.

Please include our email/letter in the others from our fellow QQLA members and concerned neighbors.

Response BB1
Please see Responses C1 to C7, I1, and K1.

CC. COMMENTS SUBMITTED MARCH 28, 2018 BY MARITA TASSE

Comment CC1
I'm writing as a QQLA member and a resident downstream of the SWWTP. Thank you for your thorough presentation at the meeting on Mar 26 in Spencer and the opportunity to share our thoughts and comments. Along with the points discussed by Jamie and Carl for QQLA's position, I would like to emphasize the urgency of prompt design and implementation of the tightest possible standards for the SWWTP for the sake of the rivers and lakes downstream. And, it's imperative that EPA enforces the 7 month growing season standard (April 1 to October 1 for phosphorus removal. That should be a significant plus for the environment with minimal inconvenience and cost to the SWWTP.

You, especially, are aware of the local community's and QQLA's long term efforts to work diligently for the best possible ecology and health for our lakes and environment.

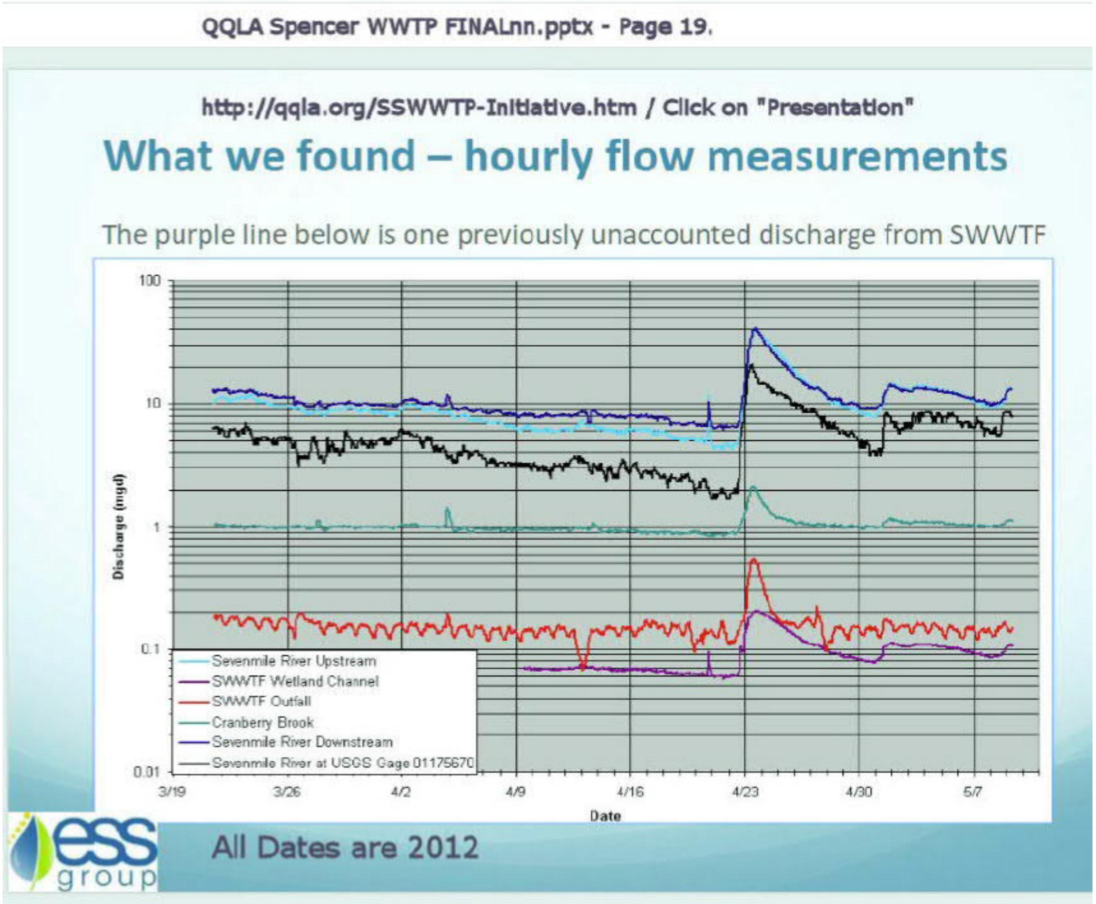
We have borne great expense in our efforts - both to stay on top of mapping and treating the weeds, also algae - plus hiring professionals to guide us scientifically and legally because the optimum results are so important to all residents in the area and the future of our resources. We realize costs are always a factor, but doing less than the best while upgrading the SWWTP would be sadly shortsighted considering the long term effects.

Response CC1
Please see Responses C1 to C7 and K1.

DD. COMMENTS SUBMITTED MARCH 28, 2018 BY RANDY WEISS

Comment DD1. Storm Water Infiltration.
It is my understanding that the term 'infiltration' in this context describes the entrance of water (often storm run off) into the sewer system. Utilizing data from the USGS river gauge on the 7 Mile River (Gauge # 01175670) and comparing data for the months of March, April and May 2012 with the data collected by the ESS group for our lake association (QQLA), it is obvious that a heavy rain causes the outflow of the 'plant' to increase in proportion to the rain fall. The ESS presentation can be found on the QQLA website (QQLA.org) at *http://qqla.org/SSWWTP-Initiative.htm* - the link is labelled "Presentation".

It is not my intention to introduce the entire ESS presentation, however there is one page (#19) that is pertinent. This is presented here:



Review:
Red line = SWWTP Outfall.
Black Line = Stream Flow condition upstream of the plant (USGS gauge).
It is clear that the 4/23 rainfall event caused the plant outfall to increase from about .15 MGD to about .55 MGD... a factor of almost 4 to 1.

Response DD1

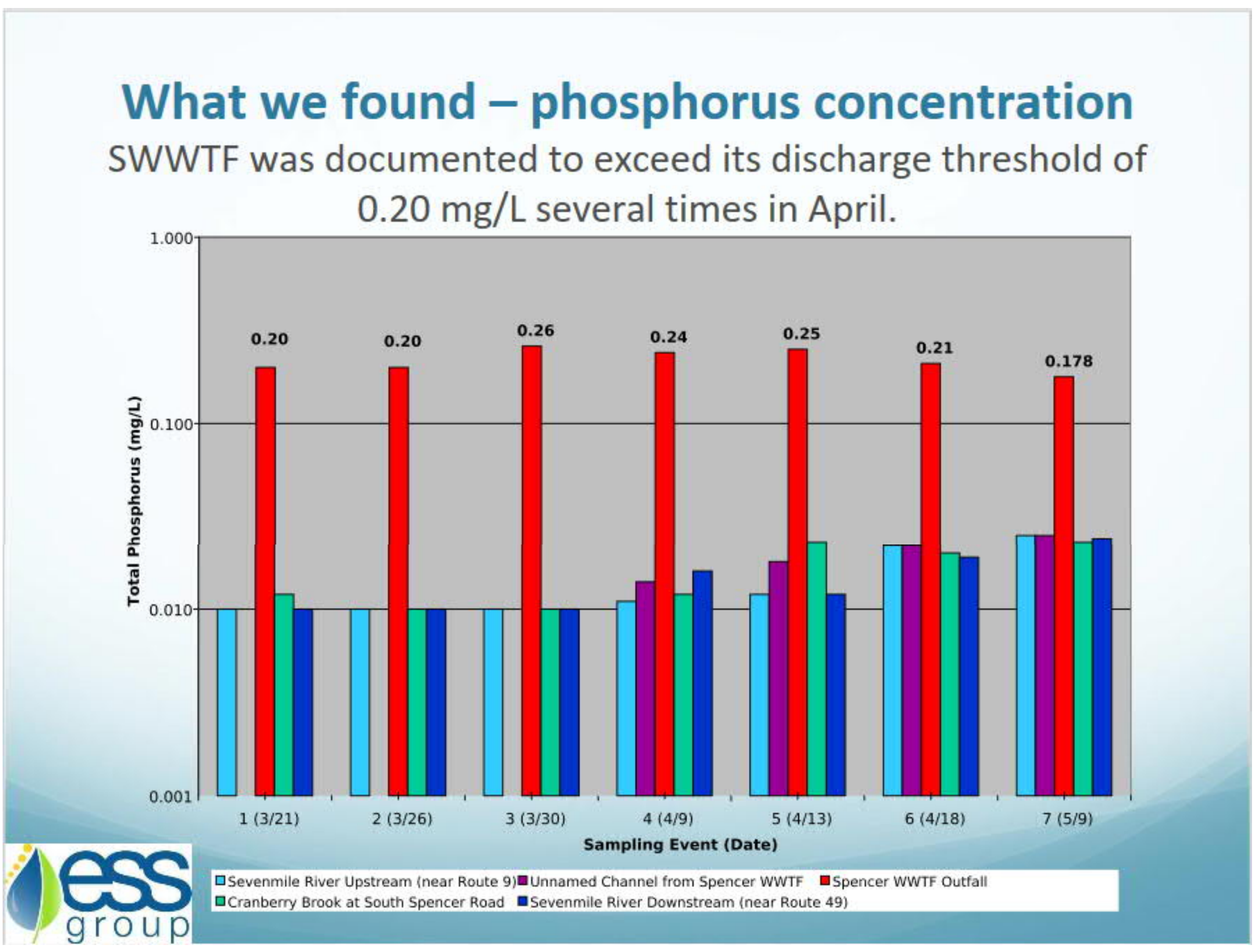
The effect described in the comment is known as Inflow & Infiltration (I/I). Inflow occurs when illegal cross connections (e.g. sump pumps, roof leaders) bring stormwater into the sewer system. Infiltration is shallow groundwater or stormwater that enters the sewer system during wet weather. Due to the age of infrastructure in Massachusetts, it is extremely common for sewer systems in Massachusetts to have physical defects that allow stormwater to enter the pipes.

For the past 20 or more years, NPDES permits for POTWs in Massachusetts have included I/I management requirements. The Final Permit includes updated Collection System Operations and Management (O&M) Requirements (Part I.D.) that, in addition to requirements to reduce I/I, also require mapping of the sewer system and the creation of a Collection System O&M plan that allows the Town to plan for routine maintenance.

Additionally, MassDEP regulations at 314 CMR 12.04(2) require that all sewer authorities develop and implement an ongoing plan to control I/I, and required sewer authorities to complete an I/I Analysis of the sewer system and submit a report to MassDEP by December 31, 2017. MassDEP allowed sewer authorities to request an extension on submitting these reports and Spencer was one of the sewer authorities that was granted an extension. As such, Spencer was required to submit this plan to MassDEP by December 31, 2018, and Spencer met that deadline. Furthermore, as discussed in Response E11, the Town is engaged in an upgrade of its sewer system as a precursor to the upgrades of the WWTP.

Comment DD2. Phosphorus Levels.
Another page of the ESS report (Page 21) shows the results of several assays of samples from the waters around the plant. Two main conclusions can be drawn from this data: A) The phosphorus levels of the plant's output are ABOVE the permit limit (and way above the TMDL limits).

B) The question of whether APRIL should be in the Winter or Summer control group is addressed: namely the April readings of the SURROUNDING waters show phosphorus increasing - implying that the time to REDUCE the plants output corresponds with this timing, ie. APRIL.



Response DD2

The reference to page 21 in the comment is to the QQLA presentation rather than the ESS Report. This claim has been made previously to MassDEP, and the agencies direct the commenter to MassDEP's earlier response:

> *At the meeting we discussed your presentation regarding SWWTP's noncompliance with phosphorus limits. On page 20* [sic] *of the presentation you state that the permittee "exceeded its discharge threshold of 0.20 mg/L several times in April" (2012) based on grab samples that ESS took from the SWWTP outfall. As discussed during the meeting, SWWTP's NPDES permit allows for a phosphorus average monthly limit of 0.3 mg/I (not 0.2 mg/I) through 24-hour composite samples (not grab samples) obtained at a frequency of 1/week from November 1 to April 30. Contrary to the conclusions drawn in the ESS Report, MassDEP has not found SWWTP to be in violation of its NPDES permit during the time periods noted in the Report. The presentation should be corrected to accurately reflect SWWTP's compliance status for phosphorus during this time period.*

In addition, the claim that the page in the presentation shows that levels are "way above the TMDL limits" is unsupported. The TMDL does not contain "limits" *per se*, although it does include a waste load allocation ("WLA") for the Spencer WWTP. This WLA, however, is expressed as a mass, not a concentration. The page referenced in the comment, however, portrays concentration data, not mass data. Thus, the referenced page does not support the statement that "phosphorus levels of the plant's output are . . . way above the TMDL limits." In any event, the Final Permit establishes phosphorus limits for the facility that are more stringent than those in the 2007 permit, and the facility will need to undergo an upgrade to achieve those limits. FS at 25.

Regarding the seasonal phosphorus limit, please see Response C2.

Comment DD3. Blue Green Algae Bloom

As I mentioned at the Public Hearing on Monday 3/26/18, the Blue-Green Algae blooms have been much worse in the last 6 years or so than anyone can recall. Many prior years (before 2000) have seen no such blooms (as per many observations over decades by local residents). In September, 2012 there was a massive algae bloom. This was noted in the Worcester Telegram and Gazette:

=== Telegram and Gazette Begin ===

From the Worcester Telegram and Gazette Wednesday, September 12, 2012

Algae bloom turns Quaboag Pond green with toxicity risk

By Bradford L. Miner TELEGRAM & GAZETTE STAFF

BROOKFIELD — Quaboag Pond, home of record northern pike, languished in the morning sun today like a bowl of lukewarm pea soup.

=== Telegram and Gazette END ===

They had an accompanying photo: "POND CLOSED" sign placed on the Quaboag Boat ramp.

Here are three of the photos taken that same week from my shoreline: [Redacted]

NOTE that the Mass Department of Public Health contacted us, and several of our neighbors in concern that our water wells might be contaminated by this toxic algae bloom. They did send out agents who took samples. Notices were placed on posts and trees in our neighborhood to avoid water contact - and prevent pets from drinking the lake water. Several local residents were somewhat terrified by this outcome.

NOTE: the well samples showed no toxic contamination.

Response DD3:
The comment included four photographs, which the agencies have not reproduced in this Response to Comments but have included in the administrative record for the permit proceeding.

Blue-green algae (aka cyanobacteria) are naturally present in fresh waters but may grow rapidly during warm weather to form cyanobacterial harmful algal blooms (cyanoHABs). Several factors contribute to cyanoHABs, including nutrient availability, light availability, water temperature, pH changes, water stagnation, and vertical mixing. Rising temperatures and changing rainfall patterns associated with anthropogenic climate change have made cyanoHABs more common.

The Final Permit dramatically reduces the allowable nutrient loading from the Spencer WWTP, which should make cyanoHABs on Quaboag Pond less likely. However, if an individual observes a potential cyanoHAB, they should avoid contact with the water and report the observation to their local health department. The local health department will then contact the appropriate state agencies to arrange for further testing and issue advisories as needed.

Comment DD4. Request for Action:
The above three items of 'comment' indicate the degree to which the SWWTP has violated its prior permit limits, and one dramatic adverse result therefrom. It is my request that the proposed permit now under consideration be such that these violation of limits be prevented, and thereby preventing the adverse effects seen downstream from the plant. NOTE: Lake Quaboag (and our sister lake, Quacumquasit) are the ONLY lakes in the commonwealth that lie downstream from a Waste Water Treatment Plant.

Response DD5:
As discussed above, the Final Permit includes more stringent limits to reduce the phosphorus load to the ponds from the Spencer WWTP, which should also make cyanoHABs less likely, and conditions to address I/I. *See* Responses DD1 to DD3. With respect to enforcement, please see Response E6. Note that, contrary to the comment,

several impoundments and lakes in Massachusetts receive POTW discharges. Some examples are listed in Response H5.

EE. COMMENTS SUBMITTED MARCH 27, 2018 BY CURTIS FAZEN

Comment EE1

In 2007, I completed my Master's Thesis in Environmental History about South Pond through Northeastern University.

My thesis was 5 chapters and covered all parts of the lakes history including the environmental degradation and the movement to protect them.

If the EPA would like a copy of my thesis, I would be happy to send a digital or paper copy.

We all benefit by protecting the lakes.

Response EE1

Please see Responses C1 to C7 and K1.

FF. PUBLIC HEARING COMMENTS – MARCH 26, 2018

Comment FF1 - Kevin Olson

MR. OLSON: Thank you everybody. Good to be here tonight. Kevin Olson, Senior Project Manager with Wright Pierce. We are a consulting engineer working with the Town. We've been working with the Town for several decades I think actually. So, we continue to work with them now as part of the permitting review process.

So, I did get a chance to speak at the meeting before. So, I'll shorten up a couple of things that I did want to say. But, I just wanted to say first and foremost, ourselves and the Town have appreciated the work that EPA and DEP have done with us to date to get to this point of the Draft Permit. So, it's good to see that we're actually at this point right now.

EPA's aware that the Town will be submitting its written comments tomorrow. Robin is aware of that. And we actually will make some comment on the dates that are proposed in the Draft Permit as well and some of the interim dates in particular. So, those are forthcoming.

A couple of big picture comments that I'd like to make on behalf of the Town. The Town has done a lot of work over the last several decades, like I mentioned, at the treatment plant as well as in the collection system. And they've tried to really be good stewards for the environment, but also do the best job they can for the sewer users. So, this is really just kind of a next step in that process.

The NPDES permit, I think, everybody knows is really going to drive some of that work. There are some needs at the plant now. But, with the permit itself, we talked about some of those metrics earlier.

Phosphorous is one of them. And I did mention there is a handout. Again, I'll mention it now that we're on the record. If you don't have it, I think, there might still be some copies there. So, feel free to take a look at that. I'll talk a little bit more about that in a minute.

The Town is doing some other things right now as well as reviewing the Draft Permit. They're working on its comprehensive wastewater management plan right now. And that will help really set the road map for the next 20 years. What are they going to do with their collection system? What are they going to do with their plant? So, everything is going to get wrapped into that, into one nice document.

And then, right at the very end of the public meeting, I didn't get a chance to say that, when that is complete, there will be a public hearing and meeting as a requirement of that. So, I just wanted to make that comment to you that there will be an opportunity to actually comment on that as well.

The CWMP is in three phases. The first phase is more or less complete at this point and moving into phase 2. Our intended schedule is to have phase 3, the final phase, completed in October of this year. So, right around that time would be the likely time we'd schedule the public meeting and hearing on that.

The Town is also working on its I/I control plan right now, infiltration and inflow, I/I. It's DEP required. They have a time extension to complete that. All municipal sewer communities were supposed to have that completed by the end of last year if you didn't have a time extension. The Town does, so that will get completed by the end of this year.

Really, I'm bringing that up more to tell you that, after you do the infiltration and inflow program, they'll move into the next phase, which is sewer system evaluation survey, where you try to further identify some issues with it in collection system. And more salient to tonight's point is ultimately move into some sewer rehab as needed to be able to reduce infiltration and inflow, which would have a positive effect on the collection system as well as the plant in terms of a flow standpoint. So, again, the Town is doing a lot of really good work.

To the handout, and my last point that I'll make, again, take a look at this. In black, the process flow diagram is the existing treatment facility. And then, in red and in green, lays out a number of things. Again, we don't have all of the details for you tonight. Give us a little bit more time and we'll have a better feel for how the Town plans to get permit compliant.

But, there are a number of things that have already been talked about tonight, phosphorous being one of them. It's likely that they're going to add on a tertiary phosphorous system to get from that seasonal 0.2 down to that seasonal 0.1.

A couple of other things, the wetland basins that were mentioned earlier we are looking at, and the Town is considering, eliminating those basins. You know, we talked about, you know, the fact that there's some flow that's being lost there. We are looking at relocating the outfall from the Cranberry to the Sevenmile River. That's also part of what we're looking at right now.

There's some other items in here that we're looking at. Total nitrogen, it's a report only for this permit cycle. So, there is no numerical limit. We know that, but we, as the Town's engineer, need to take a look ahead and say could that be coming in a future permit cycle. So, we're going to look at that as well.

And as part of making upgrades to meet the current pending permit here, you know, what about nitrogen in the future. So, we're going to keep that future in mind.

A couple of other things I just wanted to leave you guys with. In closing, the Town -- you know, there's a lot of work to be done here. And there's a lot of variables. I know that people might have their certain opinions on when this should be completed. But, the Town is aware that the end game for permit compliance as written in the draft is the end of 2024.

So that is right now what the Town is looking at as a potential treatment plant upgrade and being permit compliant. But, again, the Town will comment on those interim milestones as well.

So, I think, I’ve covered it. I don't want to get the hook here. I wanted to stay within five. So, hopefully, I did.

Response FF1
The comment is noted for the record.

Comment FF2 - Meg Noyes
MS. NOYES: Thank you. Hi. My name is Meg Noyes and I'm from the Quabog and Quacumquasit Lake Association. And I'm going to introduce the work of the organization. Then, you'll hear about our water consulting firm, ESS. They conducted testing of the waters downstream of the plant for us. And finally, our legal issues by our lawyer, Jaime Vander Salm.

Don R. Taft, resident of Brookfield, has worked with me on this presentation and is a presenter of this comment. He and I are members of the board for 12 years. And we're a non profit representative organization of about 200 families in the watershed that have an interest in seeing improvements in the Spencer Wastewater Treatment Plant. This has been over 25 years.

I'd like to make it perfectly clear that we also represent part of the towns of Sturbridge, East Brookfield and Brookfield who have interest also in seeing improvements. And they have written letters which I think you've gotten. And you'll also probably hear other people who want to express opinions, their own viewpoints.

We have concerns about the economic impact of the wastewater treatment plant. And I'd like to thank DEP and EPA for holding this required meeting and hearing.

Our mission is the protection of the environment, waterways, streams, rivers, wetlands and lakes as suggested by the 1972 Clean Water Act. We are concerned with the economic and recreational impacts of the Spencer Wastewater Treatment Plant on the lakes and streams, not to mention the protection of East Brookfield and Brookfield's public water source wells.

Quabog, North Pond and Quacumquasit, South Pond are directly downstream from the wastewater treatment plant. These bodies of waters are prime recreational water that are prized for both their warm water and cold water fisheries. The lakes also provide swimming, boating, kayaking, canoeing and a general enjoyment of this treasured resource. They also contain special flora and fauna, two different species of bittern and the largest US concentration of the rare kings bulrush.

There's deteriorating water quality and it has an effect on the value of the land for water waste and the individuals. And we're all collectively responsible. And phosphorous is the biggest problem.

So, what has QQLA done to limit phosphorous in the watershed. We helped with the implementation of the ban on phosphates in dishwashing and washing machine detergents. We have educated the public to limit the phosphorous in lawn fertilizers. We've supported the Town's efforts in Title 5 septic system replacements. We've secured 319 grants to deal with the runoff and contaminating infiltration of our waterways. We provide trash services at both ponds, beaches and boat ramps. We paid for fall and spring coverage of boat ramps with porta potties. We hold spring clean up dates. And we urge the preservation of shore trees and vegetation.

And this has happened through steady fund-raising, education and implementing costs and thousands of hours by hundreds of volunteers.

Spencer Wastewater Treatment Plant is a large point source discharge of contaminants, pollutants and high nutrient load phosphorous. Annually, we spend $12,500 to deal with the growth of invasive aquatic plants. The number is small compared to what needs to be dedicated each year after year in order to fend off these plants. That figure doesn't come close to what it might cost, in the millions, to dredge North Pond or to provide an alum treatment, about a half a million for South Pond.

In closing, I'd like to thank the DEP and the EPA for listening to our suggestions. We applaud the complete re-engineering of the plant that answers the entire problem which we've documented. But, we want to please make the process of the build up of the new plant happen in the most expeditious time frame possible. Please allow for annual public information and time for questions so we can follow the timely progress of the treatment plant's building.

Please recognize the hard work of hundreds of people and minimize the cumulative damage that's been done to our lakes. Help us improve the quality of the treasured lakes that benefit a whole community of users. Thank you.

Response FF2
Please see Responses C1 to C7, K1, and AA1.

Comment FF3 Carl D. Nielsen
MR. NIELSEN: Thank you very much. So, I'm a certified lake manager. I've been working for over 20 years with QQLA. And I've been working in lake management for over 27 years.

My experience with QQLA goes back further than that. I grew up on the lakes. I recall what they used to look like before excessive phosphorous loading had occurred.

Phosphorous, as we've all talked about, is the significant source of nutrient to the lake. It's the critical one that causes the algae blooms. Those algae blooms settle to the bottom of the lake each year and result in internal recycling within the lake.

That internal recycling adds each year an additional load to that pond. And over 20, 30 years, what's happened is, the phosphorous has inched up. When I was a kid, phosphorous in the lake was .015. Now, it's .2 in South Pond. North Pond is .4 -- .04. Sorry. So what's happened is, over time, that phosphorous has inched up and now algae blooms are more common in South Pond. They happen annually in North Pond.

QQLA has fought to combat those algae blooms with treatments to keep the water swimmable each summer. And my company, ESS, has worked to help them do that each year by monitoring and implementing those programs.

Over nearly 30 years ago, QQLA put in or worked to put in a gate between the two ponds. That gate was designed to keep phosphorous out of South Pond which has a one a half to two year flushing rate. That slow flushing rate means that every time there's a big storm in the watershed and a back flow of water, that water comes with nutrients that flush into South Pond and add to that internal recycling load.

And it takes two years for that water to flush itself out. So, if you get a back flow every year, you're going to just gain phosphorous over time. And that's what been happening.

The North Pond has a very slow flushing rate, about 30 days to 60 days. And that slow -- I mean, fast flushing rate. Sorry. That fast flushing rate means that the nutrients that come down from the Sevenmile River into North Pond flush through the pond relatively quickly. When we get into some of the discussions later, we're going to have some very specific points that will relate to some of these facts as to how we think the permit could be improved. And Jaime is going to step up to the plate, I think, next and try to run through a few of those suggestions.

That's all I have. Thank you.

Response FF3
Please see Response K1.

Comment FF3 - James Vander Salm on behalf of QQLA
MR. VANDER SALM: Thank you. So, my name is Jaime Vander Salm and I'm the attorney for QQLA. And we've submitted written comments. And I'll just briefly go through those, some of them.

But, before I do, I'm hoping -- I understand there's no -- give and take here is not what this hearing process is about. But, I certainly hope that EPA or DEP, if there's something I'm saying that you disagree with, I hope that you'll let me know.

So, we have seven -- QQLA submitted a total of seven comments. The first of those comments, was that the proposed new phosphorous limits must be lower to comply with the facility's TMDL waste load allocation. So, the waste load allocation, as it says in the fact sheet, the waste load, the effluent limits must be consistent with the TMDL waste load allocation. So, the waste load allocations are .79 pounds per day and 1.19 pounds per day as we heard before.

If you do the math, and this is one of these areas where I hope that someone will correct me if I'm incorrect, but I think, if you do the math, and you try to figure out what effluent limit is necessary in order to ensure that the daily poundage of phosphorous is under .79, for example, in the summer, I think, if you do the math, as is done in my comment, I think what you get is actually a .09 milligrams per liter -- this is rounded off -- but, it's .09 for the summer versus the .1. And you get a .13 as opposed to the .2 for the winter.

So, you've got a difference in both. And you have a difference of the actual -- the .2 that is proposed in the Draft Permit for the winter is actually more than 50% higher than I think the waste load allocation will allow. That is to say, the 1.19 pounds per day will allow. If you're at .2 milligrams per liter, you're going to be going considerably over that 1.19, that waste load allocation.

So, I think, as a matter of law, and this is as cited in the permit, this is 40 CFR, this is the federal regulations, 40 CFR 122.4(d)(1)(7)(B). I think, as a matter of law, those have to be lower. And I understand this is, again, this is not a give and take. But, if there's something I'm saying wrong, I would invite a give and take on that point here, even though I understand there will be a response to these comments on paper.

So that's the first comment. Again, the limits by law should be no greater than .09 milligrams per liter for the growing season, and no greater than .13 milligrams per liter during the winter season.

The second comment is about the length of those seasons. As, I think, everyone here knows, the summer season, the growing season within this Spencer permit has applied and does apply in the Draft Permit. That limit for phosphorous applies for six months. That is to say from May 1st through October 31st.

And as I say in the comment, I think this is an anomaly. I have cited 20 other towns in Massachusetts here in this comment all of which have these adjusted seasonal limits for phosphorous, in other words, it's different in the winter season and the growing season. And they all employ a seven month growing season. And I don't know if there's a reason for that.

I didn't find an exception. In my own review of the permits online, I didn't find an exception to this seven month growing season, five month winter season to the break down of the year into those two periods for phosphorous purposes. So, I think, at the very least, Spencer is exceptional in this respect in having the lower limit apply for six as opposed to seven months. And I would ask, on behalf of my client, that this permit reflect the norm, which is to divide the year into a seven and a five month period.

This is not just the norm. It also is smart because April, the month of April, again, which is now in the Spencer permit, the higher phosphorous limit applies for the month of April. The growing season is -- well, it's becoming longer. I think, what you see in these other permits actually reflects the true growing season or the increasingly true growing season which begins earlier. So, you should have the lower limit apply earlier.

You have climate change impacts, such as higher temperatures, higher water temperatures, accelerated ice off. You have things growing sooner. So, it makes sense for the permit here in Spencer to be aligned with what I believe is the norm. And I think the norm is actually an understatement. I think, almost every permit, I didn't find an exception, almost every permit uses this seven month/five month break down.

The third comment that we have submitted has to do with the length of the time line. And we were looking in the fact sheet for an explanation as to -- we, QQLA, was looking in the fact sheet for an explanation as to why these periods of time were necessary. And what we see is, there's a mention of -- there's an application for financial assistance and that takes a while. And also, this is going to be costly to the members, to the persons who pay sewer fees in town.

I think, what makes it for QQLA earlier is very important to bear in mind here. There is economic cost being imposed down the river. And to the degree that financial considerations are dictating a longer schedule, and the fact sheet more or less says that's what's happening here, I think, the agency should weigh that against the financial cost to those people downstream. And there doesn't seem to have been any -- well, there's no analysis in the fact sheet as to the cost that this is imposing on persons who live on -- I think, it's not just the people who live on these ponds, it's the people who recreate in these ponds. It's a huge group of people who suffer economic loss to the degree that their lives and their enjoyment of these resources are diminished. So, I think that's important to take into account.

In any event, I don't think it is reasonable, even if all of the financial cost of this were being borne by the tax payer or by the sewer rate payer in Spencer, you still have a situation here where I believe it's safe to say, as we have in the comments, that the town of Spencer has been an extraordinary beneficiary of -- they have been treated quite charitably by the agencies thus far. And I think that's true in several respects.

It's true because, for example, this permit is being -- we are six years beyond the point where this permit -- I understand this is normal, but still, they had an extra six years before they had to come to this point in time when they were going to be called upon to spend money on these upgrades.

It is also very important to keep in mind that, as things stand, the permit effectively licenses the Town, and has for the last 11 years, licenses the Town to exceed its waste load allocation when you do, in fact, take into consideration the water, more than half of the water that comes in that is being lost through the wetland beds. What the current permit does with the current limits in place, the .2, .3, it ignores that water, and thereby, has given the Town a huge break in ignoring a large percentage of the pollution that is coming from the facility.

And I do think it's worth remembering this discharge to groundwater is actually illegal. I don't think that's in question. It violations Massachusetts regulations at 314 CMR. They need a groundwater discharge permit to do this. They've been violating this for decades. For decades. And there's been no price to pay.

I believe this also violates federal law. Increasingly, the case law says that you do, in fact, need a federal clean water discharge permit if you discharge to groundwater and it then comes out into surface waters, which is what we -- I think we have here with respect to this water coming out into Cranberry River and/or Sevenmile River.

The point is, the Town has received very generous treatment. Its violations of law, both federal and state, certainly state, have been tolerated. This permit is six years late in coming. This permit has licensed them to exceed the waste load allocation that is established in the TMDL report.

For all of those reasons, the agency should say no, we're going to insist that they move diligently and expeditiously in their design and execution of these upgrades.

Number four, and I know I'm a bit over my five minutes here, so I'll be brief. The fourth comment, I think, in several respects, the permit time line for the phosphorous limits is problematic in that it is not sufficiently specific, specifically, in three respects. Part 1(b)(2)(B) states that the Town shall, “complete a conceptual design to meet the total phosphorous limit by December 31, 2018”. And QQLA requests that it be specified that they complete a 25 percent conceptual design to meet the total phosphorous limit, that the actual kind of conceptual design, the degree of design, that that be specified. I think, otherwise, you're going to have a disagreement which will be bad for all parties and all agencies later on as to what that means.

The same thing for part 1(b)(2)(C) of the phosphorous time line which says that, no later than July 31, 2020, the Town shall, complete design plans and specifications for necessary upgrades." QQLA requests that this be amended so that it reads, complete design plans and specifications for necessary upgrades and obtain all permits required to perform such upgrades. There's nothing in the time line about acquiring permits. And I think that is going -- that lack of specificity is problematic and will cause disagreement later on as well.

Thirdly, I'm not sure if this is -- I'm not sure if this was an omission or not on DEP's part, on the agency's part, but part 1(b)(2)(E) of the permit, of the Draft Permit, says, "the Town shall attain compliance with the final effluent limits for phosphorous by December 31, 2024." It doesn't say that they must complete construction of necessary upgrades including removal of the constructed wetlands which is what QQLA would suggest.

The fact sheet does say that it is -- as has been said here today, I think, by Robin or one of the speakers, it is understood that upgrades to the facility will include removal of the constructed wetlands. And I don't know what that understanding is worth in terms of its legal effect. If it just exists in the fact sheet, I don't think it's worth much in terms of binding them legally. And I understand the premise here tonight seems to have been that that is not, in fact, binding, that this is potential, and that that's not being required.

Certainly, if that is something that the agencies want to require, it should be there right there in that time line in the permit as opposed to just a suggestion in the fact sheet. QQLA would certainly urge the agencies to put that requirement that they actually, by that date, remove the constructed wetlands, that that be put in the actual permit. Because we don't really know what's happened. As has been discussed tonight, we don't really know what's happening with the water that's getting through there in terms of its phosphorous content or anything else.

And it's illegal. It's illegal. And that's not, I think, arguable. It certainly violates state law for them to be discharging to groundwater without a permit. So, those are three suggestions as to greater specificity in the time line.

The last three requests are comments that QQLA made that have to do with, when looking at this permit, and I know it resembles a lot of these permits, but one is struck by the lack of provisions that are aimed at ensuring that the Town will comply. So, I think, it's important, and this was alluded to by one of the speakers earlier, I think, it's extremely important that there's an annual report, for example, that is -- it says that each year, by December 31st, the Town shall submit an annual report summarizing what it has done for the previous year to EPA and Mass DEP. I think, that language is very weak, summarized. So, at the very least, I would hope that the actual time line would insist on a detailed as opposed to a summary report, and actually set forth the types of detail that are going to be required.

This sort of transparency, I think, will be good for everyone. It will put greater pressure on the Town to actually act. It will enable concerned citizens and the agencies to know exactly what's happening if language such as the following is included; the annual report shall include -- this is just a proposal, but I would hope that something approximating this would be included in the permit -- the annual report shall include, without limitation, a registered professional engineer's detailed description of all planning design and construction activities performed or scheduled to be performed during the past or subsequent calendar year, dates during which such activities have been performed or are scheduled to be performed shall be specified. Any problems or delays encountered or anticipated in the performance of such activities shall be explained in detail. The annual report shall be made available to the public through the Town's website simultaneously with its submission to EPA and DEP.

I think, this is very important for this permit to spell out exactly -- to make that annual report useful. I think, it's a very useful tool for transparency. But, in order to make it -- to maximize its usefulness, I think, it's very important that it specify what kind of -- that it specified detail and it specified what kind of detail should be included.

QQLA would also suggest that there should be a live public presentation required. And I understand, again, this may not be normal for a permit, but perhaps it should be, that there be a forum like this at which the Town, after having submitted its annual report, and what we propose is that next February, that there be a meeting at which the author of that report present to the public and answer questions from the public regarding what has happened for the previous year and what is planned for the next year.

Again, I think, in the long run, this will be beneficial for all parties, this kind of -- for the public to be informed, for the agencies to be informed and for the public to have opportunities to actually ask questions and express concerns about the progress that the Town is or is not making.

I would also suggest that a third party reviewer would be useful here to keep the Town honest and to ensure that it's taking these requirements -- that it's moving along quickly and that it's moving along intelligently, both with respect to its designs and its construction of upgrades.

Lastly, in some of the general NPDES permits, you see a language about enforcement. You'll see language, for example, in the construction general permit. Any violation of this permit is a violation of the Clean Water Act for which you can be fined, up to this amount, 50 some thousand dollars per day per violation. I think, it's important to have a paragraph like that in the permit. I don't think there is one that actually sets forth -- that serves to give the Town a clear advanced warning that there actually will be enforcement consequences, and ideally, what those enforcement consequences will be.

Obviously, there can be fines. But, I still think it's important to actually say that in the permit. I think, the Town has had a lot of experience with the law not being enforced against them. And I think, it is safe to assume the Town may have become accustomed to thinking that these deadlines and the terms of this permit will not be very vigorously enforced against them. And I think, a statement will be useful about the agency's intention to hold the Town to these deadlines, for example, and also, what the agencies will do concretely. So, for example, it might say, if you fail to meet these deadlines, the agencies intend to take enforcement action, and this enforcement action may include, aside from fines, it may include a ban on the receipt of further transported septage or other waste from entities that are not connected to the sewer system. Or perhaps, a freeze on further connections. The type of enforcement actions that agencies do tend to take against wastewater treatment plants that are recalcitrant or that are violating the terms of their permits.

It would seem very useful to spell that out right here. Certainly, the Town is not going to be able to come back later, if it becomes tardy or recalcitrant, it will not be able to come back later and say that it did not anticipate that these types of things would be the consequences.

Again, all of this is written in some greater detail in these comments. And on behalf of my client, we really appreciate the time that you're spending this evening, and also the time that you have spent communicating with them. In particular, Robin, they really appreciate the consideration that you have shown them in recent years. So, thank you.

Response FF4
Please see Responses C1 to C7, which address QQLA's written comments.

Comment FF5 -Randy Weiss
MR. WEISS: My name is Randy Weiss and I'm an East Brookfield resident. I live on Red Gable Road on North Pond. And I've two comments. The first is a technical one. It's pretty clear from the reports that this Spencer Wastewater Treatment Plant has put out -- if they're compared with the US geological survey gauge of the river that's upstream from the plant, that when there's heavy rains, the outflow from the plant increases dramatically. And this is easy to see from comparing those two sites.

So, it's clear, although there's no direct proof, there's no physical evidence of where the pipes are, that the storm drains are somehow flowing into the wastewater treatment plant. And this is a problem for any wastewater treatment plant. Except, if there's a major overflow, it does not affect the people in Spencer. The more of an overflow, it will go down the Sevenmile River a mile and a half. It will go under the bridge along Shore Road into North Pond. And it will be at my house, because there are no houses along the river and I'm the first house on the pond.

And that's my first comment. My second comment is a more emotional one and that is, that when the previous owner of our house lived there, there was never a blue algae, blue green algae bloom. And in the first half of the time that my wife and I have lived there, there wasn't one.

But, the amount of phosphorous has increased. And there was a significant bloom there. Now, it's a bloom almost every year. There was a significant blue green algae bloom about five or six years ago. And it's well on the record, the algae was not just on the surface, but it looked like little loaves of bread floating on the surface. And it was so severe that, I think -- I believe, it was the Massachusetts Department of Health that tested 10 or 15 wells, including ours, because once again, the phosphorous comes down the river and it comes to me.

And it was terrifying for all my neighbors, my wife and I. We were afraid our dog would drink the water. There was a warning placed on all the trees. And this was directly caused by the increased phosphorous from the plant. It's well documented. Thank you.

Response FF5
Please see Responses DD1 through DD5, which address Mr. Weiss's written comments.

Comment FF6 - Larry Dufault
MR. DUFAULT: Yes. Larry Dufault, Spencer Board of Sewer Commissioner.

Not to be confrontational with you, Mr. Nielsen, but I grew up around a couple of lakes, not on them. And you know, 40, 50 years ago, I used to fish on that lake. It was bad then. You know, we'd put the boat in. We'd get out. We'd have to bring it back and scrub it down.

I have seen on that lake and many other lakes, what you have had over the past 50 years is camps that were being occupied for the weekend or whatever, and just for the summer, have now turned into McMansions everywhere. I have friends that have them.

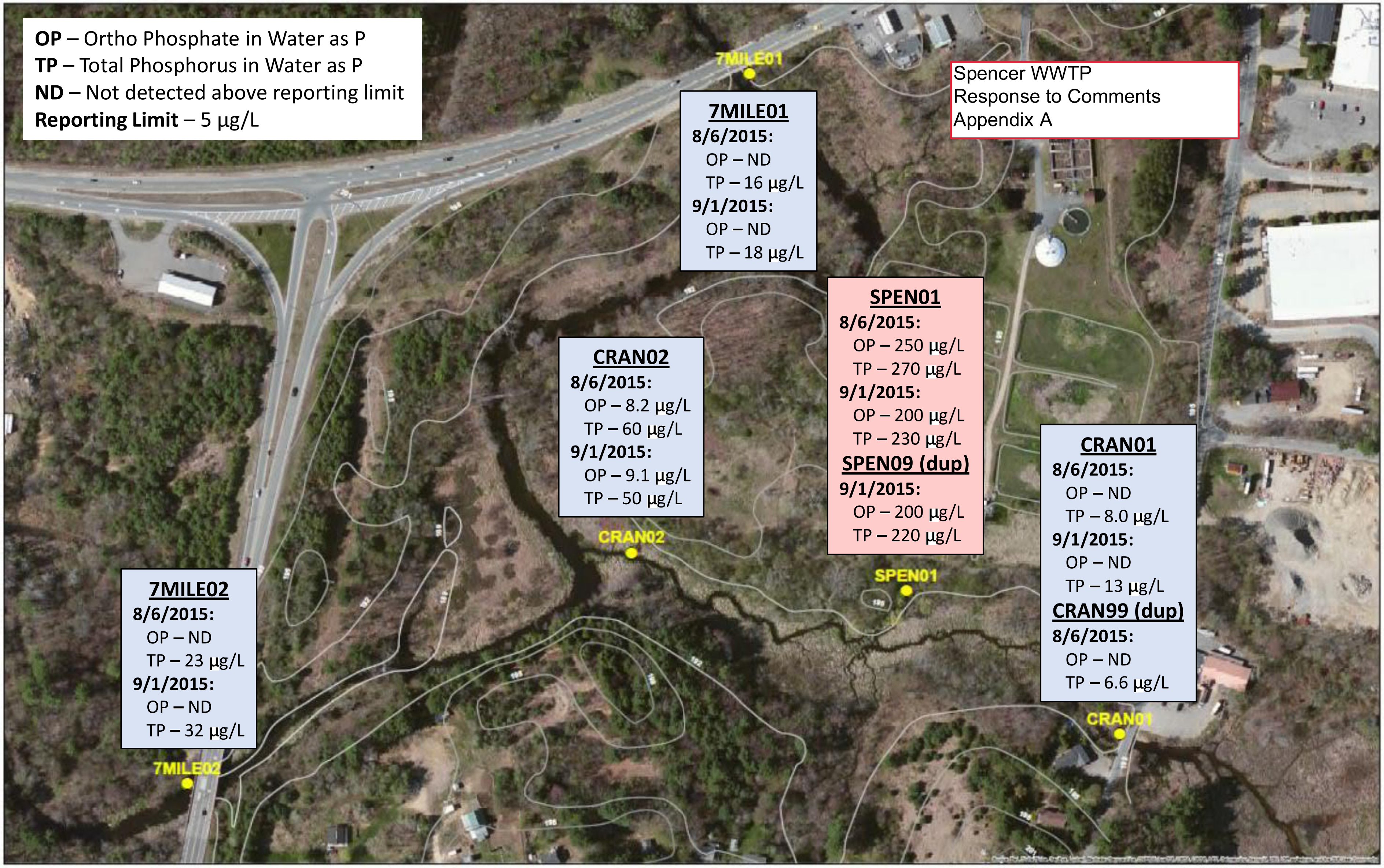
So now, you're getting a lot more septage going in right from your septage systems. Charlton did a nice thing when they got their system around Glen Echo Lake. I don't know that they forced everybody there, but most people hooked into it. And that's a really clean lake today. It always has been though.

Another thing to look at increased phosphorous is not just your lake, but you've got Wickaboag, Whittemore, Cranberry Lake, Stiles, all those houses around there are all on septic systems and where's it all going. It's going down to your house.

So, it's, you know, not just us. We understand our responsibility to the environment. But, at the same time, a lot of this phosphorous increase is coming from just so many more people being around these lakes year round. You know, I've seen it.

That's all I really have to say. And I agree. It's just -- there's a lot more people on these likes living year round and they use a lot more water today than they did in the past. So that is an issue. Thank you.

Response FF6
The comment is noted for the record.


OP – Ortho Phosphate in Water as P
TP – Total Phosphorus in Water as P
ND – Not detected above reporting limit
Reporting Limit – 5 µg/L
Spencer WWTP
Response to Comments
Appendix A
7MILE01
7MILE01
8/6/2015:
OP – ND
TP – 16 µg/L
9/1/2015:
OP – ND
TP – 18 µg/L
SPEN01
8/6/2015:
OP – 250 µg/L
TP – 270 µg/L
9/1/2015:
OP – 200 µg/L
TP – 230 µg/L
SPEN09 (dup)
9/1/2015:
OP – 200 µg/L
TP – 220 µg/L
SPEN01
CRAN02
8/6/2015:
OP – 8.2 µg/L
TP – 60 µg/L
9/1/2015:
OP – 9.1 µg/L
TP – 50 µg/L
CRAN02
CRAN01
8/6/2015:
OP – ND
TP – 8.0 µg/L
9/1/2015:
OP – ND
TP – 13 µg/L
CRAN99 (dup)
8/6/2015:
OP – ND
TP – 6.6 µg/L
CRAN01
7MILE02
8/6/2015:
OP – ND
TP – 23 µg/L
9/1/2015:
OP – ND
TP – 32 µg/L
7MILE02

B

WRIGHT-PIERCE
Engineering a Better Environment

Myths about grilling and barbecuing, debunked

Grillmasters and pitmasters work hard to produce mouth-watering fare. Many may develop secret recipes, rubs, sauces, and cooking techniques all in the name of flavorful food.

Certain myths about grilling and barbecuing have prevailed through the years. Such misconceptions may discourage newcomers from picking up their tongs and spatulas. Setting the record straight about common grilling myths can be just what people need to embrace cooking foods over an open flame.

Myth #1: Hosting a barbecue is the same as cooking barbecue.

Fact: Barbecue is the process of cooking foods slowly with low heat, typically in a smoker. Having a barbecue is an informal backyard party where foods cooked over a grill are served.

Myth #2: You can tell the temperature of the grill by placing your hand over the grates.

Fact: Everyone reacts differently to heat, so the best way to gauge temperature is by using a thermometer.

Myth #3: Grilled chicken is done when the juices run clear.

Fact: Even well-done chicken can form juices that are pink-hued. It's from a protein called myoglobin, according to the book "Meathead: The Science of Great Barbecue and Grilling." Use a cooking thermometer to learn when poultry is safe to eat, typically at 160 to 165 F.

Myth #4: Marinating is best for grilling and tenderizing.

Fact: It seems that marinades really do not penetrate much beyond the surface of the meat and can keep the outer surface of the food wet, preventing searing and browning. Rubs and salts can be more effective at adding flavor. Serve a dipping sauce for additional flavor if people desire.

Myth #5: Light up the whole grill for best cooking.

Fact: Temperature control is a key component of effective grilling and barbecuing. Having two temperature zones — direct, radiant heat for searing, and an indirect zone for grilling meat evenly and preventing burning — can make food more tasty.

Myth #6: More smoke equals better food.

Fact: When cooking, faint wisps of blue smoke are better because blue smoke is made of tiny invisible particles and gases created by small, hot, fast-burning fires. White smoke generally comes from smoldering wood that is starved for oxygen, states the cooking site Food52. All of that white smoke can affect the flavor of the food.

Myth #7: Oil the grates to prevent food from sticking.

Fact: This may or may not work, depending on the temperature of the grates when the oil is applied. A better method is to oil the food, which will be cold so the oil will keep from burning and cracking..

LEGALS

COMMONWEALTH OF MASSACHUSETTS LAND COURT DEPARTMENT OF THE TRIAL COURT 19 SM 002298 ORDER OF NOTICE TO: Lisa R. Ramsdell and George J. Lavalley and to all persons entitled to the benefit of the Servicemembers Civil Relief Act, 50 U.S.C. c. 50 §3901 (et seq) Freedom Mortgage Corporation claiming to have an interest in a mortgage covering real property in East Brookfield, 111 Drake Lane, given by Lisa R. Ramsdell and George J. Lavalley to Mortgage Electronic Registration Systems Inc., as nominee for Stearns Lending, LLC, dated September 15, 2017, and recorded at Worcester County (Worcester District) Registry of Deeds in Book 57741, Page 93, has filed with this court a complaint for determination of Defendants' Servicemembers status. If you now are, or recently have been, in the active military service of the United States of America, then you may be entitled to the benefits of the Servicemembers Civil Relief Act. If you object to a foreclosure of the above-mentioned property on that basis, then you or your attorney must file a written appearance and answer in this court at Three Pemberton Square, Boston, MA 02108 on or before July 29, 2019 or you may lose the opportunity to challenge the foreclosure on ground of noncompliance with the Act. Witness, GORDON H. PIPER, Chief Justice of said Court on June 13, 2019 Attest: Deborah J. Patterson Recorder 07/05/2019

July 5, 2019

MORTGAGEE'S NOTICE OF SALE OF REAL ESTATE

By virtue and in execution of the Power of Sale contained in a certain Mortgage given by Sarah E. Chrobak and Stephen P. Chrobak to Wells Fargo Bank, N.A., dated November 21, 2008 and recorded with the Worcester County (Worcester District) Registry of Deeds at Book 43546, Page 334, subsequently assigned to Nationstar Mortgage LLC d/b/a Champion Mortgage Company by Wells Fargo Bank, N.A. by assignment recorded in said Worcester County (Worcester District) Registry of Deeds at Book 57839, Page 202 for breach of the conditions of said Mortgage and for the purpose of foreclosing same will be sold at Public Auction at 9:00 AM on July 26, 2019 at 47 Irving Street, Spencer, MA, all and singular the premises described in said Mortgage, to wit:

Parcel 1: The land in said Spencer on the northerly side of Irving Street, with buildings thereon, and bounded and described as follows: Beginning at the Southwest corner thereof, at an iron pin in the northerly line of Irving Street, at the Southeast corner of land now or formerly of William E. Swallow et ux: Thence N 3/4 degrees W by said swallow land 82 1/2 feet to an iron pin at land now or formerly of Edward J. Talbot et ux: Thence N 68 degrees 58' E along said Talbot land about 108.5 feet to a stone wall at land now or formerly of Warten E. Tucker et ux. Thence S 16 degrees 05' E along said stone wall about 80.00 feet to said Irving Street: Thence westerly along said Irving Street, about 129.00 feet to the point of beginning. Containing in all about 9,115 square feet of land. Being all and the same premises conveyed in Book 4220 and Page 148. Parcel 2: The land in said Spencer situated easterly on Spring Street, adjoining on the north land of the grantees which fronts on the northerly side of Irving Street, bounded and described as follows: Beginning at the southeasterly corner thereof, at a point in the center of stonewall marked by an iron pin about 1.8 feet westerly thereof, being at land of Thomas B. Harrington, formerly of Warren E. Tucker, and at the northeasterly corner of said land of grantees; Thence S. 68 degrees 58' W. by said land of grantees 98.65 feet to an iron pin; Thence N. 16 degrees 58' W. by land of grantor 118.70 feet to an iron pin at land of William H. Kane, formerly of Edgar W. Smith et ux.; Thence N. 81 degrees 22' E. by said Kane land 101.44 feet to a drill hole in center of wall marked by an iron pin about 1.5 feet westerly thereof, being at said Harrington land; Thence S. 16 degrees 05' @ by said Harrington land about 97.60 feet to the point of beginning. Containing about 10,780 square feet. Being all and the same premises conveyed in Book 4240, Page 325. Subject to any conditions, covenants, easements and restrictions of record insofar as the same are in force and applicable.

Upon information and belief, there is an error in the legal description attached to the mortgage, wherein the last bound of Parcel 2 should read: Thence S. 16 degrees 05' E. by said Harrington land about 97.60 feet to the point of beginning.

The premises are to be sold subject to and with the benefit of all easements, restrictions, encroachments, building and zoning laws, liens, unpaid taxes, tax titles, water bills, municipal liens and assessments, rights of tenants and parties in possession, and attorney's fees and costs.

TERMS OF SALE:

A deposit of FIVE THOUSAND DOLLARS AND 00 CENTS ($5,000.00) in the form of a certified check, bank treasurer's check or money order will be required to be delivered at or before the time the bid is offered. The successful bidder will be required to execute a Foreclosure Sale Agreement immediately after the close of the bidding. The balance of the purchase price shall be paid within thirty (30) days from the sale date in the form of a certified check, bank treasurer's check or other check satisfactory to Mortgagee's attorney. The Mortgagee reserves the right to bid at the sale, to reject any and all bids, to continue the sale and to amend the terms of the sale by written or oral announcement made before or during the foreclosure sale. If the sale is set aside for any reason, the Purchaser at the sale shall be entitled only to a return of the deposit paid. The purchaser shall have no further recourse against the Mortgagor, the Mortgagee or the Mortgagee's attorney. The description of the premises contained in said mortgage shall control in the event of an error in this publication. TIME WILL BE OF THE ESSENCE.

Other terms, if any, to be announced at the sale.

Nationstar Mortgage LLC d/b/a Champion Mortgage Company
Present Holder of said Mortgage,
By Its Attorneys,
ORLANS PC
PO Box 540540
Waltham, MA 02454
Phone: (781) 790-7800
17-011081
July 5, 2019
July 12, 2019
July 19, 2019

Comprehensive Wastewater Management Plan
Public Hearing Notice

In accordance with the Massachusetts DEP Comprehensive Wastewater Management Plan (CWMP) guidelines, the Town of Spencer will hold a Public Hearing on Tuesday, August 20, 2019, at 6:00 pm in the Spencer Town Hall located at 157 Main Street, Spencer, MA. The purpose of the Public Hearing is to present the draft plan for evaluation of existing conditions and sewer needs assessment throughout the Town, present a detailed evaluation of alternatives for wastewater disposal, discuss the required upgrades at the wastewater treatment facility, and the recommended wastewater management plan. Town officials as well as representatives from its consultant, Wright-Pierce, will be in attendance. The Public is welcome and encouraged to attend. A record of public comment will be included in the CWMP report. Responses to questions will be included in the final CWMP.

In addition, as part of the public participation process, the Town has established a permanent information depository for project information, which can be viewed by the public per request in advance of the Public Hearing at the following location:

Town Clerk's Office, Town Hall
157 Main Street
Spencer, MA 01562
Telephone: 508-885-7500
Hours: 7:30a.m. – 4:30p.m., Monday-Wednesday 7:30a.m. – 12:00p.m., Thursday Closed Friday to Sunday
Town Website:
http://www.spencerma.gov/Pages/SpencerMA_Sewer/index
Under Additional Links

At each depository, a 3-ring binder will provide accompanying project information and documents and be placed in an accessible location for public view. Each project binder cannot be removed from any of the depositories. The information will be available prior to July 19th.

If you have any questions, please contact Wright-Pierce at 978-416-8000.

July 5, 2019

ZONING BOARD OF APPEALS
TOWN OF BROOKFIELD

The Brookfield Zoning Board of Appeals will hold a public hearing at 6pm, Tuesday, July 9, 2019 in the Brookfield Town Hall Banquet Room.

The purpose of this hearing is a request by Ryan R. Servant for a special permit for Nonconforming Land Use and Structures at 11 Marsh View Road located in the Village/Flood Plain District, according to Brookfield Zoning By-laws, Section 6C.

Stephen J. Comlois II
ZBA Chairman
June 28, 2019
July 5, 2019

and zoning laws, liens, unpaid taxes, tax titles, water bills, municipal liens and assessments, rights of tenants and parties in possession, and attorney's fees and costs.

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July 5, 2019

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Stephen J. Comtois II
ZBA Chairman
June 28, 2019
July 5, 2019

Spencer, MA

Comprehensive Wastewater Management Plan (CWMP) - Public Hearing

August 2019

Kevin Olson, PE
Adam Higgins, EIT

WRIGHT-PIERCE
Engineering a Better Environment

Presentation Overview

Project Team
Reasons for CWMP
Project Approach
Phase 1
Phase 2
Phase 3
Recommended Plan
Next Steps
Questions and Discussion

Project Team – Town of Spencer

Board of Sewer Commissioners

Frank White
Chairperson

Larry Dufault
Clerk

Michael Mercadante
Member

Sewer Department Staff

James LaPlante
Superintendent

Charles Neveu
Chief Operator

Tim Davis Jr.
Assistant Chief Operator

David Langlais
Operator

Project Team – Wright-Pierce

Kevin Olson, PE
Project Manager

Adam Higgins, EIT
Project Engineer

Reasons for the CWMP

Town-Wide Planning
- 20-year period
- Unsewered Areas
- Proposed Developments
- Key Areas of Protection and Environmental Concern

Wastewater Collection System
- Existing Pipes
- Pump Station
- Capacity
- I/I Control

Wastewater Treatment Facility
- New NPDES Permit
- Aging Equipment
- Current Building Code Requirements
- Capacity

Project Financing
- 0% SRF Loan
- 20 or 30-year Loan
- Other Requirements

Town and MassDEP involvement throughout project: Workshops, Meetings, Reviews

Comprehensive Wastewater Management Plan Approach

1 **Phase 1 – Existing Conditions, Problem Identification and Needs Assessment**

2 **Phase 2 – Alternatives Identification and Screening**

3 **Phase 3 – Detailed Evaluation of Alternatives and Recommended Wastewater Management Plan**

Comprehensive Wastewater Management Plan Phase 1

1. **Summarize existing conditions including planning area, wastewater collection and treatment system, and water distribution and treatment system**

2. **Evaluate Spencer metrics including previous Town planning documents, population forecasts, and working with several Town departments**

3. **Study Area Development including delineating Study Areas for unsewered areas of the Town by geographical, topographical, and major road means**

4. **Perform wastewater needs assessment utilizing a two-tier approach to grading study areas**

Spencer Metrics

- Population
- Demographics
- Land Use and Open Space
- Watershed Planning
- Water Quality
- Zoning and Planning
- Natural Environment

Existing Wastewater Collection System

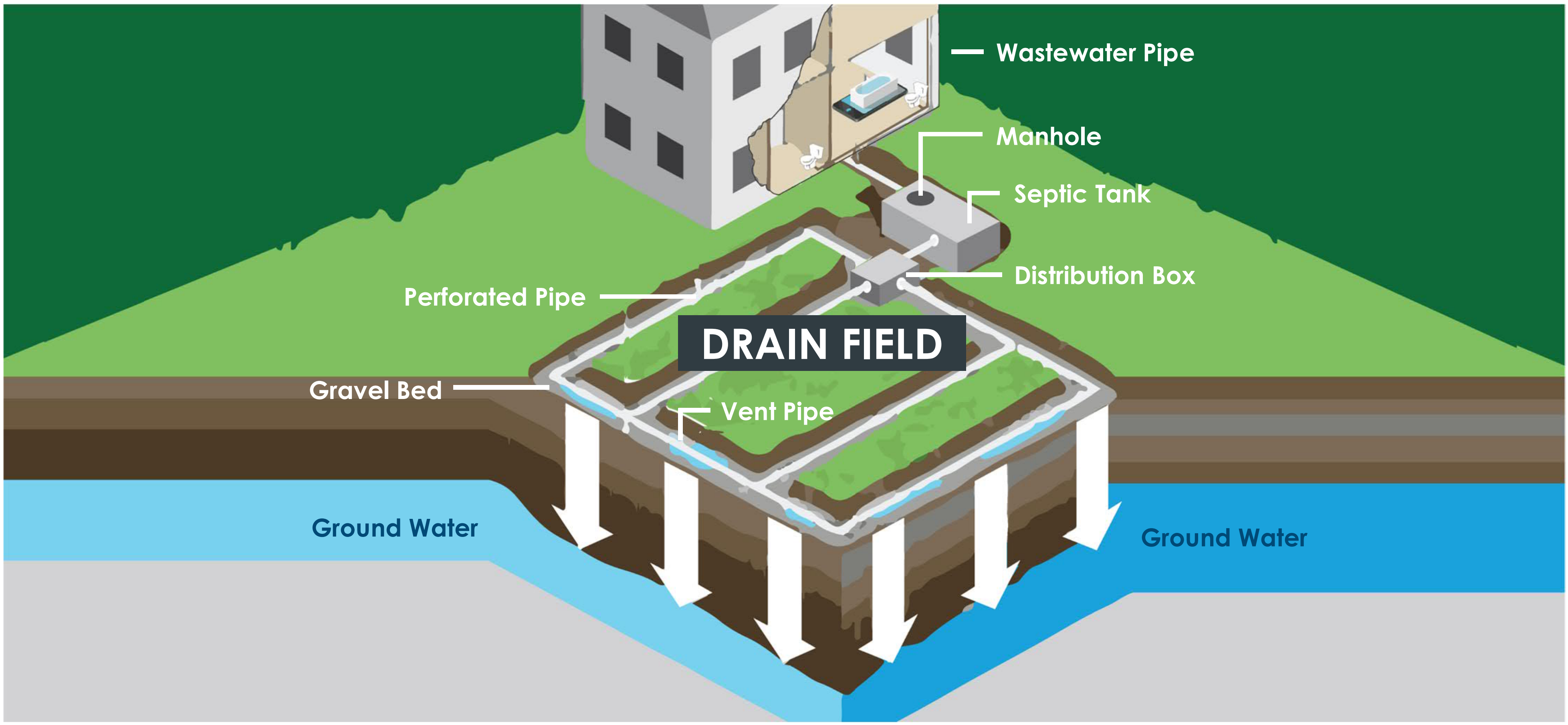
- Smoke Testing on Maple Street, Spencer

- **Miles of Sewer Piping**
- **Age and Condition of System**
- **I/I Control Efforts**
- **Pump Station and Force Main**

Existing Wastewater Treatment Facility (WWTF)

- Age of Facility
- Condition of Facility
- Permit
- Capacity
- New Codes

Onsite Septic Systems



Study Area Determination

- Parcels Removed
- Area Determination
- 33 Study Areas

Wastewater Needs Assessment

1. **Tier 1 Criteria**
   - **Primary Criteria**
   - **Secondary Criteria**
2. **Tier 2 Criteria**
3. **Needs Areas Analysis**

Study Area Grading Results

Study Area	Primary Criteria (Ranking from 0 to 10)						Secondary Criteria (Ranking from 0 to 5)						Total Score	Study Area Ranking
	Soils/ Drainage Class	Depth to Water Table	Depth to Bedrock	Lot Sizes	Private Wells	Primary Subtotal	Drinking Water Protection District	Areas with Regulated Setbacks (Title 5)	Flood Plains	Priority/ Estimated Habitat Areas	Historic District	Secondary Subtotal		
11	4	2	0	8	8	**22**	0	3	2	1	0	**6**	**28**	**High**
12	3	3	5	7	7	**25**	0	3	0	0	0	**3**	**28**	**High**
13	8	9	0	3	3	**23**	4	2	3	4	0	**13**	**36**	**High**
15	1	0	0	3	3	**7**	0	1	0	1	0	**2**	**9**	**Future**
16	2	2	4	7	7	**22**	0	3	1	0	2	**6**	**28**	**High**
18	4	4	0	5	5	**18**	3	3	1	3	0	**10**	**28**	**High**
20	8	4	3	4	4	**23**	5	2	1	3	0	**11**	**34**	**High**
28	3	2	6	8	8	**27**	0	5	3	0	0	**8**	**35**	**High**
30	9	5	0	6	6	**26**	0	2	2	1	0	**5**	**31**	**High**

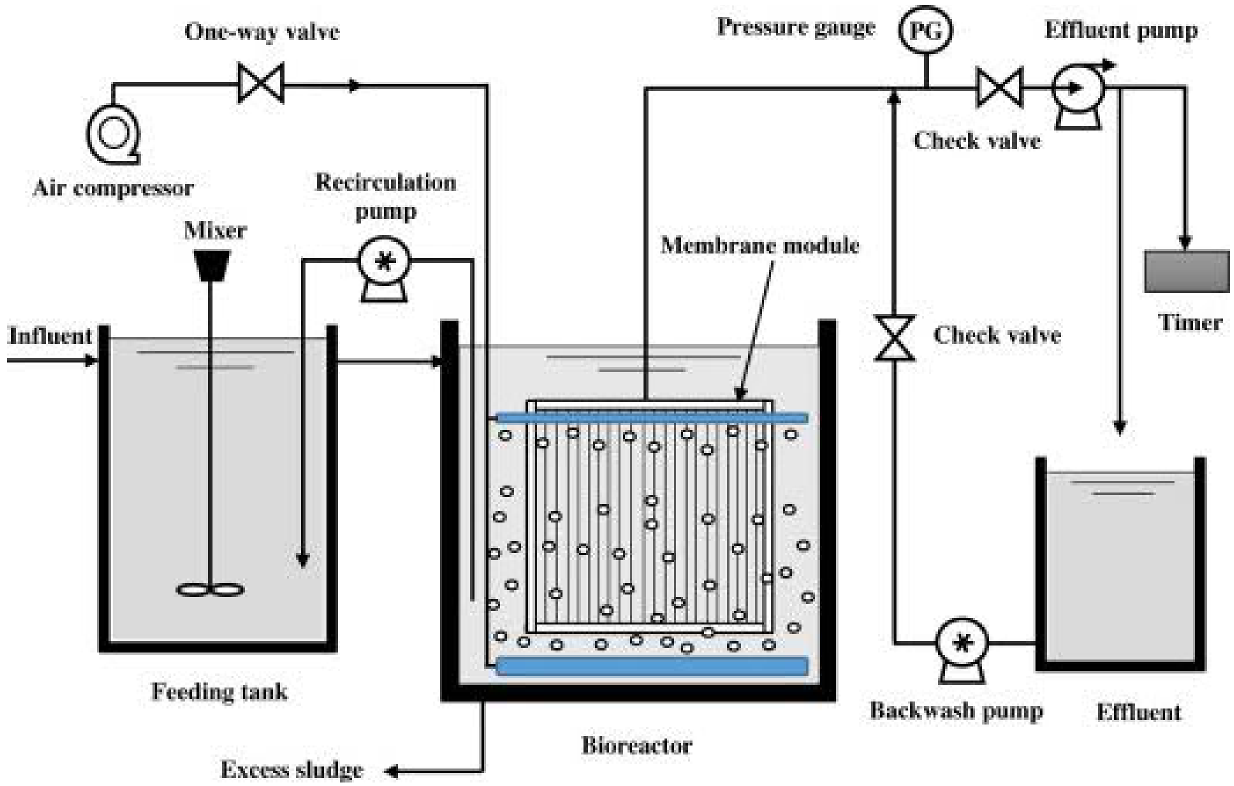
Needs Areas

- 8 High Needs Areas
- 1 Future Development Area
- Small lot sizes, poor soils major factors
- These Areas move on to Phase 2 Analysis

Comprehensive Wastewater Management Plan Phase 2

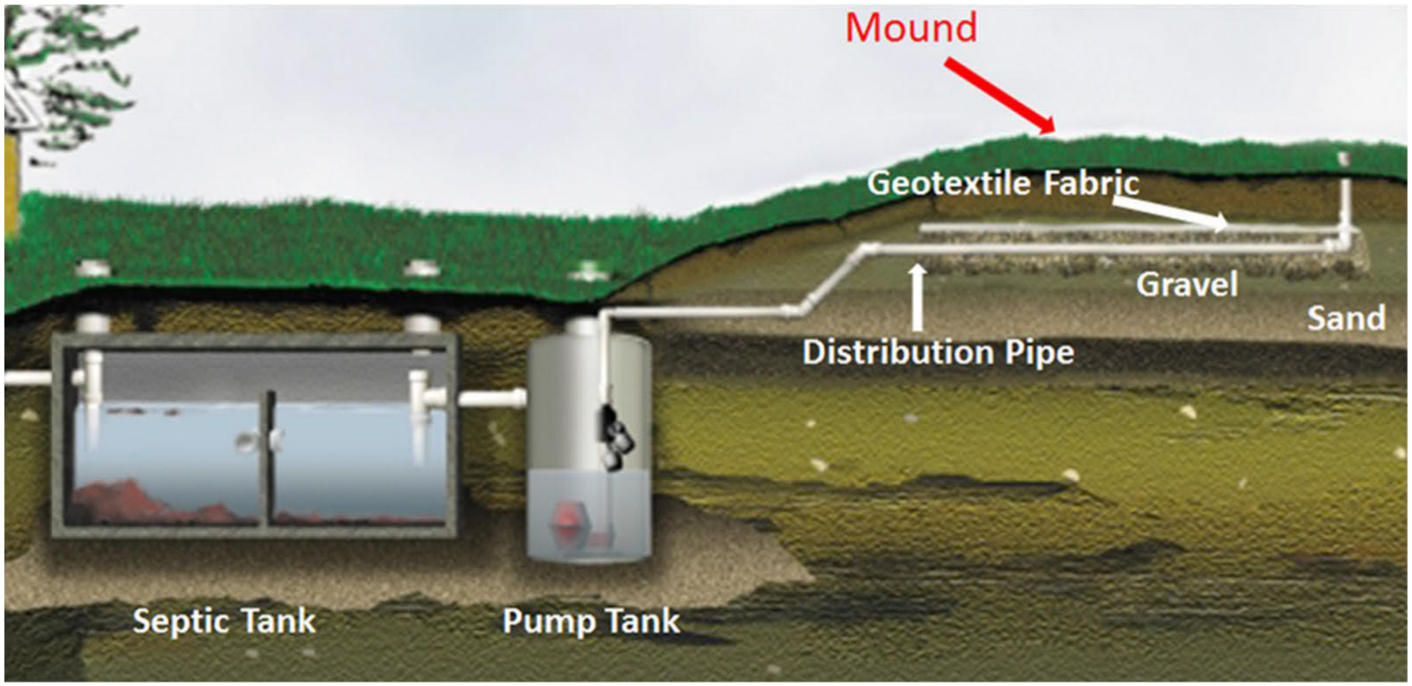
1. Needs Areas
2. Alternatives
3. Shortlisted Alternatives

Wastewater Management Alternatives



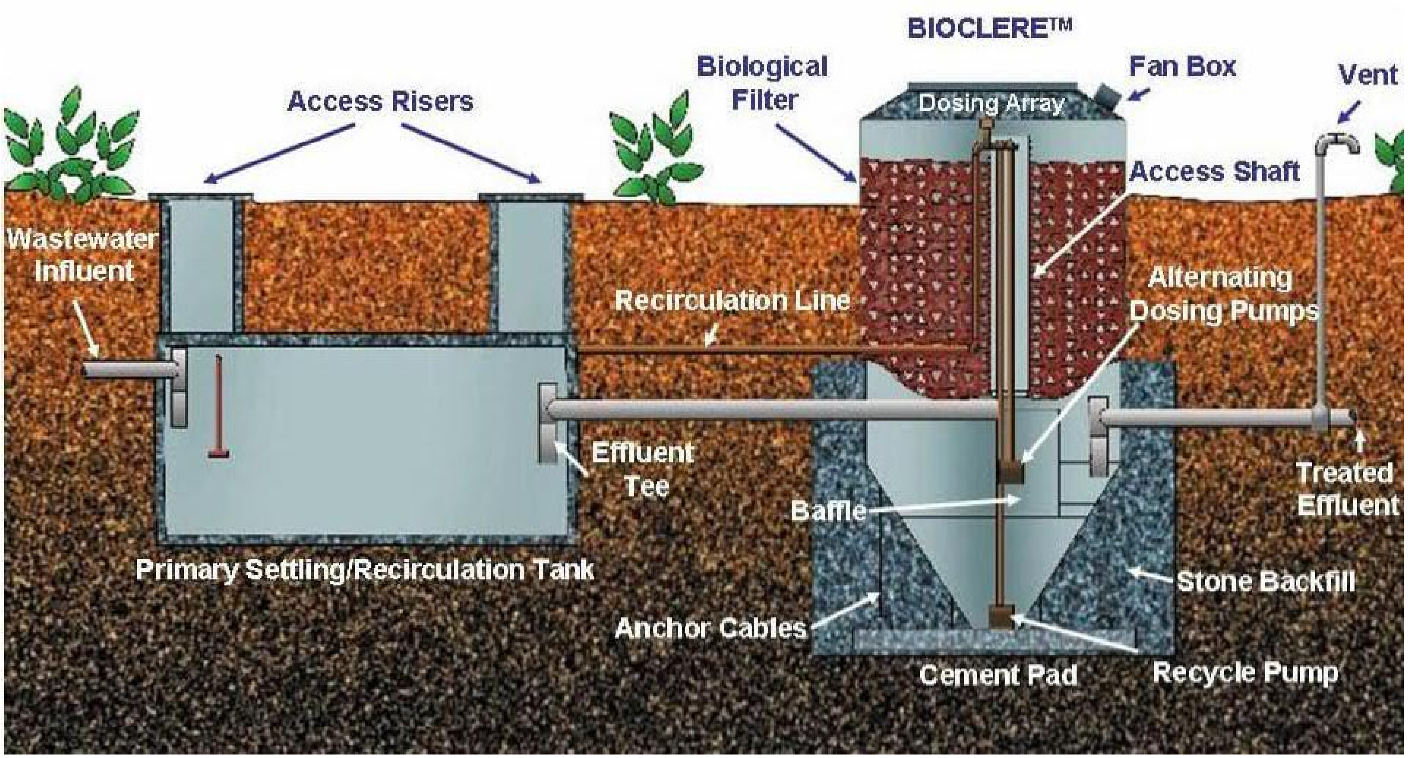
- Onsite
  - Septic
  - Innovative/Alternative (I/A)
- Decentralized
  - Shared Septic and I/A
  - Small WWTF
- Town Collection System Extension

Onsite Wastewater Treatment Alternatives



- Septic Systems
  - Onsite
  - Mounded

Onsite Wastewater Treatment Alternatives

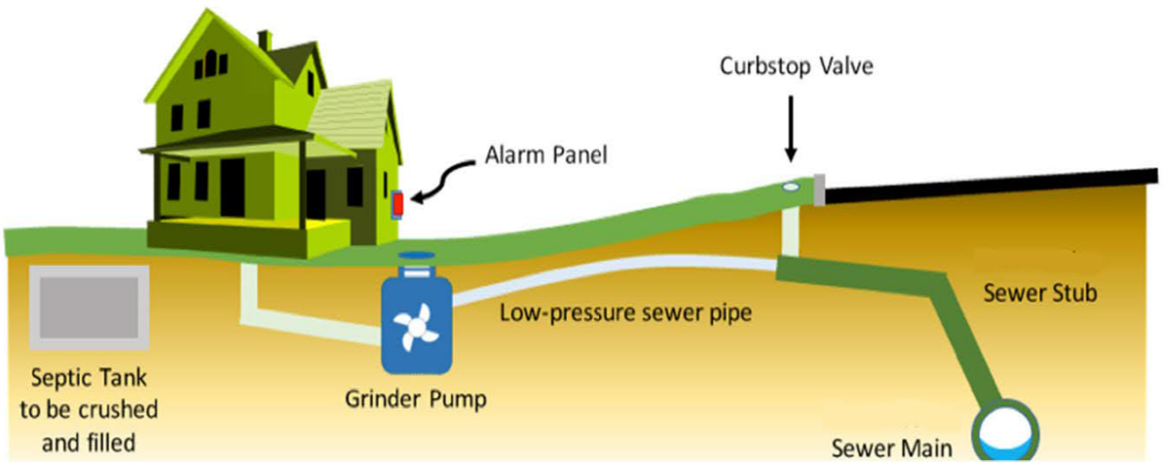


- I/A Systems
  - Bioclere®
  - Amphidrome™
  - FAST®
  - RUCK®
  - Enviro-Septic®
  - Others – MassDEP approved list

Decentralized/Small Wastewater Treatment Facility Alternatives

- "Package" Facilities
  - Rotating Biological Contactor
  - Sequencing Batch Reactor
  - Membrane Biological Reactor

Town Wastewater Collection System Extension Alternatives



- Conventional Collection System
  - Gravity
  - Pump Stations
  - Force Main
- Low Pressure Sewer System
- Vacuum Sewer System
- Small Diameter Gravity Sewers

Wastewater Needs Assessment

1. Primary Criteria
2. Secondary Criteria
3. Needs Area Results

Needs Area Grading Results Example

	Primary Criteria (Scoring from 0 to 10)						Secondary Criteria (Scoring from 0 to 5)						
Treatment Alternative	Level of Treatment	Nutrient Treatment	Land/Site Requirements	Capital / Construction Costs	Ease of Operation	Primary Criteria Subtotal	Public Acceptance	Regulatory	Legal	O&M Costs	Environmental	Secondary Criteria Subtotal	Total Score
On-site													
Conventional Septic Systems	7	9	6	2	2	26	1	1	1	1	4	8	34*
I/A Systems	6	6	6	5	4	27	2	2	2	2	4	12	39*
Decentralized													
Shared Septic Systems	7	9	8	3	3	30	3	3	4	2	4	16	46
Shared I/A Systems	5	6	8	5	5	29	3	3	4	3	4	17	46
Small WWTF	1	2	7	8	8	26	5	5	5	5	2	22	48
Collection System Extensions													
Town of Spencer	0	0	9	10	1	20	5	3	5	5	1	19	39*

*Indicates Shortlisted Alternative

Needs Area Shortlisted Alternatives Summary

Treatment Technology	Needs Area 11 Wire Village Road & Sugden Reservoir, North & West	Needs Area 12 Sugden Reservoir, South & East	Needs Area 13 Cooney Road	Needs Area 15 High Ridge Road	Needs Area 16 Lake Whittemore	Needs Area 18 Route 9 and 49, north	Needs Area 20 Route 49	Needs Area 28 Stiles Reservoir, west	Needs Area 30 Cranberry Meadow Pond
Conventional Septic Systems	X	X	X	X	X	X	X	X	X
I/A Systems	X	X	X	X	X	X	X	X	X
Decentralized Systems (Shared System or Small WWTF)									
Collection System Extension	X	X	X	X	X	X	X		

WRIGHT-PIERCE
Engineering a Better Environment

Comprehensive Wastewater Management Plan Phase 3

1. **Needs Area Evaluation**
2. **Collection System Evaluation**
    - **Condition**
    - **Capacity**
    - **I/I Removal**
3. **WWTF Evaluation**
4. **Recommended Plan**

Shortlisted Alternatives for Needs Area 11

Needs Area 11 – Wire Village Road & Sugden Reservoir, North & West

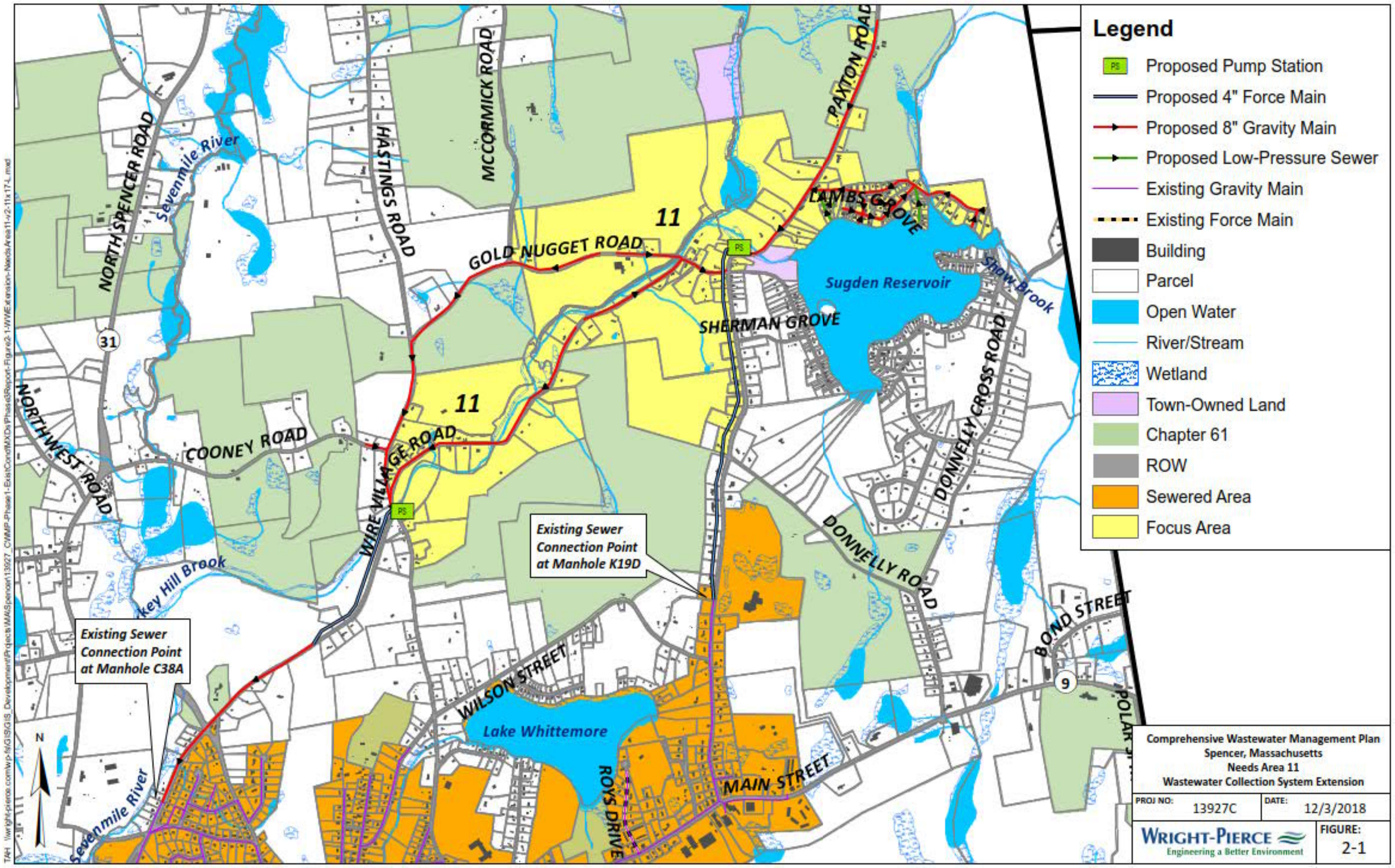
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- Northeast Central Spencer, on Sugden Reservoir
- 423 Acres, 190 Parcels
- Poor Soil and High Flooding Chance due to High Groundwater and Wetlands/Water Bodies
- Densely Populated around Reservoir
- Small Lot Size around Reservoir
- Water Quality Setbacks

Collection System Extension for Needs Area 11



WRIGHT-PIERCE
Engineering a Better Environment

Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 11

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$24,160,000
Present Worth of Future Capital Costs	$ 3,930,000	$ 3,390,000	-
Present Worth of O&M Costs	$ 485,000	$ 3,638,000	$ 833,000
Total Present Worth	$ 4,415,000	$ 7,028,000	$ 24,993,000

WRIGHT-PIERCE
Engineering a Better Environment

Shortlisted Alternatives for Needs Area 12

Needs Area 12 – Sugden Reservoir, South & East

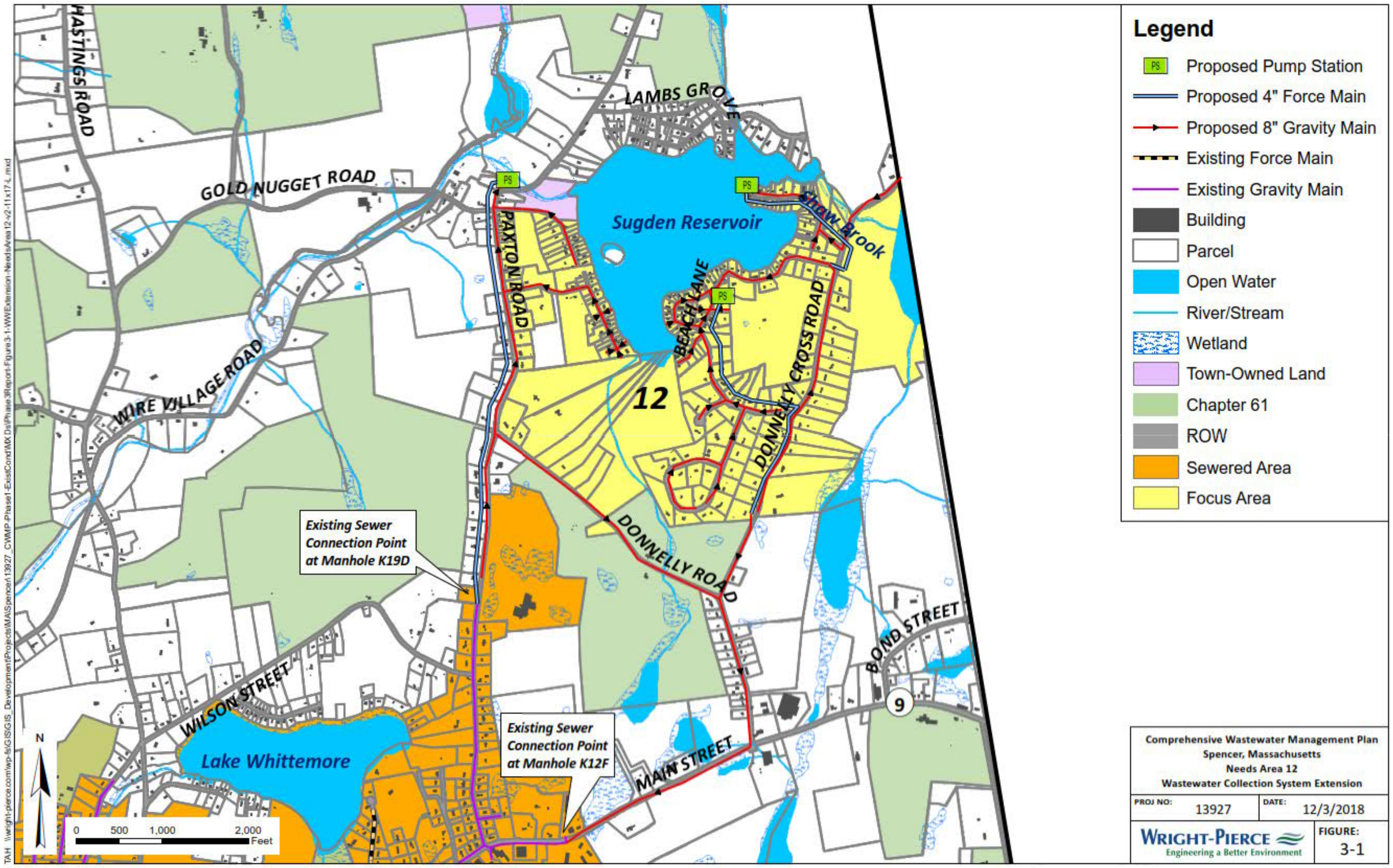
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- Central East Spencer, on Sugden Reservoir
- 280 Acres, 250 Parcels
- Densely Populated around Reservoir
- Small Lot Size around Reservoir
- Water Quality Setbacks

Collection System Extension for Needs Area 12



WRIGHT-PIERCE
Engineering a Better Environment

Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 12

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$30,190,000
Present Worth of Future Capital Costs	$ 6,014,000	$ 5,189,000	-
Present Worth of O&M Costs	$ 742,000	$ 5,556,000	$ 999,000
Total Present Worth	$ 6,756,000	$ 10,745,000	$ 31,189,000

Shortlisted Alternatives for Needs Area 13

Needs Area 13 – Cooney Road

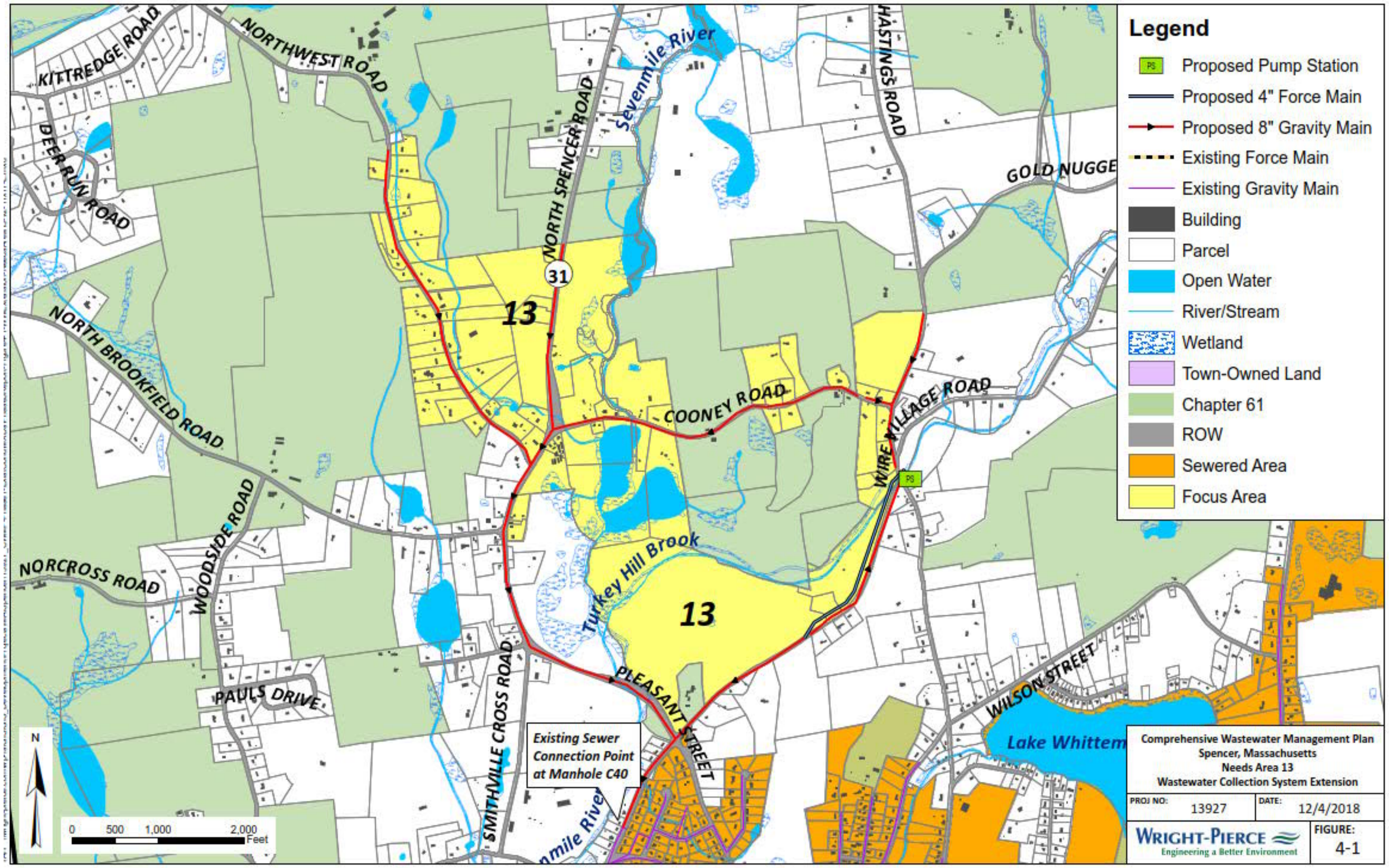
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- Central Spencer
- 325 Acres, 73 Parcels
- Poor Soil and High Flooding Chance due to High Groundwater and Wetlands/Water Bodies
- Zone II Drinking Water Protection
- Water Quality Setbacks

Collection System Extension for Needs Area 13



WRIGHT-PIERCE
Engineering a Better Environment

Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 13

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$17,750,000
Present Worth of Future Capital Costs	$ 1,819,000	$ 1,569,000	-
Present Worth of O&M Costs	$ 224,000	$ 1,683,000	$ 333,000
Total Present Worth	$ 2,043,000	$ 3,253,000	$ 18,083,000

Shortlisted Alternatives for Needs Area 15

Needs Area 15 – High Ridge Road

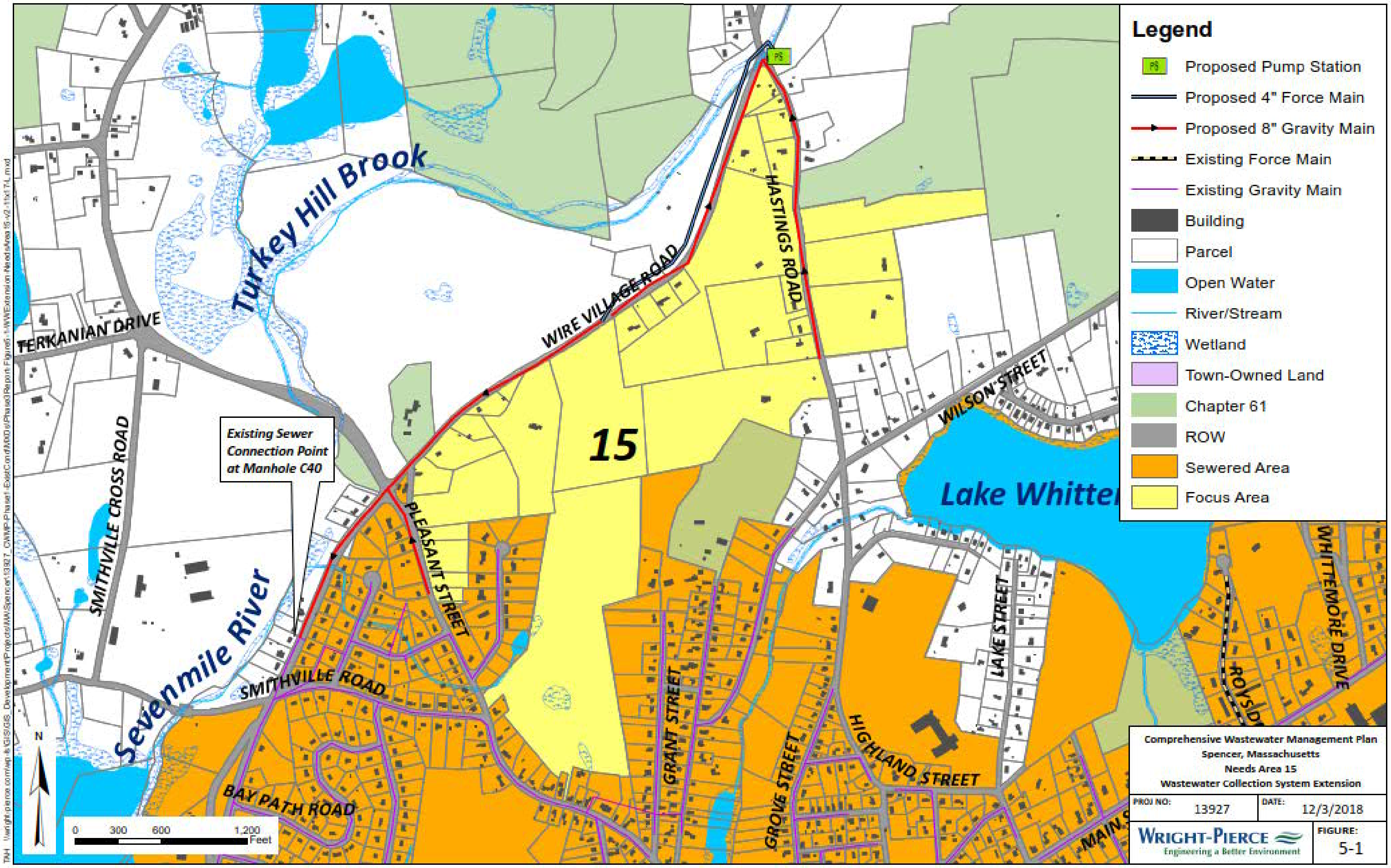
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- Central Spencer
- 135 Acres, 31 Parcels
- Good Soils and Low Groundwater
- Large Lot Size
- Very Low Needs but Brought Forward for Analysis as an Economic Area (Develop and Connect to Town Sewer) per Town Request

Collection System Extension for Needs Area 15



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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 15

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$7,890,000
Present Worth of Future Capital Costs	$ 674,000	$ 586,000	-
Present Worth of O&M Costs	$ 83,000	$ 615,000	$ 333,000
Total Present Worth	$ 758,000	$ 1,201,000	$ 8,223,000

Shortlisted Alternatives for Needs Area 16

Needs Area 16 – Lake Whittemore

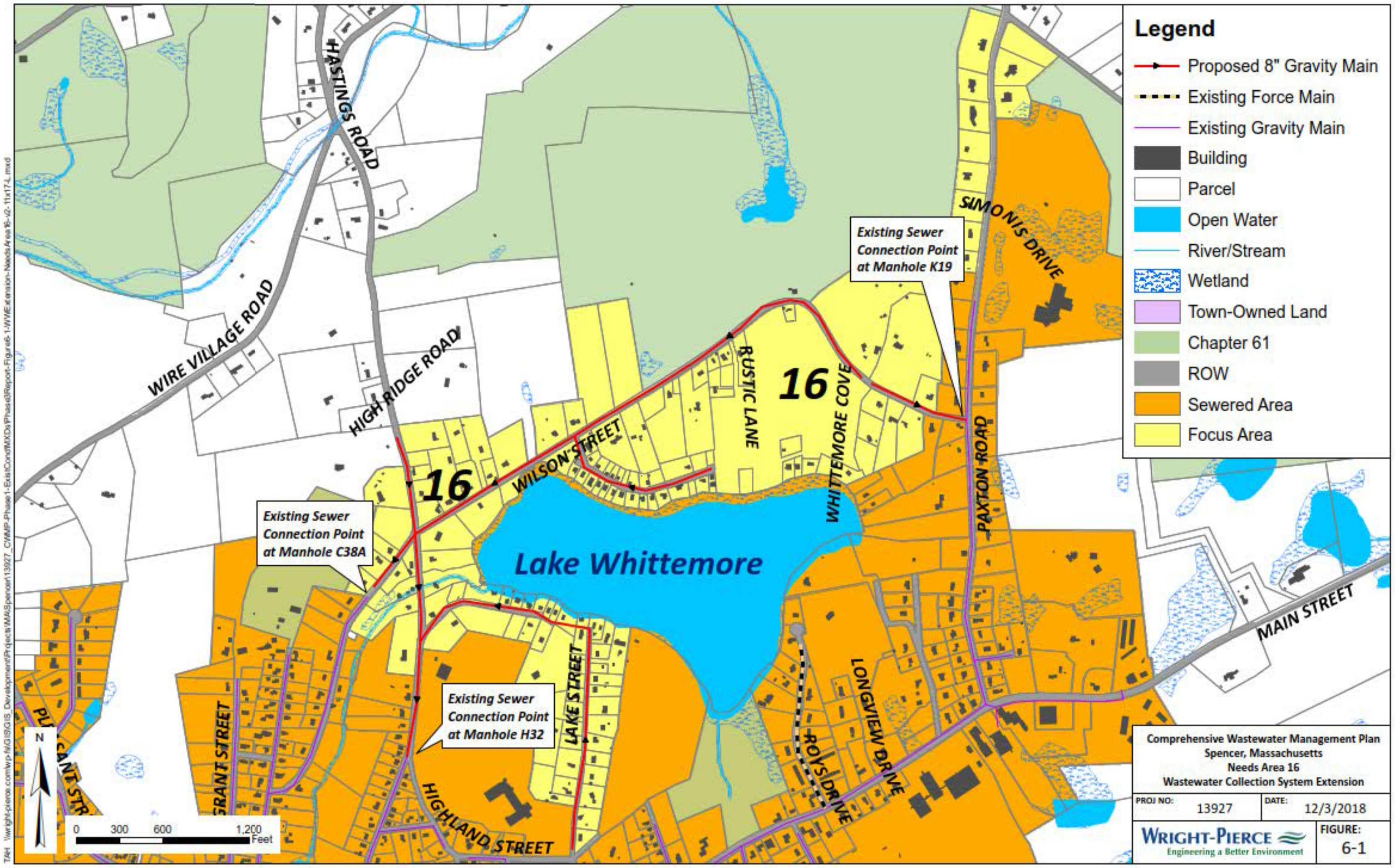
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- Central Spencer, on Lake Whittemore
- 138 Acres, 143 Parcels
- Good Soils and Low Groundwater
- Densely Populated, Small Lots around Lake
- Water Quality Setbacks

Collection System Extension for Needs Area 16



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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 16

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$13,160,000
Present Worth of Future Capital Costs	$ 3,666,000	$ 3,170,000	-
Present Worth of O&M Costs	$ 452,000	$ 3,384,000	$ 333,000
Total Present Worth	$ 4,118,000	$ 6,554,000	$ 13,493,000

Shortlisted Alternatives for Needs Area 18

Needs Area 18 – Route 9 and 49, North

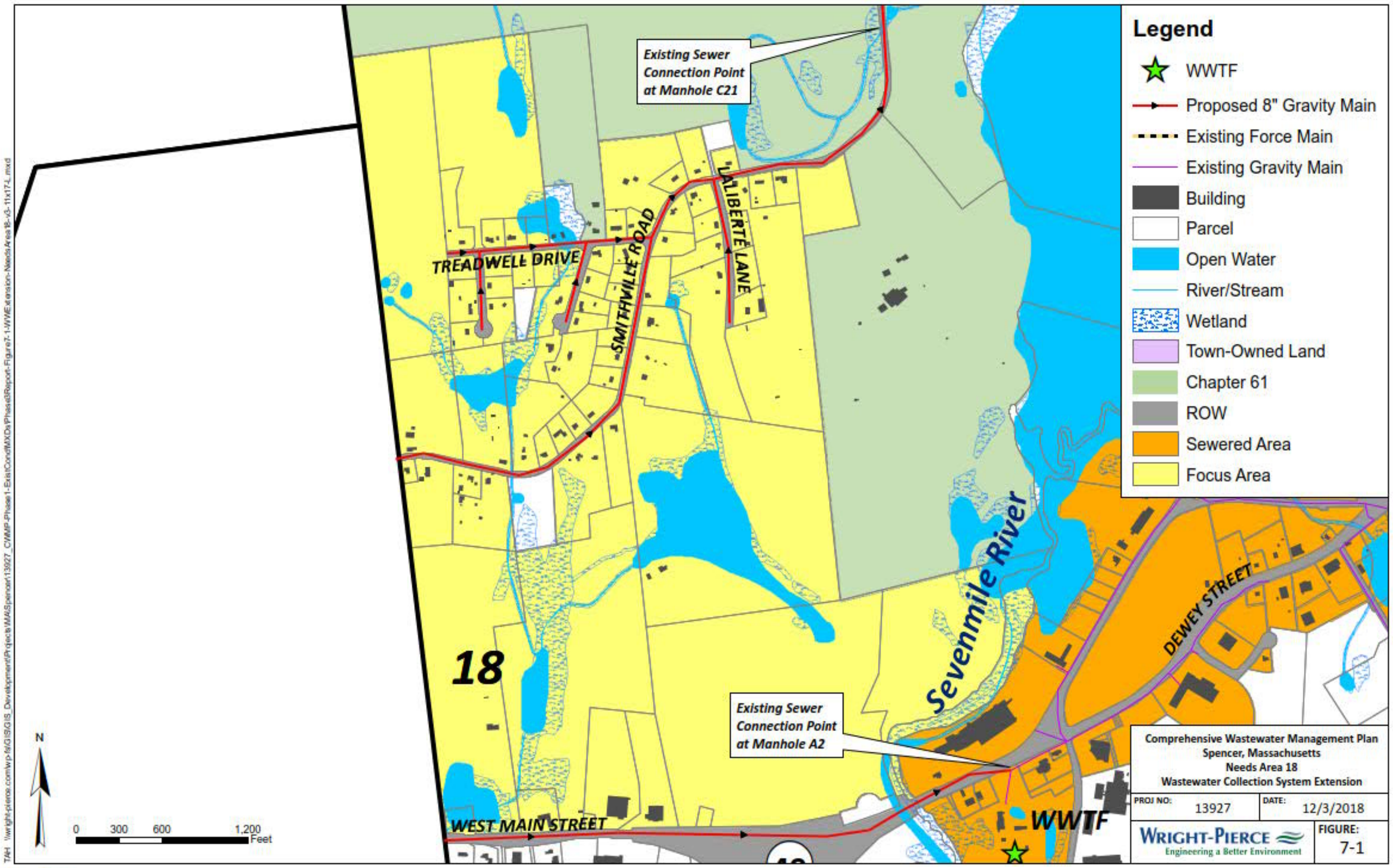
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- West Central Spencer
- 362 Acres, 74 Parcels
- Poor Soil and High Flooding Chance due to High Groundwater and Wetlands/Water Bodies
- Zone II Drinking Water Protection
- Water Quality Setbacks

Collection System Extension for Needs Area 18



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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 18

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$14,820,000
Present Worth of Future Capital Costs	$ 2,083,000	$ 1,810,000	-
Present Worth of O&M Costs	$ 257,000	$ 1,918,000	-
Total Present Worth	$ 2,341,000	$ 3,728,000	$ 14,820,000

Shortlisted Alternatives for Needs Area 20

Needs Area 20 – Route 49

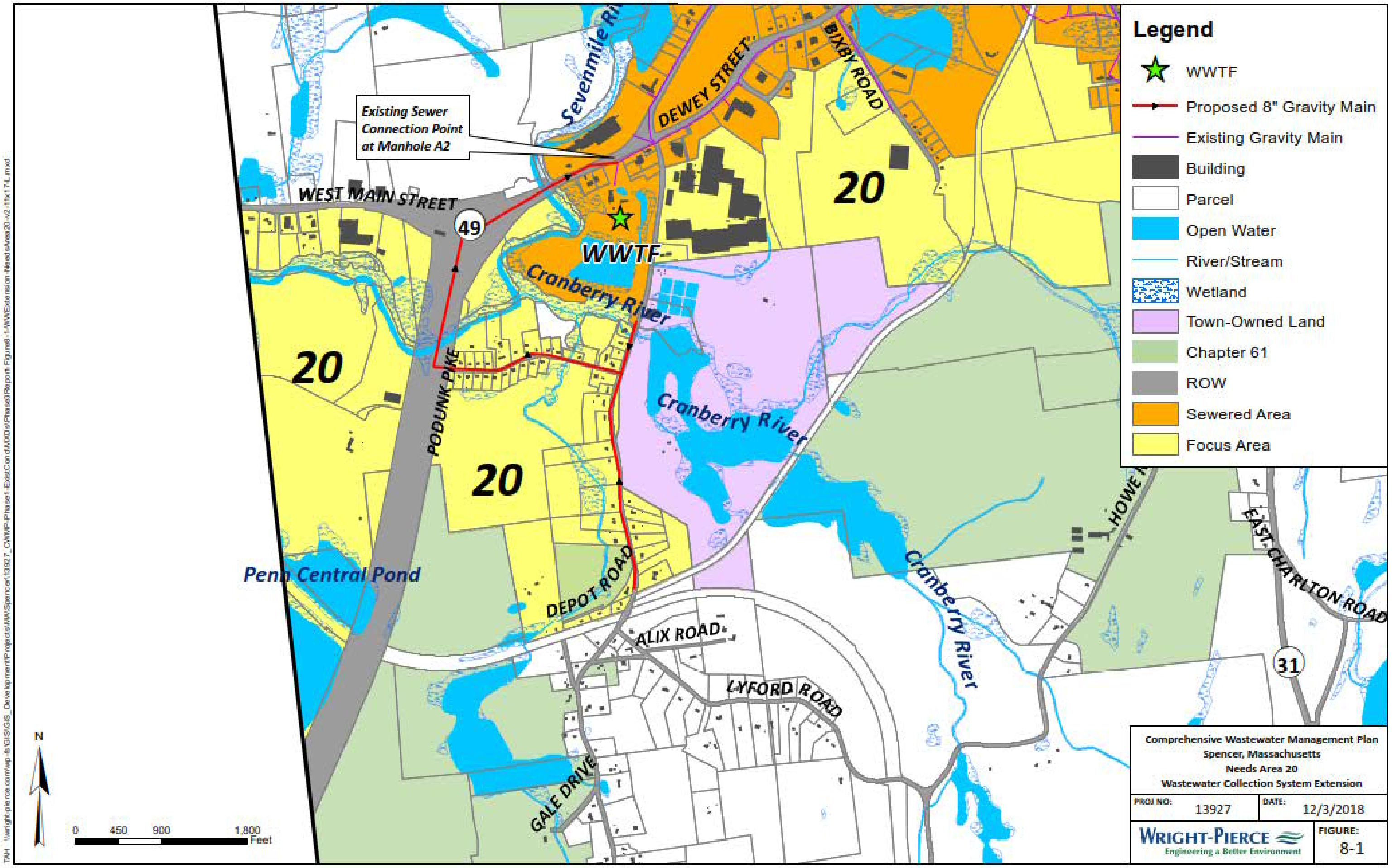
Shortlisted Alternatives

- Septic Systems
- I/A Systems
- Sewer Extension

Needs Area Description

- West Central Spencer
- 480 Acres, 85 Parcels
- Poor Soil and High Flooding Chance due to High Groundwater and Wetlands/Water Bodies
- Zone II Drinking Water Protection
- Water Quality Setbacks

Collection System Extension for Needs Area 20



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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 20

Cost Estimate	Treatment Alternatives		
	Septic System	Innovative/Alternative System	Collection System Extension
Initial Capital Cost	-	-	$12,700,000
Present Worth of Future Capital Costs	$ 2,057,000	$ 1,763,000	-
Present Worth of O&M Costs	$ 253,000	$ 1,900,000	-
Total Present Worth	$ 2,310,000	$ 3,663,000	$12,700,000

Shortlisted Alternatives for Needs Area 28

Needs Area 28 - Stiles Reservoir, West

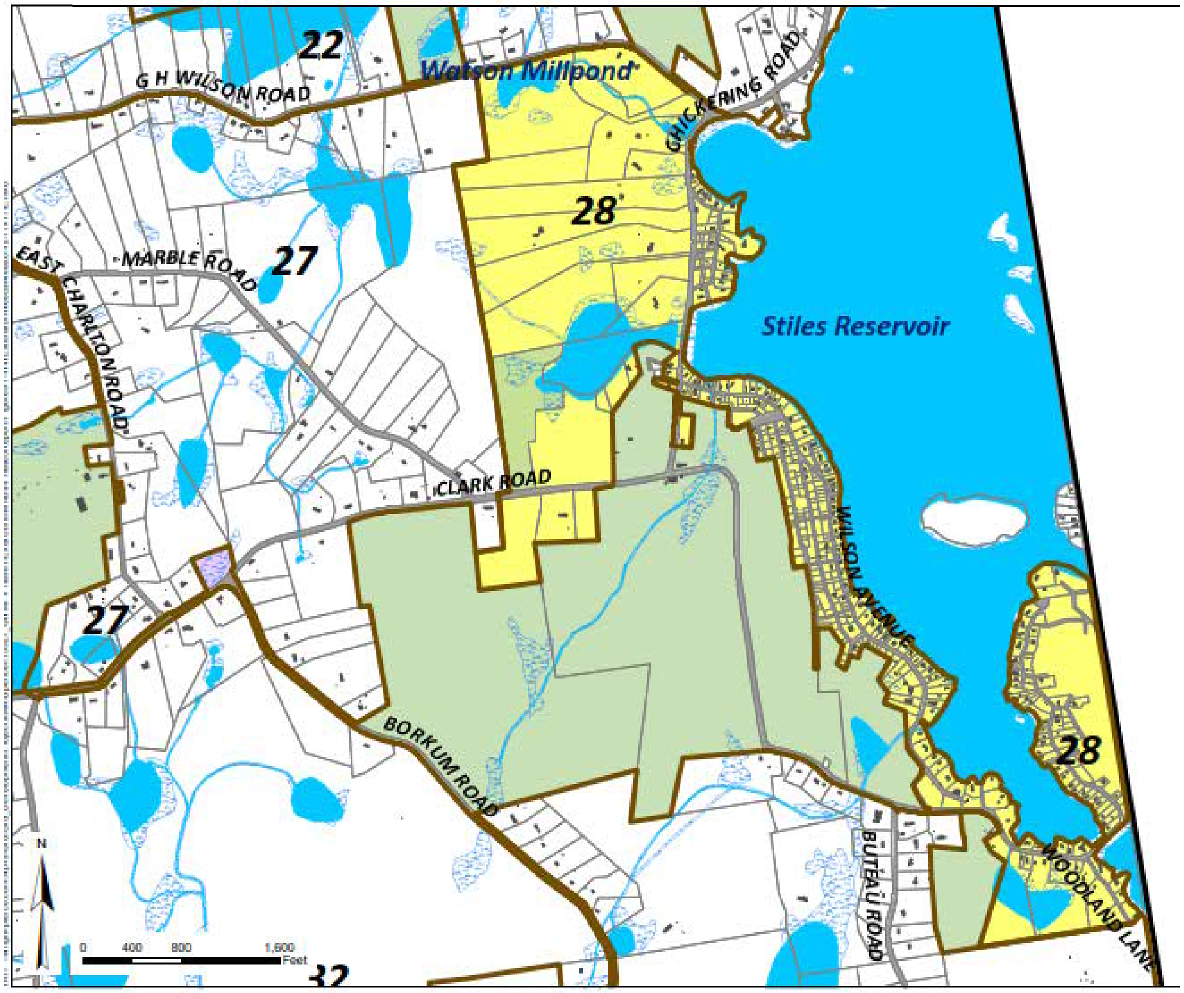
Shortlisted Alternatives

- Septic Systems
- I/A Systems

Needs Area Description

- Southeast Spencer
- 217 Acres, 375 Parcels
- Good Soils and Low Groundwater
- Densely Populated, Small Lots Near Reservoir
- Water Quality Setbacks

Needs Area 28



Wright-Pierce
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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 28

Cost Estimate	Treatment Alternatives	
	Septic System	Innovative/Alternative System
Initial Capital Cost	$ 0	$ 0
Present Worth of Future Capital Costs	$ 5,947,000	$ 5,143,000
Present Worth of O&M Costs	$ 735,000	$ 5,502,000
Total Present Worth	$ 6,682,000	$ 10,645,000

Shortlisted Alternatives for Needs Area 30

Needs Area 30 - Cranberry Meadow Pond

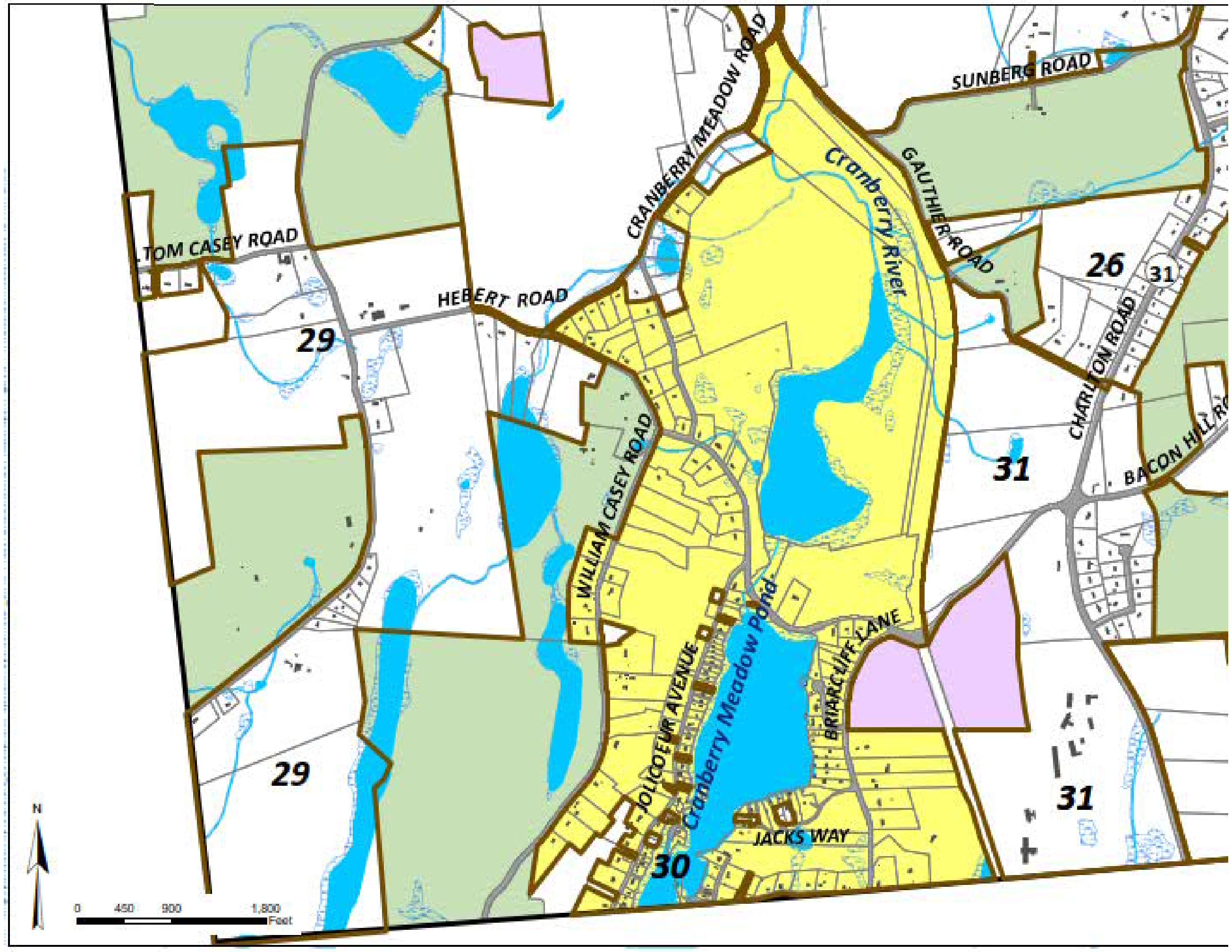
Shortlisted Alternatives

- Septic Systems
- I/A Systems

Needs Area Description

- Southwest Spencer
- 485 Acres, 173 Parcels
- Poor Soils around Wetlands/Water Bodies
- Densely Populated, Small Lots Near Pond
- Water Quality Setbacks

Needs Area 30



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Present Worth Cost Estimates

Summary of Cost Estimates for Needs Area 30

Cost Estimate	Treatment Alternatives	
	Septic System	Innovative/Alternative System
Initial Capital Cost	-	-
Present Worth of Future Capital Costs	$ 4,574,000	$ 3,945,000
Present Worth of O&M Costs	$ 565,000	$ 4,235,000
Total Present Worth	$ 5,139,000	$ 8,180,000

Collection System Capacity

- SSOs (Sanitary Sewer Overflows)
- Impacts on Flows from Infiltration/Inflow (I/I)
- Addition of New Flow from Needs Areas?
- Pipe Impacts

Existing and Buildout Flow Analysis

Existing Flow

- 70 gpd/capita
- 2.36 capita/household (Spencer)
- Number of Parcels WITH a Building
- Commercial/Industrial Flow Calculated Differently

Buildout Flow

- 70 gpd/capita
- 2.36 capita/household (Spencer)
- Number of Parcels WITHOUT a Building
- Worst-case Development Scenario Based on Zoning
- Multi-family Homes/Apartments Taken into Account
- Commercial/Industrial Flow Calculated Differently

Wastewater Flows and WWTF Capacity

Summary of Average Daily Flows to Spencer WWTF

Flow Source	MGD
Current (2015-2017) WWTF Flow	0.770
Estimated Flow from Existing Buildings Not Connected within Sewered Area	0.145
Total Build-out Flow	0.915
Total Permitted Design Flow at WWTF	*1.080*
Remaining Available Capacity at WWTF	0.165

Needs Area Flow Projection

Wastewater Flow Estimates for Needs Areas (gpd)

Flow Source	Needs Area 11 Wire Village Road & Sugden Reservoir, North & West	Needs Area 12 Sugden Reservoir, South & East	Needs Area 13 Cooney Road	Needs Area 15 High Ridge Road	Needs Area 16 Lake Whittemore	Needs Area 18 Route 9 and 49, north	Needs Area 20 Route 49	Needs Area 28 Stiles Reservoir, west	Needs Area 30 Cranberry Meadow Pond
Potential Existing Flow	22,100	33,850	10,250	3,800	20,650	11,700	11,550	33,550	25,750
Estimated Build-out Flow	9,250	1,800	3,600	17,300	9,100	8,100	19,800	9,100	18,200
Estimated Flow from I/I	24,600	3,600	7,800	3,600	7,200	4,500	10,200	10,500	8,400
Total Future Flow Estimate	55,950	39,250	21,650	24,700	36,950	24,300	41,550	53,150*	52,350*

*Not Recommended for Collection System Extension in Phase 2

Existing and Buildout Flow Analysis

Pipe Capacity

- Minimum Slope Assumed (Conservative)
- Pipe Diameter, Length, and Material
- Flow in Pipe
- I/I Estimate based on 375 gpd/idm (gallons per day per inch-diameter mile)
- Manning's Equation to Calculate Wetted Perimeter
- Over 80% Full is Over Capacity
- Peaking Factor Taken from WWTF Peak Flow Compared to Average Day Flow

Existing and Buildout Flow Analysis

Capacity Scenarios

- **Existing Collection System, Average vs. Peak**
- **Buildout Collection System, Average vs. Peak**
- **All Needs Areas Connected, Trace Flow Through System**
- **Certain Needs Areas Connected: Parts of Area 11 and 12 (shared); Area 13, 15, 18; Parts of Area 18 and 20 (shared)**

Needs Area Recommended Plan

Recommended Plan for Needs Areas

Treatment Technology	Needs Area 11 Wire Village Road & Sugden Reservoir, North & West	Needs Area 12 Sugden Reservoir, South & East	Needs Area 13 Cooney Road	Needs Area 15 High Ridge Road	Needs Area 16 Lake Whittemore	Needs Area 18 Route 9 and 49, north	Needs Area 20 Route 49	Needs Area 28 Stiles Reservoir, west	Needs Area 30 Cranberry Meadow Pond
Conventional Septic Systems	X	X	X	X	X	X	X	X	X
I/A Systems									
Collection System Extension									

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Collection System I/I Control Plan

- Work Completed to Date
- I/I Control Plan Recommendations
  - Phase 1 Sewer System Evaluation Survey (SSES) Tasks ongoing
- Recommended Schedule
- Cost Estimate

Infiltration/Inflow Control History

- 1978 Infiltration/Inflow Analysis
- 1987 PL 92-500 funded SS Rehabilitation/Construction Project based on 1981 SSES.
- 1990 conducted follow up Spencer Sewer System I/I Study.
- 1991 developed Sewer Bank to provide for repairs of sewer system with known I/I.
- 2000 thru 2006 evaluated/modeled major sewer truck line through Spencer
- 2006 recommended existing Spencer sewer manhole & sewer line improvements.
- 2006 evaluated/modeled existing Bixby Estates private sewer system and deficiency letter.
- 2008 Maple Street (Route 31) Smoke Testing & Sewer Manhole Inspection
- 2009 conducted Maple Street sewer lining improvements and replaced Manholes
- 2011 replaced Water Street Manholes and 280' of 18" line
- 2015 replaced Mechanic Street manholes, sewer line and service connections.
- 2017 Route 9 SMH replacement, pipe lining, and other improvements
- 2018 Chestnut Street Pipe and MH replacement
- 2018/9 I/I Control Plan Finalized
- 2019 Phase 1 SSES Tasks

I/I Control Plan Cost Estimate

SSES Phase	Meter Basin	Total Cost
Phase 1	F6; portions of other basins	$63,500
Phase 2	H1, J2	$91,600
Phase 3	A2, B1, B10, B14C	$148,700
Phase 4	C1, F1, G1	$166,300
TOTAL		$470,100

I/I Control Plan Recommended Schedule

SSES Phase	2019	2020	2021	2022	2023	2024	2025
1							
2							
3							
4							

Wastewater Treatment Facility Evaluation

WWTF History

Upgrades at WWTF

- 1897 Original Construction
- Primary Treatment Added in 1940's
- Secondary Treatment Added in 1970
- WWTF Upgrade in 1988, Wetland Beds Added
- Town Takes Ownership of WWTF in 1992
- Aeration Upgrade 1996
- WWTF Wet Weather Pump Upgrade 2010
- Miscellaneous WWTF Improvements 2013
- Meadow Road Pump Station Upgrade 2015

New Permit Limits and Requirements

Old NPDES Permit Limits

- **Total Phosphorous**
  - **Dates were May 1 to October 31 and November 1 April 30**
  - **Limits were 0.2 mg/L summer, 0.3 mg/L winter**

New NPDES Permit Limits

- **Total Phosphorous**
  - **Dates changed to April 1 to October 31 and November 1 to March 31**
  - **Limits changed to 0.1 mg/L summer, 0.2 mg/L winter**

Recommended Site Plan

WRIGHT-PIERCE Engineering a Better Environment

WWTF Recommended Improvements Cost Estimate

Item	Estimated Cost
Civil	$975,000
Architectural	$1,020,000
Structural	$1,960,000
Process Equipment & Piping	$4,861,000
HVAC/Plumbing	$675,000
Instrumentation	$859,000
Electrical	$2,267,000
Contractor Mobilization (5%)	$631,000
Itemized Construction Subtotal	**$13,248,000**
Contractor Overhead and Profit (20%)	$2,650,000
Contractor Mark-up on Subcontractor Work, Bonds and Insurance, Unit Price Items	$714,000
Construction Cost Subtotal	**$16,612,000**
Design Contingency (20%)	$3,322,000
Inflation to Midpoint of Construction (5%)	$831,000
Total Estimated Construction Cost	**$20,765,000**
Construction Phase Contingency (5%)	$1,038,000
Total Estimated Bid Cost	**$21,803,000**
Engineering Services – Design & Construction Administration (18%)	$3,738,000
Materials Testing (1%)	$208,000
Town Legal/Administration Fees (2%)	$415,000
Financing (1%)	$262,000
Total Estimated Project Cost	**$26,426,000**

WWTF Recommended Improvements Schedule

Milestone	Date
Final NPDES Permit Issuance*	February 2019
Final CWMP	July 2019
CWMP Public Hearing	August 20, 2019
Conceptual Design Report Due**	By December 31, 2019
Spencer Annual Town Meeting to Appropriate Design Funds	May 2020
Preliminary Design Begins	July 2020
MassDEP SRF Project Evaluation Form (PEF) Submitted	August 2020
Preliminary Design Report (30%)	December 2020
MassDEP SRF Intended Use Plan (IUP) Notification Draft	By December 31, 2020
Final IUP	January 2021
Final Design & Permitting Begins	January 2021
Spencer Annual Town Meeting to Appropriate Construction Funds	May 2021
SRF Application Submission (90% Design)	By October 15, 2021
100% Design & Permitting Complete	By December 31, 2021
Bidding	January through March 2022
Start Construction	By June 30, 2022
Substantial Completion	October 2023
Final Completion December 2023	December 2023
One-year Warranty Period	October 2024
Attain Compliance	By December 31, 2024

*Went Into Effect on May 1, 2019
**CWMP Understood to Satisfy this Requirement

Overall CWMP Recommended Plan

Needs Areas

- Onsite Septic Systems for all Areas
- Consider Connecting Needs Area 15, Portions of 11/12, and Portions of 18/20 in Future, as Needed/Desired by Town

Collection System & I/I Control

- I/I Control is of High Importance for WWTF
- Phase 1 - Ongoing
- Phase 2
- Phase 3
- Phase 4

WWTF

- Permit Related Needs
- Age Related Needs
- Condition Related Needs

Funding/Financing

- Develop Funding/Financing Plan to Support
  - WWTF Upgrade
  - Collection System SSES and Rehabilitation Work

- Potential Grant/Loan Funding Opportunities
  - 0% SRF Loan for the WWTF Upgrade
  - 2% SRF loan for Collection System Rehabilitation
  - Investigate other Grant Options

- Sewer User Fees

Other Large-scale WWTF Upgrades in Massachusetts

- Grafton - $59 million, permit and age-related
- Uxbridge - $45 million, permit-related
- Middleborough - $25 million, permit-related
- Leominster - $25 million, permit and age-related
- Orange - $20 million, age-related
- Sturbridge - $17 million, permit and age-related
- Hudson – Phase 1 - $15 million, permit and age – related, Phase 2 pending ($15M+)

Contact Information – Wright-Pierce

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Adam Higgins, EIT

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978.416.8000

Contact Information – Spencer Sewer Department

Sewer Department Staff

James LaPlante
Superintendent
Jlaplante@spencerma.gov
508.885.7542

Board of Sewer Commissioners

Frank White
Larry Dufault
Michael Mercadante

Meet 2nd Wednesday at 4:00 PM of Every Month
3 Old Meadow Road, Spencer, MA

THANK YOU

SIGN-IN-SHEET
PUBLIC HEARING
SPENCER, MA
COMPREHENSIVE WASTEWATER MANAGEMENT PLAN
13927A

DATE: August 20, 2019
AT: 6:00 PM

No.	Name (*Please print legibly*)	Resident of Spencer (Y/N)	Street Address	Company/Organization
1.	Adam Higgins	N		W-P
2.	[illegible]	N		Spencer Sewer
3.	Kevin Olson	N		W-P
4.	Debora Graves	Y		Town of Spencer
5.	[illegible]	Y		Select Board
6.	[illegible]	Y		State Rep.
7.	[illegible]	Y		resident / Spencer
8.	Michael Malone	Y		Resident
9.	[illegible]	Y		Select Board
10.	Ryan [illegible]	N		T&B
11.	Paul Dell'Aquila	N	157 Main St.	Town Planner
12.	Jeff Clark	N		resident downstream
13.	Don [illegible]	N		[illegible]
14.	Doug [illegible]	N		QQLA
15.	[illegible]	Y		Sewer Commissioner
16.	[illegible]	Y	[illegible]	Sewer Comm

QUESTION AND ANSWER PERIOD
PUBLIC HEARING
SPENCER, MA
COMPREHENSIVE WASTEWATER MANAGEMENT PLAN
13927A

DATE: August 20, 2019
AT: 6:00 PM

A Public Hearing was held at the Spencer Town Hall to present three-phase Comprehensive Wastewater Management Plan (CWMP). A summary of the questions and answers discussed during the meeting is presented below:

Question 1 – Will tonight's presentation be made available online?

Answer 1 – The final CWMP will include the presentation in an appendix, which will be available in the Town Clerk's office in hard copy form and on the Sewer Department's website in PDF form. The meeting is also being taped and is available.

Question 2 – Does this plan and the intended WWTF upgrade increase capacity?

Answer 2 – No, the NPDES permit issued in February 2019 does not change the rated capacity of the system. The CWMP does not recommend adding additional flow from any High Needs Areas during the next 20-year time period. And the WWTF upgrade will not increase permitted capacity at the facility but will add tankage to better treat the current flows. The Sewer Department is also working diligently on reducing I/I from the system to decrease peak flows at the WWTF.

Question 3 – The NPDES permit says something about action needed by the Sewer Department when capacity goes over 80%?

Answer 3 – Yes, when the rolling average daily flow exceeds 80% of the design capacity for the WWTF, a report must be submitted regarding actions the Sewer Department can take to reduce flows and detail how the facility intends to continue treating flow up to the 100% design capacity.

Question 4 – Does the Sewer Department intend to utilize SRF funding next year?

Answer 4 – No, SRF funding is only eligible for planning and construction phase costs, design phase costs are not eligible. As such, the Sewer Department intends to file the Project Evaluation Form (PEF) next year (August 2020) to apply for 2021 SRF funding.

Question 5 – Your presentation said that the WWTF discharges to the Cranberry River, but the NPDES permit says the Seven Mile River.

Answer 5 – The NPDES permit issued in February 2019 did not change the current outfall location. The name changed from Cranberry Brook to Cranberry River, but the location did not change to the Seven Mile River. Changing discharge locations was investigated during the CWMP process but there was no cost-benefit to moving the location to the Seven Mile River.

Question 6 – Is the Town Administrator and Board of Selectmen supporting the Sewer Commission in this endeavor?

Answer 6 – The Town Departments have assisted the Sewer Department where they can, but they have limited abilities in assisting in monetary form for any work the Sewer Department does. The Sewer Commission has no complaints with the other Town Departments.

Question 7 – Do you know when and where pipes will be repaired as a result of your investigative work in the collection system?

Answer 7 – From the I/I Control Plan flow metering, we have some ideas on "trouble" areas in the collection system. Phase 1 of the SSES targeted those areas and the investigative work is wrapping up now. We do not have definitive answers yet but will have a better idea in a few months after Phase 1 SSES work. As Phases 2, 3 and 4 SSES work is complete we will identify additional sources of I/I and come up with a plan to remove it from the collection system.

<u>**7:10 PM, close meeting**</u>

C

Present Worth Cost Analysis for Needs Area 11
Septic Systems

<u>Septic Systems</u>						
	Quantity	Unit	Unit Cost ($)			Cost ($)
Septic Systems	134	EA	$	20,000	*$*	*2,680,000*
Bare Construction Subtotal					$	2,680,000
Present Worth Subtotal					$	2,425,225
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS				10.0%	$	243,000
SUBTOTAL, SUBCONTRACTORS						
BONDS & INSURANCES				1.5%	$	36,000
SUBTOTAL, CONSTRUCTION COSTS					$	2,704,225
PROJECT MULTIPLIER, DESIGN CONTINGENCY						
PROJECT MULTIPLIER, DESIGN CONTINGENCY				1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.				1.00		
SUBTOTAL					**$**	**2,974,647**
CONSTRUCTION					$	2,974,647
CONSTRUCTION CONTINGENCY		10.0%			$	300,000
ENGINEERING SERVICES - DESIGN		15.0%			$	446,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%			$	149,000
MATERIALS TESTING		1.0%			$	30,000
DIRECT EQUIPMENT PURCHASE					$	-
LAND ACQUISITION/ EASEMENTS					$	-
LEGAL/ ADMINISTRATIVE		1.0%			$	30,000
FINANCING		1.0%			$	30,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS					**$**	**3,930,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)					$	26,800
$200/year						
PW ANNUAL O&M COST					**$**	**485,045**
TOTAL PRESENT WORTH COSTS					**$**	**4,416,000**

Present Worth Cost Analysis for Needs Area 11
I/A Systems

I/A Systems	Quantity	Unit	Unit Cost ($)	Cost ($)
I/A System - NEW	67	EA	$ 25,000	$ 1,675,000
I/A System - RETROFIT	67	EA	$ 9,500	$ 636,500
Bare Construction Subtotal				**$ 2,311,500**
Present Worth Subtotal				***$ 2,091,756***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$ 209,000
SUBTOTAL, SUBCONTRACTORS				
BONDS & INSURANCES			1.5%	$ 31,000
SUBTOTAL, CONSTRUCTION COSTS				$ 2,331,756
PROJECT MULTIPLIER, DESIGN CONTINGENCY				
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00	
SUBTOTAL				**$ 2,564,932**
CONSTRUCTION				$ 2,564,932
CONSTRUCTION CONTINGENCY		10.0%		$ 260,000
ENGINEERING SERVICES - DESIGN		15.0%		$ 385,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$ 128,000
MATERIALS TESTING		1.0%		$ 26,000
DIRECT EQUIPMENT PURCHASE				$ -
LAND ACQUISITION/ EASEMENTS				$ -
LEGAL/ ADMINISTRATIVE		1.0%		$ 26,000
FINANCING		1.0%		$ 26,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$ 3,390,000**
O&M COSTS				$ 134,000
DECOMISSIONING COSTS				$ 67,000
PW ANNUAL O&M COST				**$ 3,637,837**
TOTAL PRESENT WORTH COSTS				**$ 7,028,000**

Present Worth Cost Analysis for Needs Area 12
Septic Systems

Septic Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	205	EA	$ 20,000	*$*	*4,100,000*
Bare Construction Subtotal				$	4,100,000
Present Worth Subtotal				$	3,710,232
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	371,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	56,000
SUBTOTAL, CONSTRUCTION COSTS				$	4,137,232
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**4,550,955**
CONSTRUCTION				$	4,550,955
CONSTRUCTION CONTINGENCY		10.0%		$	460,000
ENGINEERING SERVICES - DESIGN		15.0%		$	683,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	228,000
MATERIALS TESTING		1.0%		$	46,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	46,000
FINANCING		1.0%		$	46,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**6,014,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	41,000
$200/year					
PW ANNUAL O&M COST				**$**	**742,046**
TOTAL PRESENT WORTH COSTS				**$**	**6,757,000**

Present Worth Cost Analysis for Needs Area 12
I/A Systems

I/A Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	103	EA	$ 25,000	$	2,575,000
I/A System - RETROFIT	102	EA	$ 9,500	$	969,000
Bare Construction Subtotal				**$**	**3,544,000**
Present Worth Subtotal				***$***	***3,207,088***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	321,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	48,000
SUBTOTAL, CONSTRUCTION COSTS				$	3,576,088
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**3,933,697**
CONSTRUCTION				$	3,933,697
CONSTRUCTION CONTINGENCY		10.0%		$	390,000
ENGINEERING SERVICES - DESIGN		15.0%		$	590,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	197,000
MATERIALS TESTING		1.0%		$	39,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	39,000
FINANCING		1.0%		$	39,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**5,189,000**
O&M COSTS				$	205,000
DECOMISSIONING COSTS				$	102,000
PW ANNUAL O&M COST				**$**	**5,556,298**
TOTAL PRESENT WORTH COSTS				**$**	**10,746,000**

Present Worth Cost Analysis for Needs Area 13
Septic Systems

Septic Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	62	EA	$ 20,000	*$*	*1,240,000*
Bare Construction Subtotal				$	1,240,000
Present Worth Subtotal				$	1,122,119
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	112,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	17,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,251,119
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,376,231**
CONSTRUCTION				$	1,376,231
CONSTRUCTION CONTINGENCY		10.0%		$	140,000
ENGINEERING SERVICES - DESIGN		15.0%		$	206,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	69,000
MATERIALS TESTING		1.0%		$	14,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	14,000
FINANCING		1.0%		$	14,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**1,819,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	12,400
$200/year					
PW ANNUAL O&M COST				**$**	**224,424**
TOTAL PRESENT WORTH COSTS				**$**	**2,044,000**

Present Worth Cost Analysis for Needs Area 13
I/A Systems

I/A Systems

	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	31	EA	$ 25,000	$	775,000
I/A System - RETROFIT	31	EA	$ 9,500	$	294,500
Bare Construction Subtotal				**$**	**1,069,500**
Present Worth Subtotal				***$***	***967,828***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	97,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	15,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,079,828
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,187,810**
CONSTRUCTION				$	1,187,810
CONSTRUCTION CONTINGENCY		10.0%		$	120,000
ENGINEERING SERVICES - DESIGN		15.0%		$	178,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	59,000
MATERIALS TESTING		1.0%		$	12,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	12,000
FINANCING		1.0%		$	12,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**1,569,000**
O&M COSTS				$	62,000
DECOMISSIONING COSTS				$	31,000
PW ANNUAL O&M COST				**$**	**1,683,178**
TOTAL PRESENT WORTH COSTS				**$**	**3,253,000**

Present Worth Cost Analysis for Needs Area 15
Septic Systems

Septic Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	23	EA	$ 20,000	*$*	*460,000*
Bare Construction Subtotal				$	460,000
Present Worth Subtotal				$	416,270
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	42,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	6,000
SUBTOTAL, CONSTRUCTION COSTS				$	464,270
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**510,697**
CONSTRUCTION				$	510,697
CONSTRUCTION CONTINGENCY		10.0%		$	50,000
ENGINEERING SERVICES - DESIGN		15.0%		$	77,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	26,000
MATERIALS TESTING		1.0%		$	5,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	5,000
FINANCING		1.0%		$	5,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**674,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	4,600
$200/year					
PW ANNUAL O&M COST				**$**	**83,254**
TOTAL PRESENT WORTH COSTS				**$**	**758,000**

Present Worth Cost Analysis for Needs Area 15
I/A Systems

I/A Systems

	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	12	EA	$ 25,000	$	300,000
I/A System - RETROFIT	11	EA	$ 9,500	$	104,500
Bare Construction Subtotal				**$**	**404,500**
Present Worth Subtotal				***$***	***366,046***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	37,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	5,000
SUBTOTAL, CONSTRUCTION COSTS				$	408,046
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**448,851**
CONSTRUCTION				$	448,851
CONSTRUCTION CONTINGENCY		10.0%		$	40,000
ENGINEERING SERVICES - DESIGN		15.0%		$	67,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	22,000
MATERIALS TESTING		1.0%		$	4,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	4,000
FINANCING		1.0%		$	4,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**586,000**
O&M COSTS				$	23,000
DECOMISSIONING COSTS				$	11,000
PW ANNUAL O&M COST				**$**	**615,356**
TOTAL PRESENT WORTH COSTS				**$**	**1,202,000**

Present Worth Cost Analysis for Needs Area 16
Septic Systems

<u>Septic Systems</u>					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	125	EA	$ 20,000	*$*	*2,500,000*
Bare Construction Subtotal				$	2,500,000
Present Worth Subtotal				$	2,262,336
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	226,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	34,000
SUBTOTAL, CONSTRUCTION COSTS				$	2,522,336
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**2,774,570**
CONSTRUCTION				$	2,774,570
CONSTRUCTION CONTINGENCY		10.0%		$	280,000
ENGINEERING SERVICES - DESIGN		15.0%		$	416,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	139,000
MATERIALS TESTING		1.0%		$	28,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	28,000
FINANCING		1.0%		$	28,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**3,666,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	25,000
$200/year					
PW ANNUAL O&M COST				**$**	**452,467**
TOTAL PRESENT WORTH COSTS				**$**	**4,119,000**

Present Worth Cost Analysis for Needs Area 16
I/A Systems

<u>**I/A Systems**</u>					
	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	63	EA	$ 25,000	$	1,575,000
I/A System - RETROFIT	62	EA	$ 9,500	$	589,000
Bare Construction Subtotal				**$**	**2,164,000**
Present Worth Subtotal				***$***	***1,958,278***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	196,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	29,000
SUBTOTAL, CONSTRUCTION COSTS				$	2,183,278
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**2,401,606**
CONSTRUCTION				$	2,401,606
CONSTRUCTION CONTINGENCY		10.0%		$	240,000
ENGINEERING SERVICES - DESIGN		15.0%		$	360,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	120,000
MATERIALS TESTING		1.0%		$	24,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	24,000
FINANCING		1.0%		$	24,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**3,170,000**
O&M COSTS				$	125,000
DECOMISSIONING COSTS				$	62,000
PW ANNUAL O&M COST				**$**	**3,384,455**
TOTAL PRESENT WORTH COSTS				**$**	**6,555,000**

Present Worth Cost Analysis for Needs Area 18
Septic Systems

<u>Septic Systems</u>					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	71	EA	$ 20,000	*$*	*1,420,000*
Bare Construction Subtotal				$	1,420,000
Present Worth Subtotal				$	1,285,007
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	129,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	19,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,433,007
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,576,308**
CONSTRUCTION				$	1,576,308
CONSTRUCTION CONTINGENCY		10.0%		$	160,000
ENGINEERING SERVICES - DESIGN		15.0%		$	236,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	79,000
MATERIALS TESTING		1.0%		$	16,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	16,000
FINANCING		1.0%		$	16,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**2,083,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	14,200
$200/year					
PW ANNUAL O&M COST				**$**	**257,001**
TOTAL PRESENT WORTH COSTS				**$**	**2,341,000**

Present Worth Cost Analysis for Needs Area 18
I/A Systems

I/A Systems

	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	36	EA	$ 25,000	$	900,000
I/A System - RETROFIT	35	EA	$ 9,500	$	332,500
Bare Construction Subtotal				**$**	**1,232,500**
Present Worth Subtotal				***$***	***1,115,332***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	112,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	17,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,244,332
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,368,765**
CONSTRUCTION				$	1,368,765
CONSTRUCTION CONTINGENCY		10.0%		$	140,000
ENGINEERING SERVICES - DESIGN		15.0%		$	205,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	68,000
MATERIALS TESTING		1.0%		$	14,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	14,000
FINANCING		1.0%		$	14,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**1,810,000**
O&M COSTS				$	71,000
DECOMISSIONING COSTS				$	35,000
PW ANNUAL O&M COST				**$**	**1,918,461**
TOTAL PRESENT WORTH COSTS				**$**	**3,729,000**

Present Worth Cost Analysis for Needs Area 20
Septic Systems

Septic Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	70	EA	$ 20,000	*$*	*1,400,000*
Bare Construction Subtotal				$	1,400,000
Present Worth Subtotal				$	1,266,908
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	127,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	19,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,412,908
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,554,199**
CONSTRUCTION				$	1,554,199
CONSTRUCTION CONTINGENCY		10.0%		$	160,000
ENGINEERING SERVICES - DESIGN		15.0%		$	233,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	78,000
MATERIALS TESTING		1.0%		$	16,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	16,000
FINANCING		1.0%		$	16,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**2,057,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	14,000
$200/year					
PW ANNUAL O&M COST				**$**	**253,382**
TOTAL PRESENT WORTH COSTS				**$**	**2,311,000**

Present Worth Cost Analysis for Needs Area 20
I/A Systems

I/A Systems	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	35	EA	$ 25,000	$	875,000
I/A System - RETROFIT	35	EA	$ 9,500	$	332,500
Bare Construction Subtotal				**$**	**1,207,500**
Present Worth Subtotal				***$***	***1,092,708***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	109,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	16,000
SUBTOTAL, CONSTRUCTION COSTS				$	1,217,708
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**1,339,479**
CONSTRUCTION				$	1,339,479
CONSTRUCTION CONTINGENCY		10.0%		$	130,000
ENGINEERING SERVICES - DESIGN		15.0%		$	201,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	67,000
MATERIALS TESTING		1.0%		$	13,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	13,000
FINANCING		1.0%		$	13,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**1,763,000**
O&M COSTS				$	70,000
DECOMISSIONING COSTS				$	35,000
PW ANNUAL O&M COST				**$**	**1,900,363**
TOTAL PRESENT WORTH COSTS				**$**	**3,664,000**

Present Worth Cost Analysis for Needs Area 28
Septic Systems

Septic Systems

	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	203	EA	$ 20,000	*$*	*4,060,000*
Bare Construction Subtotal				$	4,060,000
Present Worth Subtotal				$	3,674,034
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	367,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	55,000
SUBTOTAL, CONSTRUCTION COSTS				$	4,096,034
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**4,505,638**
CONSTRUCTION				$	4,505,638
CONSTRUCTION CONTINGENCY		10.0%		$	450,000
ENGINEERING SERVICES - DESIGN		15.0%		$	676,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	225,000
MATERIALS TESTING		1.0%		$	45,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	45,000
FINANCING		1.0%		$	45,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**5,947,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	40,600
$200/year					
PW ANNUAL O&M COST				**$**	**734,807**
TOTAL PRESENT WORTH COSTS				**$**	**6,682,000**

Present Worth Cost Analysis for Needs Area 28
I/A Systems

I/A Systems					
		Quantity	Unit	Unit Cost ($)	Cost ($)
I/A System - NEW		102	EA	$ 25,000	$ 2,550,000
I/A System - RETROFIT		101	EA	$ 9,500	$ 959,500
Bare Construction Subtotal					**$ 3,509,500**
Present Worth Subtotal					***$ 3,175,868***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS				10.0%	$ 318,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES				1.5%	$ 48,000
SUBTOTAL, CONSTRUCTION COSTS					$ 3,541,868
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY				1.10	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.				1.00	
SUBTOTAL					**$ 3,896,055**
CONSTRUCTION					$ 3,896,055
CONSTRUCTION CONTINGENCY	10.0%				$ 390,000
ENGINEERING SERVICES - DESIGN	15.0%				$ 584,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	5.0%				$ 195,000
MATERIALS TESTING	1.0%				$ 39,000
DIRECT EQUIPMENT PURCHASE					$ -
LAND ACQUISITION/ EASEMENTS					$ -
LEGAL/ ADMINISTRATIVE	1.0%				$ 39,000
FINANCING	1.0%				$ 39,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS					**$ 5,143,000**
O&M COSTS					$ 203,000
DECOMISSIONING COSTS					$ 101,000
PW ANNUAL O&M COST					**$ 5,502,002**
TOTAL PRESENT WORTH COSTS					**$ 10,646,000**

Present Worth Cost Analysis for Needs Area 30
Septic Systems

Septic Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
Septic Systems	156	EA	$ 20,000	*$*	*3,120,000*
Bare Construction Subtotal				$	3,120,000
Present Worth Subtotal				$	2,823,396
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	282,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	42,000
SUBTOTAL, CONSTRUCTION COSTS				$	3,147,396
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**3,462,135**
CONSTRUCTION				$	3,462,135
CONSTRUCTION CONTINGENCY		10.0%		$	350,000
ENGINEERING SERVICES - DESIGN		15.0%		$	519,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	173,000
MATERIALS TESTING		1.0%		$	35,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	35,000
FINANCING		1.0%		$	35,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**4,574,000**
SEPTAGE PUMPING & HAULING COST TO BE PERFORMED EVERY OTHER YEAR (PRORATED FOR THIS YEAR)				$	31,200
$200/year					
PW ANNUAL O&M COST				**$**	**564,679**
TOTAL PRESENT WORTH COSTS				**$**	**5,139,000**

Present Worth Cost Analysis for Needs Area 30
I/A Systems

I/A Systems					
	Quantity	Unit	Unit Cost ($)		Cost ($)
I/A System - NEW	78	EA	$ 25,000	$	1,950,000
I/A System - RETROFIT	78	EA	$ 9,500	$	741,000
Bare Construction Subtotal				**$**	**2,691,000**
Present Worth Subtotal				***$***	***2,435,179***
GENERAL CONTRACTOR OH&P AND GEN. CONDITIONS			10.0%	$	244,000
SUBTOTAL, SUBCONTRACTORS					
BONDS & INSURANCES			1.5%	$	37,000
SUBTOTAL, CONSTRUCTION COSTS				$	2,716,179
PROJECT MULTIPLIER, DESIGN CONTINGENCY					
PROJECT MULTIPLIER, DESIGN CONTINGENCY			1.10		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.			1.00		
SUBTOTAL				**$**	**2,987,797**
CONSTRUCTION				$	2,987,797
CONSTRUCTION CONTINGENCY		10.0%		$	300,000
ENGINEERING SERVICES - DESIGN		15.0%		$	448,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.		5.0%		$	149,000
MATERIALS TESTING		1.0%		$	30,000
DIRECT EQUIPMENT PURCHASE				$	-
LAND ACQUISITION/ EASEMENTS				$	-
LEGAL/ ADMINISTRATIVE		1.0%		$	30,000
FINANCING		1.0%		$	30,000
ENGINEER'S ESTIMATE OF CAPITAL COSTS				**$**	**3,945,000**
O&M COSTS				$	156,000
DECOMISSIONING COSTS				$	78,000
PW ANNUAL O&M COST				**$**	**4,235,094**
TOTAL PRESENT WORTH COSTS				**$**	**8,181,000**

Present Worth Cost Analysis for Needs Area 11
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	24,600	LF	$ 200	$ 4,920,000
6" PVC services	13,400	LF	$ 100	$ 1,340,000
Manhole	82	EA	$ 6,000	$ 492,000
Cleanouts	25	EA	$ 5,000	$ 125,000
Pump Station	2	EA	$ 500,000	$ 1,000,000
4" forcemain	6,200	LF	$ 75	$ 465,000
Air Release	2	EA	$ 7,000	$ 14,000
LPS	1,140	LF	$ 75	$ 85,500
Grinder Pump Stations	15	EA	$ 8,000	$ 120,000
Ledge Excavation	710	CY	$ 150	$ 106,467
Trench Paving Top/Surface + Binder	10,625	TON	$ 300	$ 3,187,463
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	134	EA	$ 1,000	$ 134,000
Subtotal				$ 12,009,000

SUBTOTAL, CONSTRUCTION			$ 12,009,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 2,102,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 180,000
SUBTOTAL, CONSTRUCTION COSTS			$ 14,291,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 18,007,000**
CONSTRUCTION			$ 18,007,000
CONSTRUCTION CONTINGENCY	10.0%		$ 1,800,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 1,801,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 1,801,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 90,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 180,000
FINANCING	1.0%		$ 180,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 24,160,000**
Annual O&M Cost per Pump Station			**$ 15,000**
Number of PS			**$ 2**
Annual O&M Cost per Grinder			**$ 500**
Number of Grinders			**$ 15**
TOTAL ANNUAL O&M COST			**$ 37,500**
TOTAL PROJECT COST			$ 24,160,000
LOAN RATE			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 24,160,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ 833,000
TOTAL OF PRESENT WORTH	**$ 24,993,000**

Present Worth Cost Analysis for Needs Area 12
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	30,800	LF	$ 200	$ 6,160,000
6" PVC services	20,500	LF	$ 100	$ 2,050,000
Manhole	103	EA	$ 6,000	$ 618,000
Cleanouts	31	EA	$ 5,000	$ 155,000
Pump Station	3	EA	$ 500,000	$ 1,500,000
4" forcemain	9,500	LF	$ 75	$ 712,500
Air Release	2	EA	$ 7,000	$ 14,000
LPS	0	LF	$ 75	$ -
Grinder Pump Stations	0	EA	$ 8,000	$ -
Ledge Excavation	896	CY	$ 150	$ 134,333
Trench Paving Top/Surface	11,582	TON	$ 300	$ 3,474,563
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	205	EA	$ 1,000	$ 205,000
Subtotal				$ 15,043,000

SUBTOTAL, CONSTRUCTION			$ 15,043,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 2,633,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 226,000
SUBTOTAL, CONSTRUCTION COSTS			$ 17,902,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 22,557,000**
CONSTRUCTION			$ 22,557,000
CONSTRUCTION CONTINGENCY	10.0%		$ 2,260,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 2,256,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 2,256,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 113,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 226,000
FINANCING	1.0%		$ 226,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 30,190,000**
Annual O&M Cost per Pump Station			**$ 15,000**
Number of PS			**$ 3**
TOTAL ANNUAL O&M COST			**$ 45,000**
TOTAL PROJECT COST			$ 30,190,000
LOAN RATE			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 30,190,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ 999,000
TOTAL OF PRESENT WORTH	**$ 31,189,000**

Present Worth Cost Analysis for Needs Area 13
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	19,700	LF	$ 200	$ 3,940,000
6" PVC services	6,200	LF	$ 100	$ 620,000
Manhole	66	EA	$ 6,000	$ 396,000
Cleanouts	20	EA	$ 5,000	$ 100,000
Pump Station	1	EA	$ 500,000	$ 500,000
4" forcemain	1,600	LF	$ 75	$ 120,000
Air Release	0	EA	$ 7,000	$ -
LPS	0	LF	$ 75	$ -
Grinder Pump Stations	0	EA	$ 8,000	$ -
Ledge Excavation	473	CY	$ 150	$ 71,000
Trench Paving Top/Surface	9,842	TON	$ 300	$ 2,952,563
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	62	EA	$ 1,000	$ 62,000
Subtotal				$ 8,782,000

SUBTOTAL, CONSTRUCTION			$ 8,782,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 1,537,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 132,000
SUBTOTAL, CONSTRUCTION COSTS			$ 10,451,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 13,168,000**
CONSTRUCTION			$ 13,168,000
CONSTRUCTION CONTINGENCY	10.0%		$ 1,320,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 1,317,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 1,317,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 66,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 132,000
FINANCING	1.0%		$ 132,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 17,750,000**
Annual O&M Cost per Pump Station			**$ 15,000**
Number of PS			**$ 1**
TOTAL ANNUAL O&M COST			**$ 15,000**
TOTAL PROJECT COST			$ 17,750,000
LOAN RATE			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 17,750,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ 333,000
TOTAL OF PRESENT WORTH	**$ 18,083,000**

Present Worth Cost Analysis for Needs Area 15
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)			Cost ($)
8" PVC gravity pipe	8,200	LF	$	200	$	1,640,000
6" PVC services	2,300	LF	$	100	$	230,000
Manhole	28	EA	$	6,000	$	168,000
Cleanouts	9	EA	$	5,000	$	45,000
Pump Station	1	EA	$	500,000	$	500,000
4" forcemain	2,000	LF	$	75	$	150,000
Air Release	0	EA	$	7,000	$	-
LPS	0	LF	$	75	$	-
Grinder Pump Stations	0	EA	$	8,000	$	-
Ledge Excavation	227	CY	$	150	$	34,000
Trench Paving Top/Surface	3,371	TON	$	300	$	1,011,375
Maintenance & Protection of Traffic	1	LS	$	10,000	$	10,000
Erosion and Sediment Control	1	LS	$	10,000	$	10,000
Decommission Septic Tank	23	EA	$	1,000	$	23,000
Subtotal					$	3,821,000

SUBTOTAL, CONSTRUCTION			$	3,821,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$	669,000
SUBTOTAL, SUBCONTRACTORS				
BONDS & INSURANCES		1.5%	$	57,000
SUBTOTAL, CONSTRUCTION COSTS			$	4,547,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY				
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05		
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$**	**5,729,000**
CONSTRUCTION			$	5,729,000
CONSTRUCTION CONTINGENCY	10.0%		$	570,000
ENGINEERING SERVICES - DESIGN	10.0%		$	573,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$	573,000
TRAFFIC POLICE DETAIL			$	100,000
MATERIALS TESTING	0.5%		$	29,000
DIRECT EQUIPMENT PURCHASE			$	-
LAND ACQUISITION/ EASEMENTS			$	200,000
LEGAL/ ADMINISTRATIVE	1.0%		$	57,000
FINANCING	1.0%		$	57,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$**	**7,890,000**
Annual O&M Cost per Pump Station			**$**	**15,000**
Number of PS			**$**	**1**
TOTAL ANNUAL O&M COST			**$**	**15,000**
TOTAL PROJECT COST			$	7,890,000
LOAN RATE				3.5%
LOAN LIFE, YEARS				20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$	7,890,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$	333,000
TOTAL OF PRESENT WORTH	**$**	**8,223,000**

Present Worth Cost Analysis for Needs Area 16
Municipal Wastewater Collection System Extension

Collection Costs						
	Quantity	Unit		Unit Cost ($)		Cost ($)
8" PVC gravity pipe	12,100	LF	$	200	$	2,420,000
6" PVC services	12,500	LF	$	100	$	1,250,000
Manhole	41	EA	$	6,000	$	246,000
Cleanouts	13	EA	$	5,000	$	65,000
Pump Station	1	EA	$	500,000	$	500,000
4" forcemain	2,000	LF	$	75	$	150,000
Air Release	0	EA	$	7,000	$	-
LPS	0	LF	$	75	$	-
Grinder Pump Stations	0	EA	$	8,000	$	-
Ledge Excavation	313	CY	$	150	$	47,000
Trench Paving Top/Surface	5,492	TON	$	300	$	1,647,563
Maintenance & Protection of Traffic	1	LS	$	10,000	$	10,000
Erosion and Sediment Control	1	LS	$	10,000	$	10,000
Decommission Septic Tank	125	EA	$	1,000	$	125,000
Subtotal					$	6,471,000

SUBTOTAL, CONSTRUCTION			$	6,471,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$	1,132,000
SUBTOTAL, SUBCONTRACTORS				
BONDS & INSURANCES		1.5%	$	97,000
SUBTOTAL, CONSTRUCTION COSTS			$	7,700,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY				
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05		
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$**	**9,702,000**
CONSTRUCTION			$	9,702,000
CONSTRUCTION CONTINGENCY	10.0%		$	970,000
ENGINEERING SERVICES - DESIGN	10.0%		$	970,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$	970,000
TRAFFIC POLICE DETAIL			$	100,000
MATERIALS TESTING	0.5%		$	49,000
DIRECT EQUIPMENT PURCHASE			$	-
LAND ACQUISITION/ EASEMENTS			$	200,000
LEGAL/ ADMINISTRATIVE	1.0%		$	97,000
FINANCING	1.0%		$	97,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$**	**13,160,000**
Annual O&M Cost per Pump Station			**$**	**15,000**
Number of PS			**$**	**1**
TOTAL ANNUAL O&M COST			**$**	**15,000**
TOTAL PROJECT COST			$	13,160,000
LOAN RATE				3.5%
LOAN LIFE, YEARS				20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$	13,160,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$	333,000
TOTAL OF PRESENT WORTH	**$**	**13,493,000**

Present Worth Cost Analysis for Needs Area 18
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	16,600	LF	$ 200	$ 3,320,000
6" PVC services	7,100	LF	$ 100	$ 710,000
Manhole	56	EA	$ 6,000	$ 336,000
Cleanouts	17	EA	$ 5,000	$ 85,000
Pump Station	0	EA	$ 500,000	$ -
4" forcemain	0	LF	$ 75	$ -
Air Release	0	EA	$ 7,000	$ -
LPS	0	LF	$ 75	$ -
Grinder Pump Stations	0	EA	$ 8,000	$ -
Ledge Excavation	369	CY	$ 150	$ 55,333
Trench Paving Top/Surface	9,026	TON	$ 300	$ 2,707,875
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	71	EA	$ 1,000	$ 71,000
Subtotal				$ 7,305,000

SUBTOTAL, CONSTRUCTION			$ 7,305,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 1,278,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 110,000
SUBTOTAL, CONSTRUCTION COSTS			$ 8,693,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 10,953,000**
CONSTRUCTION			$ 10,953,000
CONSTRUCTION CONTINGENCY	10.0%		$ 1,100,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 1,095,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 1,095,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 55,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 110,000
FINANCING	1.0%		$ 110,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 14,820,000**
Annual O&M Cost per Pump Station			**$ 15,000**
Number of PS			**$ -**
TOTAL ANNUAL O&M COST			**$ -**
TOTAL PROJECT COST			$ 14,820,000
LOAN RATE			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 14,820,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ -
TOTAL OF PRESENT WORTH	**$ 14,820,000**

Present Worth Cost Analysis for Needs Area 20
Municipal Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	13,900	LF	$ 200	$ 2,780,000
6" PVC services	7,000	LF	$ 100	$ 700,000
Manhole	47	EA	$ 6,000	$ 282,000
Cleanouts	14	EA	$ 5,000	$ 70,000
Pump Station	0	EA	$ 500,000	$ -
4" forcemain	0	LF	$ 75	$ -
Air Release	0	EA	$ 7,000	$ -
LPS	0	LF	$ 75	$ -
Grinder Pump Stations	0	EA	$ 8,000	$ -
Ledge Excavation	309	CY	$ 150	$ 46,333
Trench Paving Top/Surface	7,558	TON	$ 300	$ 2,267,438
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	70	EA	$ 1,000	$ 70,000
Subtotal				$ 6,236,000

SUBTOTAL, CONSTRUCTION			$ 6,236,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 1,091,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 94,000
SUBTOTAL, CONSTRUCTION COSTS			$ 7,421,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 9,350,000**
CONSTRUCTION			$ 9,350,000
CONSTRUCTION CONTINGENCY	10.0%		$ 940,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 935,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 935,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 47,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 94,000
FINANCING	1.0%		$ 94,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 12,700,000**
Annual O&M Cost per Pump Station			**$ 15,000**
Number of PS			**$ -**
TOTAL ANNUAL O&M COST			**$ -**
TOTAL PROJECT COST			$ 12,700,000
LOAN RATE			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 12,700,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ -
TOTAL OF PRESENT WORTH	**$ 12,700,000**

Present Worth Cost Analysis for Study Shared Area 11/12
Wastewater Collection System Extension

Collection Costs				
	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	17,000	LF	$ 200	$ 3,400,000
6" PVC services	17,900	LF	$ 100	$ 1,790,000
Manhole	57	EA	$ 6,000	$ 342,000
Cleanouts	17	EA	$ 5,000	$ 85,000
Pump Station	1	EA	$ 500,000	$ 500,000
4" forcemain	5,200	LF	$ 75	$ 390,000
Air Release	1	EA	$ 7,000	$ 7,000
LPS	1,140	LF	$ 75	$ 85,500
Grinder Pump Stations	15	EA	$ 8,000	$ 120,000
Ledge Excavation	519	CY	$ 150	$ 77,800
Trench Paving Top/Surface	7,036	TON	$ 300	$ 2,110,838
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	179	EA	$ 1,000	$ 179,000
Subtotal				$ 9,107,000

SUBTOTAL, CONSTRUCTION			$ 9,107,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 1,594,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 137,000
SUBTOTAL, CONSTRUCTION COSTS			$ 10,838,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 13,656,000**
CONSTRUCTION			$ 13,656,000
CONSTRUCTION CONTINGENCY	10.0%		$ 1,370,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 1,366,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 1,366,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 68,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 137,000
FINANCING	1.0%		$ 137,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 18,400,000**
Annual O&M Cost per Pump Station			**$ 20,000**
Number of PS			**$ 1**
Annual O&M Cost per Grinder			**$ 500**
Number of Grinders			**$ 15**
TOTAL ANNUAL O&M COST			**$ 27,500**
TOTAL PROJECT COST			$ 18,400,000
Loan Rate			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 18,400,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ 611,000
TOTAL OF PRESENT WORTH	**$ 19,011,000**

Present Worth Cost Analysis for Study Shared Area 11/13/15
Wastewater Collection System Extension

Collection Costs						
	Quantity	Unit	Unit Cost ($)			Cost ($)
8" PVC gravity pipe	22,500	LF	$	200	$	4,500,000
6" PVC services	11,900	LF	$	100	$	1,190,000
Manhole	75	EA	$	6,000	$	450,000
Cleanouts	23	EA	$	5,000	$	115,000
Pump Station	1	EA	$	500,000	$	500,000
4" forcemain	2,500	LF	$	75	$	187,500
Air Release	0	EA	$	7,000	$	-
LPS	0	LF	$	75	$	-
Grinder Pump Stations	0	EA	$	8,000	$	-
Ledge Excavation	556	CY	$	150	$	83,333
Trench Paving Top/Surface	10,875	TON	$	300	$	3,262,500
Maintenance & Protection of Traffic	1	LS	$	10,000	$	10,000
Erosion and Sediment Control	1	LS	$	10,000	$	10,000
Decommission Septic Tank	119	EA	$	1,000	$	119,000
Subtotal					$	10,427,000

SUBTOTAL, CONSTRUCTION			$	10,427,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$	1,825,000
SUBTOTAL, SUBCONTRACTORS				
BONDS & INSURANCES		1.5%	$	156,000
SUBTOTAL, CONSTRUCTION COSTS			$	12,408,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY				
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20		
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05		
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$**	**15,634,000**
CONSTRUCTION			$	15,634,000
CONSTRUCTION CONTINGENCY	10.0%		$	1,560,000
ENGINEERING SERVICES - DESIGN	10.0%		$	1,563,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$	1,563,000
TRAFFIC POLICE DETAIL			$	100,000
MATERIALS TESTING	0.5%		$	78,000
DIRECT EQUIPMENT PURCHASE			$	-
LAND ACQUISITION/ EASEMENTS			$	200,000
LEGAL/ ADMINISTRATIVE	1.0%		$	156,000
FINANCING	1.0%		$	156,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$**	**21,010,000**
Annual O&M Cost per Pump Station			**$**	**20,000**
Number of PS			**$**	**1**
Annual O&M Cost per Grinder			**$**	**500**
Number of Grinders			**$**	**-**
TOTAL ANNUAL O&M COST			**$**	**20,000**
TOTAL PROJECT COST			$	21,010,000
Loan Rate				3.5%
LOAN LIFE, YEARS				20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$	21,010,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$	444,000
TOTAL OF PRESENT WORTH	**$**	**21,454,000**

Present Worth Cost Analysis for Study Shared Area 18/20
Wastewater Collection System Extension

Collection Costs

	Quantity	Unit	Unit Cost ($)	Cost ($)
8" PVC gravity pipe	11,600	LF	$ 200	$ 2,320,000
6" PVC services	6,300	LF	$ 100	$ 630,000
Manhole	39	EA	$ 6,000	$ 234,000
Cleanouts	12	EA	$ 5,000	$ 60,000
Pump Station	0	EA	$ 500,000	$ -
4" forcemain	0	LF	$ 75	$ -
Air Release	0	EA	$ 7,000	$ -
LPS	0	LF	$ 75	$ -
Grinder Pump Stations	0	EA	$ 8,000	$ -
Ledge Excavation	258	CY	$ 150	$ 38,667
Trench Paving Top/Surface	6,308	TON	$ 300	$ 1,892,250
Maintenance & Protection of Traffic	1	LS	$ 10,000	$ 10,000
Erosion and Sediment Control	1	LS	$ 10,000	$ 10,000
Decommission Septic Tank	63	EA	$ 1,000	$ 63,000
Subtotal				$ 5,258,000

SUBTOTAL, CONSTRUCTION			$ 5,258,000
GENERAL CONTRACTOR OH&P AND GEN. COND.		17.5%	$ 920,000
SUBTOTAL, SUBCONTRACTORS			
BONDS & INSURANCES		1.5%	$ 79,000
SUBTOTAL, CONSTRUCTION COSTS			$ 6,257,000
PROJECT MULTIPLIER, DESIGN CONTINGENCY			
PROJECT MULTIPLIER, DESIGN CONTINGENCY		1.20	
PROJECT MULTIPLIER, INFLATION TO MIDPT CONST.		1.05	
ENGINEERS ESTIMATE OF CONSTRUCTION COST			**$ 7,884,000**
CONSTRUCTION			$ 7,884,000
CONSTRUCTION CONTINGENCY	10.0%		$ 790,000
ENGINEERING SERVICES - DESIGN	10.0%		$ 788,000
ENGINEERING SERVICES - CONSTRUCTION ADMIN.	10.0%		$ 788,000
TRAFFIC POLICE DETAIL			$ 100,000
MATERIALS TESTING	0.5%		$ 39,000
DIRECT EQUIPMENT PURCHASE			$ -
LAND ACQUISITION/ EASEMENTS			$ 200,000
LEGAL/ ADMINISTRATIVE	1.0%		$ 79,000
FINANCING	1.0%		$ 79,000
ENGINEER'S ESTIMATE OF CAPITAL COST			**$ 10,750,000**
Annual O&M Cost per Pump Station			**$ 20,000**
Number of PS			**$ -**
Annual O&M Cost per Grinder			**$ 500**
Number of Grinders			**$ -**
TOTAL ANNUAL O&M COST			**$ -**
TOTAL PROJECT COST			$ 10,750,000
Loan Rate			3.5%
LOAN LIFE, YEARS			20

SUMMARY OF PRESENT WORTH COST ANALYSIS

INITIAL CAPITAL COST	$ 10,750,000
O&M (PRESENT WORTH at 3% INFLATION & 2% INTEREST)	$ -
TOTAL OF PRESENT WORTH	**$ 10,750,000**

D

SEPTAGE MANAGEMENT PLANNING

INTRODUCTION

A septage management plan for the Town of Spencer is recommended for areas proposed for long-term on-site wastewater disposal as well as those areas proposed for future infrastructure until such time as the recommended plan is implemented in those areas. Inadequate maintenance of on-site systems can hurt their performance and pose a threat to public health and nearby surface waters and groundwater. The Health Department regulates the installation and repair of on-site systems per Title 5 requirements. The Department is also responsible for inspecting systems when properties are sold or when the Department receives evidence of a problem. However, individual owners are responsible for regular maintenance. Often, problems with on-site systems persist undetected or are ignored for long periods of time.

A municipality may enact more stringent regulations than those associated with Title 5 to minimize the risk to public health and threats to environmental resources. The particular elements of those regulations would vary considerably with the goals of the community. When preparing a regulation (such as a SMP), a community must balance the environmental benefits of the regulations with the additional financial burden on taxpayers and the administrative burden on the municipality's departments. At the forefront of any SMP is the public education portion.

TYPICAL SEPTAGE MANAGEMENT PLAN TASKS

A typical SMP includes the following tasks.

- **Level of Management**
  The Town would need to establish an appropriate level of management for its SMP that is tailored to the Town's resources, management capabilities, and the level of protection necessary for protection of health, drinking water resources and other water resources.

- **Planning Objectives**

  Set planning objectives. The Health Department is responsible for coordinating program rules and regulations with state and local planning and zoning and other water related programs. The potential risks of wastewater discharge would be evaluated to limit environmental impacts on receiving environments during the rule making process.

- **Performance Requirements**

  Set performance requirements according to local rules and regulations. Right now, the Health Department, along with Title 5 Regulations, is responsible for establishing system failure criteria to protect public health.

- **Site Evaluation**

  Set all site evaluation criteria. All site evaluations are currently performed according to state Title 5 and local rules and regulations governing site evaluations.

- **Design Criteria**

  Set any and all design parameters. All designs are currently in conformance of state Title 5 and local rules and regulations governing the design and construction of on-site wastewater systems.

- **Operation and Maintenance Requirements/Responsibilities**

  Set operation and maintenance requirements/responsibilities with guidance from public education materials.

- **Residuals Management (Pumping Requirements)**

  Set pumping requirements/responsibilities with guidance from public education materials. Provide free inspections of the system's storage component (typically a septic tank) by the Health Department.

- **Certification/Licensing/Jurisdiction**

  Set parameters for Certification/Licensing/Jurisdiction through the Health Department.

- **Public Education and Training**

  Develop and implement a public education and training program on Title 5 systems.

- **Water Conservation**

  Promote and if necessary, expand the Town's public education program on water conservation benefits.

- **Corrective Actions/Enforcement**

  The Health Department currently negotiates all compliance schedules with the property owners for correcting documented noncompliance items and administers the enforcement actions taken. A program, including fines and or/penalties for failure to comply with compliance requirements, could be established.

- **Record Keeping and Reporting-Database Design and Implementation**

  All database record keeping is currently undertaken through the Health Department. New programs should be administered with the use of the database, for example pumping notices.

- **Financial Assistance**

  The Town of Spencer used to participate in the Commonwealth’s Title 5 Betterments Help for Homeowners with Failed Septic Systems: The Community Septic Management Program. The program targets homeowners with failed septic systems for upgrade/repair to Title 5 or connection to an existing sewer line. Funding for the program is through the State Revolving Fund (SRF) loan and Water Pollution Abatement Trust (WPAT). The homeowner’s pay their betterment through their taxes at a 5% interest rate. This program could be revisited for participation.

- **Level of Consultant Involvement**

  A SMP could be developed with several levels of outsourced assistance from the consultant.

- **Required Board of Selectmen Action for Adoption & Required Legislative Review Procedures, if Required**

  Rules, regulations, and by-laws for the Septage Management Plan would be developed and adopted by Board of Selectmen, such as "Septic Districts".

- **Schedule of Implementation**

  A schedule of scope implementation would be developed.

- **Estimated Costs**

  A schedule of costs to implement and carry out the SMP would need to be developed based on the level and complexity of services offered.

- **Level of Conformance With Town's Goals**

  Coordination with the CWMP recommended plan and other relevant Town plans.

- **Identification of Required Permits and Potential Environmental Impacts**

  All necessary permits and environmental impacts would need to be discussed and identified.

TYPICAL SEPTAGE MANAGEMENT PLAN REGULATIONS

A typical SMP regulation consists of any of the following examples:

- Requiring existing systems to be pumped at regular intervals, such as every two years, as determined by the Health Department;
- Requiring existing systems to be inspected and if necessary, repaired, or upgraded to meet Title 5 regulations; or
- Requiring certain failing systems to be upgraded with I/A technologies.

E

PHOSPHORUS REMOVAL TO 20 µg/L

Advanced Phosphorus Removal

Nexom is the industry leader in the development of technologies for phosphorus removal from wastewater. With advanced control techniques and patented nutrient removal systems, Nexom can provide you with a cost effective solution to meet your phosphorus level needs.

The Blue PRO® system provides a unique approach to chemical dosing, with significantly lower chemical use across the entire wastewater treatment plant than competitors. No other chemical dosing is required in the plant to achieve the lowest phosphorus discharge requirements. Nexom's unique chemical control system provides an advantage due to its cost efficiency and ability to seamlessly integrate into and respond to the needs of existing wastewater treatment systems. The chemical dose used with Blue PRO methods is so much lower than the competition that the comparative savings represent a return on the capital investment in less than three years.

The Blue PRO process is the leading technology for phosphorus reduction to any level. For phosphorus discharge limits as low as 0.02 mg/L (20 µg/L) P, Blue PRO provides reductions in chemical usage, equipment footprint, and associated operations and maintenance costs over alternative technologies. The Blue PRO platform is the most effective and most inexpensive tertiary treatment solution where additional considerations are needed, such as denitrification or metals removal.

A Blue PRO installation in Grangeville, Idaho for 0.05 mg/L phosphorus with a chemical dose of only 10 mg/L of Fe.

BluePRO®

The Blue PRO® System

How does the Blue PRO process work? Using Nexom's Centra-flo® continuous backwash gravity sand filters, a unique control system, and the patented Blue PRO process for reactive filtration, phosphorus is removed from wastewater streams through an array of mechanisms. Most importantly, Blue PRO systems optimize adsorption.

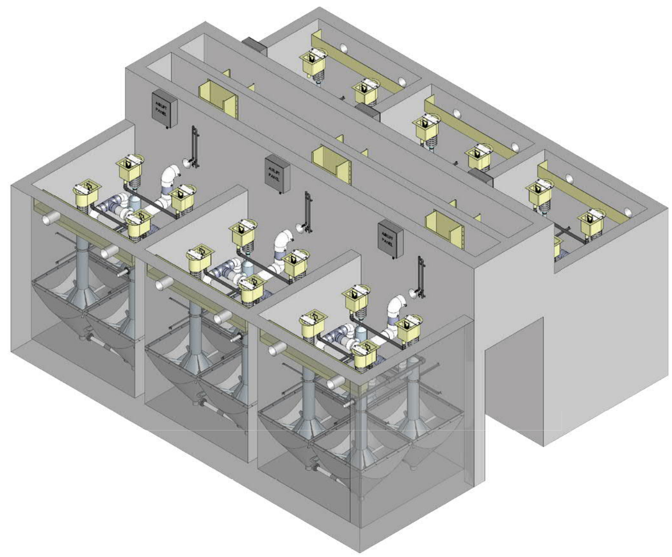
Nexom's reactive filtration process overcomes a critical obstacle to achieving efficient phosphorus removal in bulk aqueous solutions by providing reactive surface sites within the media bed, resulting in forced contact of chemical species with high adsorptive capacity. The adsorptive surface in Blue PRO filters is a continuously regenerated hydrous ferric oxide (HFO) coating that forms on the surface of the sand media. Coagulation followed by filtration simply cannot compare to the efficiency of adsorptive phosphorus removal.

Waste HFO, phosphorus, and solids are removed from the filter through the backwash or reject stream. Recycling this reject upstream provides the added benefit of removing phosphorus in plant clarification systems, further guaranteeing the achievement of the discharge phosphorus target as well as lowering the chemical dose. The phosphorus is chemically bound, leaving the plant with the sludge, rather than releasing in effluent streams or digestion. Integration of Nexom's phosphorus removal technology does not require change in the plant's sludge handling system. The Blue PRO system uses over 30% less chemical than other technologies, therefore producing less sludge. The waste HFO also helps with odor control and can reduce water content in biosolids.

Blue PRO Applications:

- **Advanced total phosphorus removal**
- **Metals removal, including mercury**
- **Combined denitrification**
- **Algae mitigation**

The Blue PRO® system is available in several models and configurations. The modular nature of the filters allows for easy system expansion. The filters are available as freestanding fiberglass or stainless steel units or as in-ground concrete cells. Control systems and smaller filters may be skid mounted for mobility or ease of commissioning.



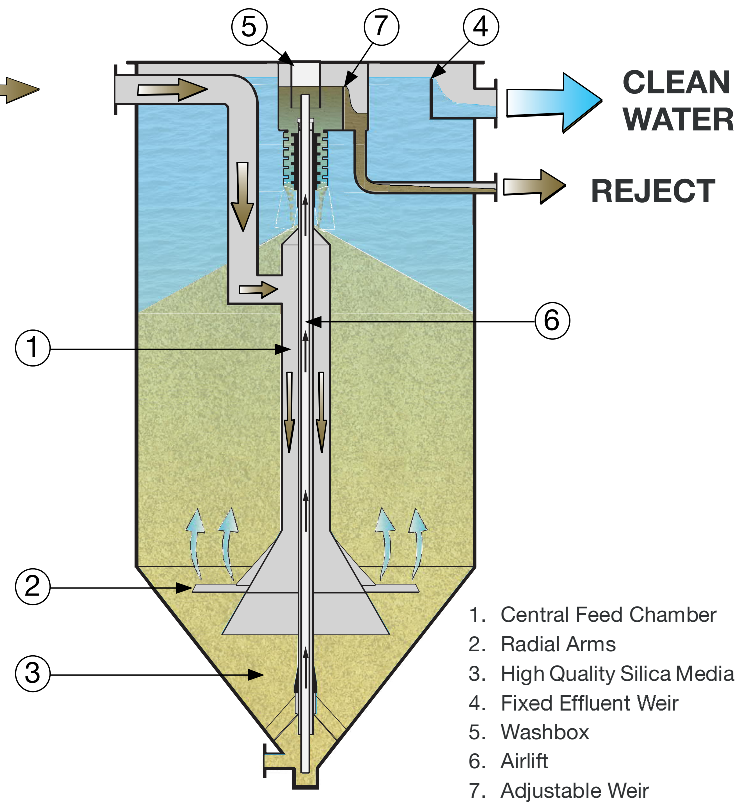
4.3 MGD Blue PRO system design for 0.07 mg/L TP in a Massachusetts WWTP.

Additional Features

Since many plants requiring phosphorus mitigation also require nitrogen control, Nexom provides the option to simultaneously denitrify in the same vessel with the Blue PRO process. With slight modifications, Nexom can provide a unique and efficient system for total nutrient reduction.

Besides phosphorus, Blue PRO methods are effective at removing many other contaminants, such as mercury, arsenic, chromium, and uranium. Minor adjustments in water chemistry may be implemented for the removal of metals and other contaminants, including zinc, lead, copper, iron, and manganese. Nexom has installations for removal of these contaminants in wastewater plants as well as groundwater systems, including self-contained package treatment systems.

INFLUENT → + CHEMICAL →



BluePRO®

Nexom's Blue PRO technology is covered by multiple patents and patents pending.

The Blue PRO Advantages:

- **Low capital and O&M costs**
- **Continuous flow – no interruption for backwash or changing media**
- **Modular design easily handles capacity increases**
- **Simple operation & low chemical use**

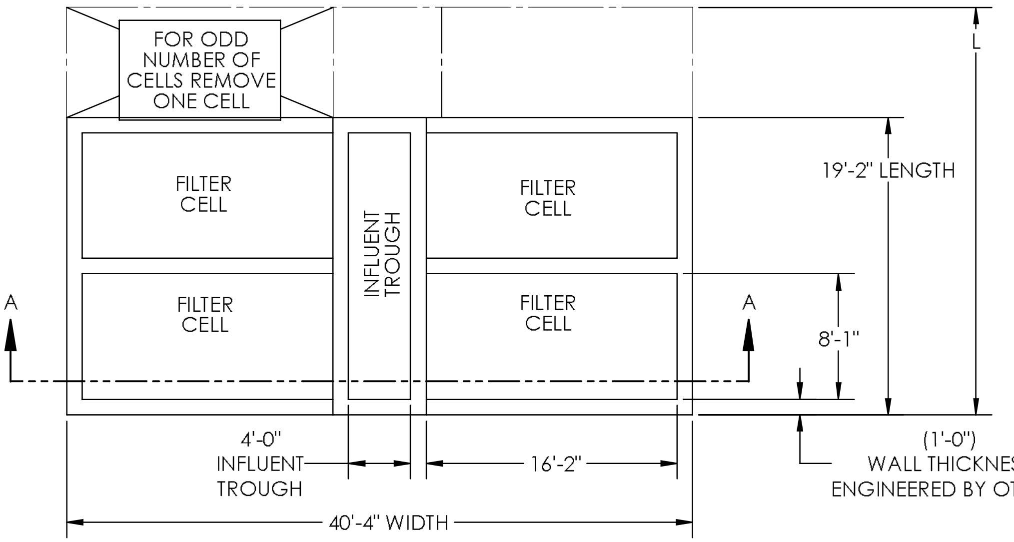
Nexom™

For more information, please contact **Nexom**:
888.710.2583
www.nexom.com

Manufacturer's representative:

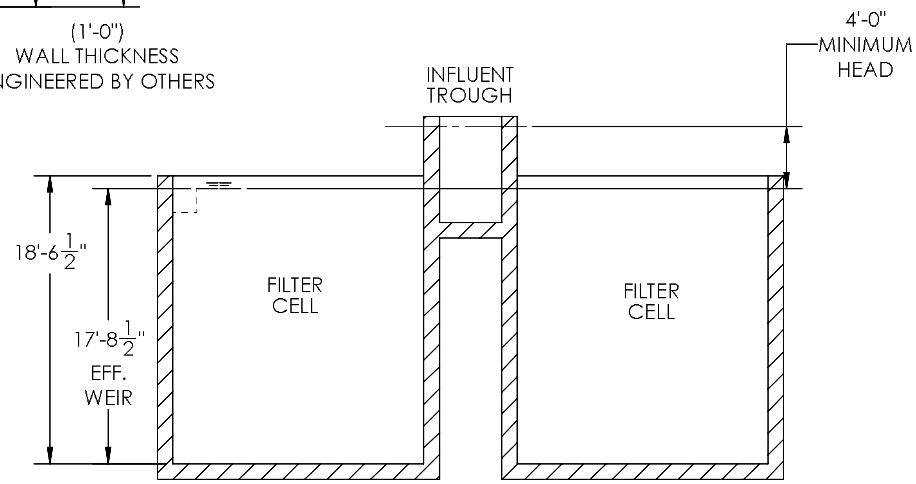
REV.	DESCRIPTION	DATE	ECO

REVISIONS



PLAN VIEW
4 CELLS SHOWN
OF 2 MODULES EACH

The drawings are for CF64-80.
Take off 20'' overall from the height of the cell.



ELEVATION VIEW
SECTION A-A

FOOT PRINT LENGTH L	
NUMBER OF CELLS	OVERALL LENGTH
6	28'3"
8	37'4"
10	46'5"
12	55'6"
14	64'7"
16	73'8"
18	82'9"
20	91'10"

NOTES:

1. DIMENSIONS ARE BASED ON A 1'-0" CONCRETE WALL THICKNESS.
2. DIMENSIONS MAY VARY DEPENDING ON CONCRETE WALL THICKNESS, ENGINEERED BY OTHERS.
3. INFLUENT TROUGH DIMENSIONS MAY VARY DEPENDING ON DESIGN FLOW.
4. FOR ADDITIONAL FOOTPRINT LENGTHS ADD 8'-1" FOR EACH ADDITIONAL CELL.
5. IF AN ODD NUMBER OF CELLS ARE REQUIRED REMOVE ONE CELL AS SHOWN IN THE PLAN VIEW.
6. HEIGHTS MAY VARY DEPENDING ON REQUIRED BED DEPTH AND/OR HYDRAULIC PROFILE.
   - MINIMUM EFFLUENT WEIR HEIGHT = 17' 8 1/2"

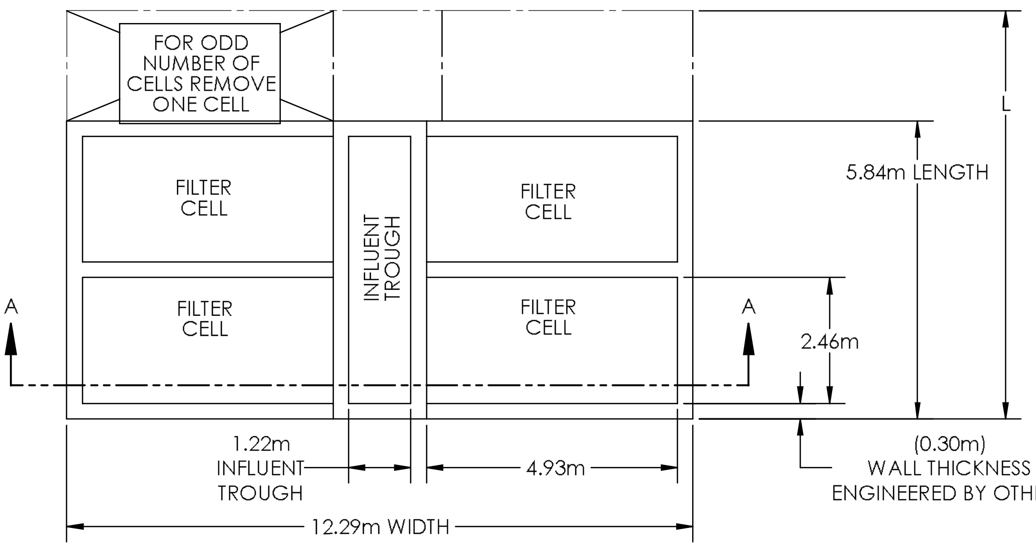
Nexom™
10450 N. AIRPORT RD.
HAYDEN, ID 83835

	NAME:	DATE:
DRAWN BY:	KJennings	7/9/13
CHECKED BY:	BMesserschmidt	7/9/13
PROJECT APPROVAL:	--	--

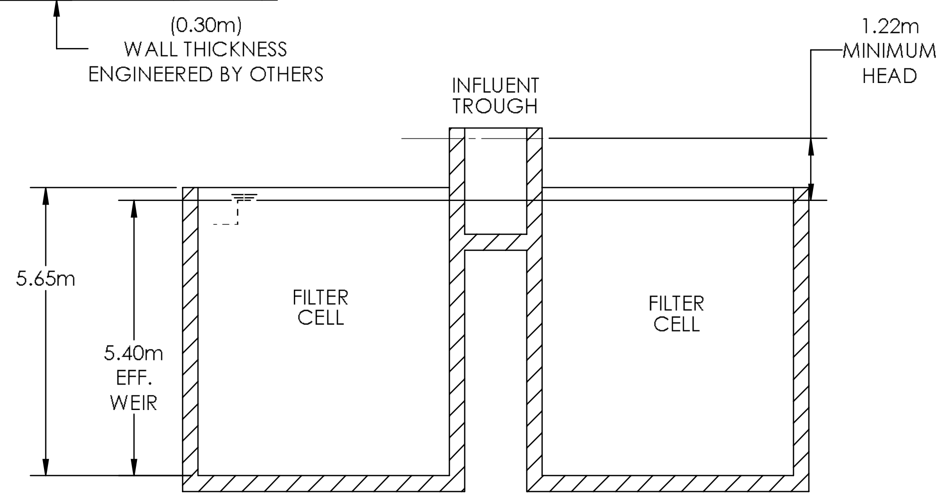
COMPANY CONFIDENTIAL

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16"
ONE PLACE DECIMAL ±.125
TWO PLACE DECIMAL ±.030
THREE PLACE DECIMAL ±.010
ANGULAR ±2.0°
THIRD ANGLE PROJECTION

PROJECT: Templates
DESCRIPTION: Footprint Drawing, CF64-80BG Dual Center
DRAWING NUMBER: CF64-80BG Dual Center
REV: F
DWG SIZE: B
SCALE: 1:96
PAGE: 1 OF 2



PLAN VIEW
4 CELLS SHOWN
OF 2 MODULES EACH



ELEVATION VIEW
SECTION A-A

FOOT PRINT LENGTH L	
NUMBER OF CELLS	OVERALL LENGTH
6	8.61m
8	11.38m
10	14.15m
12	16.92m
14	19.69m
16	22.45m
18	25.22m
20	28.00m

NOTES:

1. DIMENSIONS ARE BASED ON A 0.3m CONCRETE WALL THICKNESS.
2. DIMENSIONS MAY VARY DEPENDING ON CONCRETE WALL THICKNESS, ENGINEERED BY OTHERS.
3. INFLUENT TROUGH DIMENSIONS MAY VARY DEPENDING ON DESIGN FLOW.
4. FOR ADDITIONAL FOOTPRINT LENGTHS ADD 2.46m FOR EACH ADDITIONAL CELL.
5. IF AN ODD NUMBER OF CELLS ARE REQUIRED REMOVE ONE CELL AS SHOWN IN THE PLAN VIEW.
6. HEIGHTS MAY VARY DEPENDING ON REQUIRED BED DEPTH AND/OR HYDRAULIC PROFILE.
   - MINIMUM EFFLUENT WEIR HEIGHT = 4.94m

Nexom
10450 N. AIRPORT RD.
HAYDEN, ID 83835

	NAME:	DATE:
DRAWN BY:	KJennings	7/9/13
CHECKED BY:	BMesserschmidt	7/9/13
PROJECT APPROVAL:	--	--

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UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL ±1/16"
ONE PLACE DECIMAL ±.125
TWO PLACE DECIMAL ±.030
THREE PLACE DECIMAL ±.010
ANGULAR ±2.0°
THIRD ANGLE PROJECTION

PROJECT: Templates
DESCRIPTION: Footprint Drawing, CF64-80BG Dual Center
DRAWING NUMBER: CF64-80BG Dual Center
REV: F
DWG SIZE: B
SCALE: 1:96
PAGE: 2 OF 2

CASE STUDY:
MALBOROUGH, MASSACHUSETTS

A wastewater facility upgrade designed for phosphorus removal and affordability

Project Type:
Municipal Wastewater Treatment

Completion Date:
February 2012

Treatment Objectives:
Design flow:
2.89 MGD average
11.62 MGD peak
Required Effluent Quality:
May-Oct TP: 0.07 mg/L
Nov-Apr TP: 1.0 mg/L

Project Background and Challenges

The city of Malborough, Massachusetts consists of approximately 40,000 people located in Middlesex County, about 32 miles from Boston. Initially settled as a town in 1660, it became a favored stop on the Post Road as populations, business and travel grew in the colonies. By 1890, Marlborough was a major shoe manufacturing center, producing boots for Union soldiers. Marlborough became so well known for this that its official seal is decorated with a factory, a shoe box, and a pair of boots when it was incorporated as a city that year.

With more than a quarter of its territory as water, Massachusetts is one of the smallest states in the United States but also the third most densely populated, primarily around these waterways. Today, with phosphorus-fed algae blooms plaguing many North American bodies of water, and in response to environmental concerns, regulators in cities like Malborough are pressuring wastewater treatment plants (WWTP) to meet ever decreasing phosphorus limits in order to protect waterways.

These limits can vary, but are usually tied to Total Maximum Daily Loads (TMDL) established for bodies of water. In regions like Malborough where permits have addressed phosphorus pollution, discharge limits traditionally range from 1 mg/L down to 0.1 mg/L total phosphorus (TP). Historically, a limit of 0.1 mg/L has been considered an ultra-low target. But in Malborough, they faced an tough challenge from regulators with an ultra-low phosphorus TMDL limit of <0.07 mg/L, one of the lowest requirements in North America.

technologies for cleaner water

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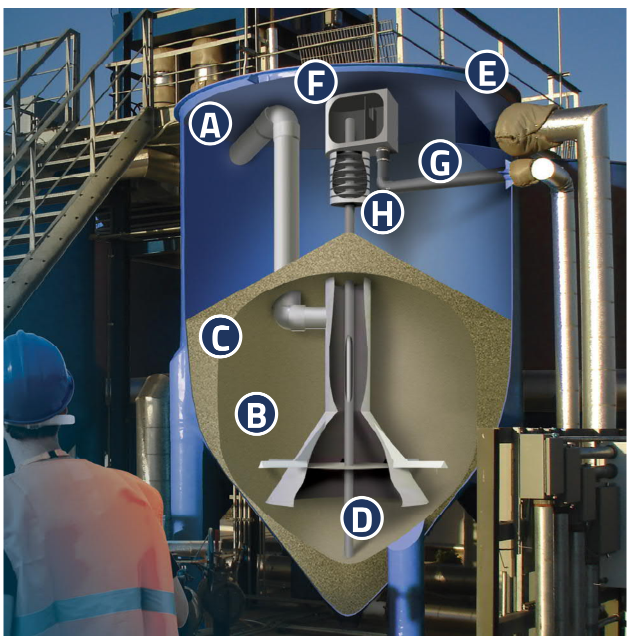
888·426·8180 • **www.nexom.com**

The Nexom Answer

Engineers across North America who are conducting facility planning are now also having to accommodate design for discharge permits ranging from 0.07 down to 0.02 mg/L total phosphorus (70 and 20 µg/L respectively). The permit issued to Malborough, Massachusetts, is currently among the most stringent requirements being met by reactive filtration to date, a TMDL of <0.07 mg/L. There, the WWTP discharges to the Assabet River. The challenge in Marlborough became not only from the need to achieve a low phosphorus limit efficiently, but the system also needed to be easy to operate and affordable.

The Blue PRO system was chosen for the Westerly WWTP in Marlborough after a competitive pilot project with two other technologies. In collaboration with Carlin Contracting and CDM Smith Engineering, Nexom provided an upgraded system for Malborough by adding the Blue PRO® reactive filtration system for enhanced treatment efficiency and cost minimization. The reactive filtration phosphorus compliance upgrade was sized for 4.15 MGD average daily flow, with a 11.62 MGD peak flow. With a design deliverable of 0.07 mg/L total phosphorus on a rolling 60-day average, its implementation has allowed the WWTP to meet its discharge permit cost effectively.



How it Works:

Blue PRO reactive filtration is a simple yet powerful tool for meeting ultra-low phosphorus limits. The Blue PRO uses a patented reactive filtration process within Nexom's Centra-flo® continuous-backwash media filter to achieve the industry's lowest phosphorus levels.

Influent enters the tank **(A)** and is distributed through the filter **(B)** near the bottom of the sand column. Water is then filtered upward, and the sand coated with hydrous ferric oxide (HFO) attracts and reacts with the phosphorus. The sand **(C)**, however, moves downward by gravity to an airlift device **(D)**. When the filtered water exits near the top of the filter **(E)**, the airlift transports the phosphorus laden media up into the washbox **(F)** where the discharged HFO coating and adsorbed contaminates are separated from the media. Water velocities in the washbox are carefully designed to carry away the contaminates **(G)** while allowing the media to fall to the filter bed **(H)**. The freshly scrubbed media from the washbox is recoated with HFO as its cycle begins again.

Key Features

There are two key features that the Blue Pro reactive filtration offers, that allow it to be so successful for phosphorus removal.

First, it overcomes a critical obstacle to achieving efficient phosphorus removal from high quantities of wastewater, by providing a large reactive surface area within the media bed. This results in guaranteed contact between phosphorus and the highly absorptive HFO. The reactive filter is not simply trapping particles, but instead is actively pulling dissolved phosphorus out of the wastewater.

The second feature is that the adsorptive surface in reactive filtration is a continuously regenerated coating forming on the surface of the sand media. The end result of these two features is an efficient, phosphorus-scrubbing technology that is not limited by surface site exhaustion, unlike more conventional adsorbants.

System Design:

The single stage Blue PRO system features twenty-four CF-50 modules arranged in six cells of four.

The Marlborough Westerly plant operates without an automated phosphorus feedback control. Despite only having manual setpoint dose control as process control, the effectiveness of reactive filtration has allowed site operators to maintain the 60-day rolling average target since the reactive filter commissioning. It is possible that online phosphorus analyzers will be added in the future to allow further chemical cost trimming or to allow the plant to hit even lower phosphorus targets as needed.

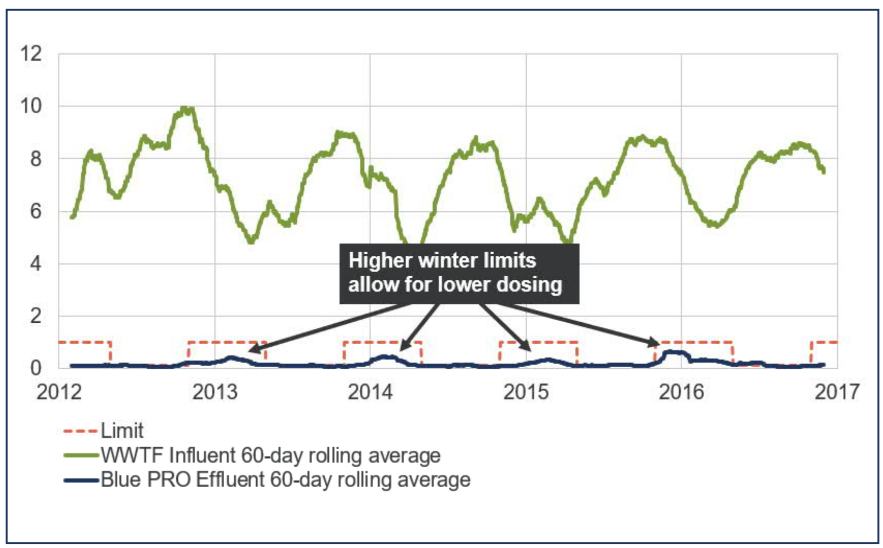
Project Timeline:

The project was contracted in early 2010, with the filter system started up in December 2011 and commissioned before year end in preparation of the performance test. The performance tests were completed during the first quarter of 2012. At that time, TMDL requirements for phosphorus were seasonal with a 1 mg/L winter limit and a 0.1 mg/L summer permit. However, the plant was designed for a TMDL of < 0.07 mg/L TP, which served as the basis of the performance test.

Upgraded System Performance

An extensive 30-day system performance test was completed in February 2012. During this test period, with the plant operating within the Nexom design, residual total phosphorus in 24-hour composite samples averaged 0.044 mg/L. Single samples measured as low as 0.026 mg/L.

Ortho phosphorus was never measured above 0.007 mg/L for the entire performance test. Since commissioning, operators make weekly adjustments to minimize chemical used to address their seasonally varying water quality and phosphorus limits.



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Engineering a Better Environment

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