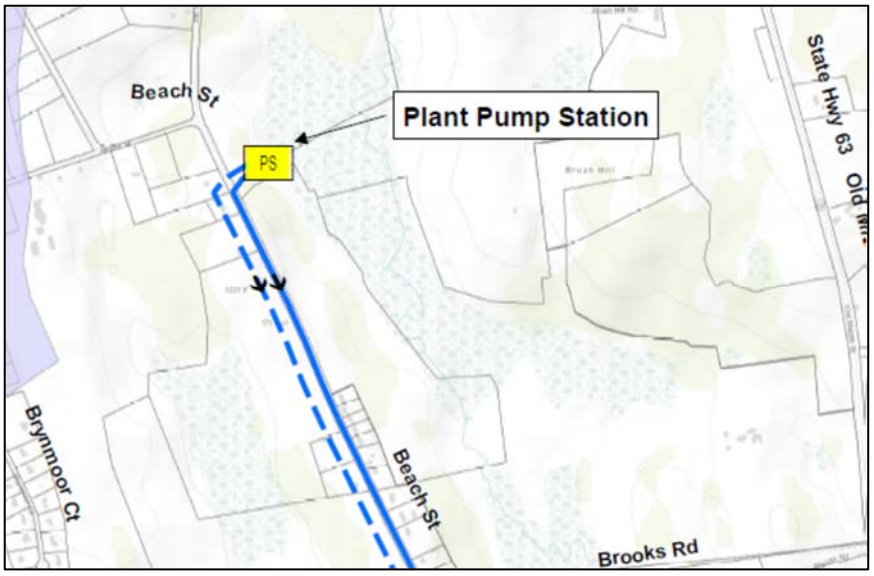

Woodridge Lake Sewer District Goshen, CT

Preliminary Engineering Report for USDA-RD Funding Application

Regional Wastewater Management Project

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PRELIMINARY ENGINEERING REPORT
REGIONAL WASTEWATER MANAGEMENT PROJECT
WOODRIDGE LAKE SEWER DISTRICT (GOSHEN, CT)
ISSUED NOVEMBER 2019, REVISED ON DECEMBER 6, 2019 & MARCH 25, 2020

This Preliminary Engineering Report (PER) was developed in accordance with the United States Department of Agriculture – Rural Development (USDA-RD) guidelines for preparing the PER. Similar to past projects, we presented this PER in outline format to facilitate review by USDA-RD's State Engineer. The guidelines are shown in black font. Our proposed PER text, as it relates to WLSD's proposed Regional Wastewater Management Project, is shown in blue font. Attached are Figures 1 through 8, as well as Appendices A and B, which are referenced throughout this PER.

1) PROJECT PLANNING

Describe the area under consideration. Service may be provided by a combination of central, cluster, and/or centrally managed individual facilities. The description should include information on the following:

a) Location: Provide scale maps and photographs of the project planning area and any existing service areas. Include legal and natural boundaries and a topographical map of the service area.

The Woodridge Lake Sewer District (WLSD) is an existing, private residential development around the 385-acre Woodridge Lake in the Town of Goshen, Connecticut. The Project Planning Area, including the existing WLSD Water Pollution Control Facility (WPCF) is shown in Figure 1 (attached). The Litchfield WPCF, and Torrington WPCF, major components of this PER, are also shown geographically on Figure 1 (attached).

b) Environmental Resources Present: Provide maps, photographs, and/or a narrative description of environmental resources present in the project planning area that affect design of the project. Environmental review information that has already been developed to meet requirements of NEPA or a state equivalent review process can be used here.

The WLSD community surrounds Woodridge Lake, which is a man-made waterbody. Central sewer service to each property was constructed when the residential development was constructed. This assured protection of the groundwater in the Project Planning Area, as well as the abundance of wildlife and natural resources at Woodridge Lake, which is a Class A surface water resource. The existing WLSD WPCF is located on a 90-acre site to the east of the WLSD sewer service area. Treated effluent from the WPCF is discharged back to the ground via infiltration beds. Since the WPCF is located in a GAA groundwater supply area, maintaining groundwater quality within WLSD is a key component of the Project goals.

c) Population Trends: Provide U.S. Census or other population data (including references) for the service area for at least the past two decades if available. Population projections for the project planning area and concentrated growth areas should be provided for the project design period. Base projections on historical records with justification from recognized sources.

As of 2019, there are 697 existing residential developments connected to the WLSD sanitary sewer system. Based on 2010 Census data, the unit population per home in Goshen is 2.54. This results in an estimated current sewered population of approximately 1,771. Based on recent historical observations, there have been approximately six new sewer connections per year over the last few

years. WLSD includes 861 buildable lots, all of which were originally approved as part of the Sewer Service Area. At full buildout, this results in an estimated sewered population of 2,187. It should be noted that many of the WLSD homes are used seasonally, so the actual full-time population is lower than Town-wide Goshen estimates. This contributes to lower water use and wastewater generation patterns in the Project Area.

d) Community Engagement: Describe the utility's approach used (or proposed for use) to engage the community in the project planning process. The project planning process should help the community develop an understanding of the need for the project, the utility operational service levels required, funding and revenue strategies to meet these requirements, along with other considerations.

WLSD acts as an independent municipal tax district. Residents of WLSD meet regularly to review budgets, capital projects, and wastewater planning information. WLSD completed a Facilities Plan Update Project in 2010. This Planning Project included an evaluation of existing facilities, a wastewater treatment and disposal needs assessment, and alternatives analyses to address the requirements of the Consent Order (Appendix B) from the Connecticut Department of Energy and Environmental Protection (CT-DEEP). The Facilities Plan Update also developed recommendations for WLSD's wastewater infrastructure for the next 20 years. During this process, there have been regular Planning Committee meetings, Finance Committee meetings, WLSD Board meetings, informational workshops with residents, and Annual District meetings. In addition, WLSD is familiar with capital planning efforts, having approved project costs associated with the Inflow and Infiltration (I/I) Removal and Pump Station Upgrades Projects, both of which were funded by the United States Department of Agriculture, through its Rural Development sub-group (USDA-RD). WLSD leadership anticipates additional meetings with residents to provide updates on this Project as it moves forward.

2) EXISTING FACILITIES

Describe each part (e.g. processing unit) of the existing facility and include the following information:

a) Location Map. Provide a map and a schematic process layout of all existing facilities. Identify facilities that are no longer in use or abandoned. Include photographs of existing facilities.

The existing sanitary sewer collection system, WPCF and effluent disposal system are shown in Figures 2 and 5 (attached).

b) History: Indicate when major system components were constructed, renovated, expanded, or removed from service. Discuss any component failures and the cause for the failure. Provide a history of any applicable violations of regulatory requirements.

WLSD's wastewater infrastructure was constructed in 1972. The system received very few improvements and proactive maintenance during its first 20 years of operation. The CT-DEEP issued a Consent Order (CO) to WLSD in 1989. The CO requires WLSD to address its sanitary sewer collection and wastewater treatment/disposal needs. In response to the CO, WLSD conducted several planning studies, but a capital plan to resolve the issues was not implemented. Unfortunately, reactive system maintenance continued for many years following the CO. Although an implementation plan was sought with Torrington, insufficient funding was available, and WLSD's Consent Order remains in effect today. The Consent Order is included in Appendix B.

However, the current WLSD leadership has implemented several recent upgrades and proactive maintenance measures over the past ten years. In 2013, open cut sewer repairs were performed to mitigate excessive I/I. In 2015, an I/I Removal Project was performed to grout and line sewer mains and manholes. In 2017, a sewer pipe lining project was performed, and in 2019, an I/I Rehabilitation Project was performed to grout and line sewer mains and apply root treatment. These projects significantly reduced extraneous flows into the collection system. Also, in 2015, the Pump Station Upgrades Project was implemented to improve emergency readiness, flow data and remote monitoring capabilities by adding supervisory control and data acquisition (SCADA) systems at WLSD's eight remote pump stations.

c) Condition of Existing Facilities: Describe present condition; suitability for continued use; adequacy of current facilities; and their conveyance, treatment, storage, and disposal capabilities. Describe the existing capacity of each component. Describe and reference compliance with applicable federal, state, and local laws. Include a brief analysis of overall current energy consumption. Reference an asset management plan if applicable.

The WLSD collection system, shown in Figure 5 (attached), was privately constructed approximately 45 years ago, and includes 16.2 miles (85,500 feet) of gravity sewer, 1.9 miles (10,000 feet) of force main piping, and eight wastewater pump stations. The majority of the gravity sewer mains are double-walled plastic truss pipe, with a limited amount of cast iron pipe. Of the 697 existing sewer connections, approximately 115 are low-lying homes around Woodridge Lake that are served by individual grinder pumps, which discharge to mainline gravity sewers. For the number of connections, the system has an unusually large amount of pipe, which allows for greater I/I potential.

In order to combat excessive I/I, the Wastewater Facilities Plan incorporated several I/I tasks and investigations, including flow monitoring, flow isolation, physical site inspection, building inspections, smoke and dye testing, manhole inspections and CCTV inspections. The results of the CCTV work and manhole inspections suggest that the primary I/I sources relate to service lateral connections to sewer mains, sewer main penetrations at manholes, and a limited number of mainline truss-pipe joints. Several pipe-manhole joint leaks, numerous service connection leaks and pipe-to-pipe joint leaks were observed. A few cracks and breaks were also detected that contribute I/I to the sewer system. WLSD implemented the I/I Removal Project in 2015, a pipe lining project in 2017, and the I/I Rehabilitation Project in 2019, including grouting and lining of the pipes and manholes in the system, to significantly reduce I/I in the collection system.

During the Facilities Plan Project, several pump station limitations were observed including unreliable autodialers and pump controllers without the ability to connect to a SCADA system. The lack of a centralized flow monitoring and data collection system hampers the trending and analysis of data. Deficiencies with the pump station design also included the lack of the ability to bypass pump and motors that could fail in the event of station flooding. In addition, six of the eight pump stations lacked permanent emergency generators and instead have portable generator quick-connects. The majority of these issues were addressed in 2015 as part of the Pump Stations/SCADA Upgrades Project.

The WPCF and effluent disposal system are located on a separate 90-acre site, east of the sewer service area. The existing WPCF, shown in Figure 2 (attached), was also constructed in 1972. The WPCF incorporates several unit treatment processes, including preliminary treatment equipment, activated sludge, rapid rate multi-media filtration, aerobic sludge digestion, sludge drying beds, a waste

sludge dewatering system, as well as an Operations Building and Garage. Effluent produced by the plant typically meets the existing permit requirements for treatment. Visual inspection of the 40+ year old in-ground steel tanks is severely limited. The rapid rate multimedia filtration system has neither been able to perform as intended since construction in 1972 or remain in service since being upgraded in 2011. Solids produced at the facility are dewatered and disposed of on-site to the east of the WPCF. This practice of on-site disposal of biosolids is not expected to continue if the on-site WPCF is upgraded. The anticipated permit requirements and excessive age of equipment at the WLSD WPCF will necessitate either a replacement WPCF under a local alternative, or conveyance of flow to a regional treatment system.

The WPCF was not designed to provide the high levels of treatment that are anticipated to be required in the near future as a result of the continued use of the on-site effluent disposal fields. In order to convert the existing system to a nutrient removal process, the existing tank volume would need to be roughly three times as large as the existing process tanks.

WLSD utilizes groundwater disposal for treated effluent, which is regulated by CT-DEEP through a 1977 CT-DEEP Discharge Permit and a 1989 Consent Order. The WLSD plant discharges effluent to a groundwater disposal system, consisting of approximately 90 beds over roughly 90 acres. These beds were constructed in a ridge and furrow configuration with most of the beds approximately 25 feet wide, and ranging in length from just over 100 feet to as much as approximately 700 feet. Treated effluent is discharged to the beds via a series of pipelines and valves. WPCF staff manually open and close valves to direct flow to a particular bed and typical operation involves loading only a single bed at a time. The system is not configured to allow operation of multiple beds simultaneously: (1) due to existing piping limitations; and (2) because the beds are not at the same elevation preventing effective distribution of flow. During the Facilities Plan we: reviewed existing data and original design criteria; interviewed WLSD operations staff; conducted hydraulic conductivity testing; performed flow testing; monitored groundwater and surface water levels; analyzed and summarized field data; and prepared summary observations. In addition, flow testing of the existing disposal beds was conducted in Spring 2012. Groundwater monitoring was performed before, during and after flow testing. During this testing, a series of data analyses was conducted on: groundwater level responses to flow testing; hydraulic conductivity; groundwater contour mapping and gradient; surficial hydrogeologic mapping; travel time; and site loading rates. Several challenges occurred during the testing including: leaking distribution system pipes; maintaining a consistent flow rate to the test beds; groundwater level monitoring; and site drainage. Although the 2015, 2017 and 2019 I/I Removal Projects dramatically reduced flows, the long-term reduction of system flows to levels well below the 100,000 gpd permitted capacity of the effluent disposal system may not be possible. Therefore, a key component of the Wastewater Facilities Plan included evaluation of the current disposal site to determine current/actual capacity.

d) Financial Status of any Existing Facilities: (Note: Some agencies require the owner to submit the most recent audit or financial statement as part of the application package.) Provide information regarding current rate schedules, annual O&M cost (with a breakout of current energy costs), other capital improvement programs, and tabulation of users by monthly usage categories for the most recent typical fiscal year. Give status of existing debts and required reserve accounts.

WLSD currently uses Ad Valorem taxing, based on assessed property values, to

apportion capital and annual operation and maintenance (O&M) costs to the parcels within the sewer service area. Therefore, WLSD does not use a sewer user fee system based on a fixed fee or fixed rate basis. The current annual budget for fiscal year 2019-20 is $1,286,178 which includes payment of the annual debt service for the 2015 I/I Removal and Pump Station/SCADA Upgrade Projects, as funded by USDA-RD. Given the limited number of parcels served by the WLSD sewer system, including 697 current connections, current unit annual costs are high. The average annual sewer charge per WLSD property is $1,764 (which is 2.3% of median household income (MHI)), as compared to the estimated 2016 Connecticut Statewide average of $472, as published by Tighe & Bond in its 2016 Connecticut Sewer Rates Survey Summary Report (which is 0.7% of CT MHI). This annual sewer cost, prior to the proposed project, is nearly four times the State average prior to implementation of the proposed Project. Absent a 75% maximum-grant with poverty interest rate for a 40-year term from USDA, the annual sewer rate after the proposed project will be excessive, representing nearly 7% of the median household income of the WLSD residents and more than 10 times the statewide average.

e) Water/Energy/Waste Audits: If applicable to the project, discuss any water, energy, and/or waste audits which have been conducted and the main outcomes.

Energy efficiency and renewable energy projects are critical to the sustainability of any utility system. Although much of the Wastewater Facilities Plan Project focused on upgrades to address permitting requirements, the proposed Project design phase will include an evaluation of these cost saving measures, including solar at the proposed pump stations, high efficiency motors, variable frequency drives to decrease power costs, and energy rebates to mitigate capital costs.

3) NEED FOR PROJECT

Describe the needs in the following order of priority:

a) Health, Sanitation, and Security: Describe concerns and include relevant regulations and correspondence from/to federal and state regulatory agencies. Include copies of such correspondence as an attachment to the Report.

The majority of the concerns related to health and sanitation center on the WPCF effluent disposal system. Although the permitted capacity of the disposal system is 100,000 gallons per day, soil permeability and seasonal limitations impact the actual performance of the system. The requirements of the 1989 Consent Order are centered on the surrounding Class GAA groundwater supply, separation to groundwater and travel time, all of which relate to protection of public health and the environment. Based on the testing and the State's groundwater disposal guidelines, addressing these concerns with an on-site treatment and disposal upgrade may be challenging but WLSD continues its dialogue with CT-DEEP with the hope of a more economical solution. Copies of the WLSD permit, and Consent Order are included in Appendix A and B, respectively.

b) Aging Infrastructure: Describe the concerns and indicate those with the greatest impact. Describe water loss, inflow and infiltration, treatment or storage needs, management adequacy, inefficient designs, and other problems. Describe any safety concerns.

The average daily wastewater flow to the WLSD WPCF is approximately 106,000 gallons per day (gpd) for the time period from January 2018 through August 2019. Historical trends indicate a maximum daily flow of up to 400,000 gpd, but this was in 2011, prior to WLSD's three recent I/I removal projects. This fluctuation is due to variations in seasonal population use but also due to variations in inflow and infiltration (I/I). Wastewater is comprised of sanitary and I/I flow sources. Based

on our observations, the average annual sanitary flow is approximately 65,000 gpd, and the remaining average annual I/I is approximately 40,000 gpd. Historical flow data from January 2010 through August 2019 indicates that the average I/I from month to month ranges from near zero in low-groundwater summer months to nearly 135,000 gpd in high groundwater spring months. Based on the results of the recent 2015, 2017 and 2019 I/I Removal Projects, system flows have dropped considerably. As a result, we estimate that average annual flows, including current connections, future connections and I/I flows will be approximately 150,000 gpd at design conditions. For the local WPCF Upgrade alternatives, this design flow is in excess of the permitted disposal system capacity. For all wastewater treatment and disposal alternatives (local and regional), maintaining low I/I conditions is important. As such, WLSD implemented an annual I/I removal program and maintenance program to minimize future I/I flow contributions. Based on the results of these efforts, WLSD is annually monitoring and adjusting I/I removal goals considering seasonal flow, groundwater and precipitation factors, and the rate at which new sewer users are connected to the system.

In addition to collection system needs, significant time and resources were dedicated to testing of the existing effluent disposal system during the Wastewater Facilities Plan. This testing, approved by CT-DEEP, used a number of considerations from the 2006 CT-DEEP document "Guidance for Design of Large-Scale On-Site Wastewater Renovation Systems" (Guidance Manual) for the Field Flow Testing Plan. Because the Guidance Manual is based on development of new systems versus renovation of existing ones, we performed large-scale testing to demonstrate site capacity in lieu of small-scale and laboratory testing criteria. The key testing and evaluation criteria included separation distance under seasonal high groundwater conditions, unit flow rate and travel time. The Guidance Manual requires an unsaturated separation distance of three feet between the top of mounded groundwater and the bottom of the loading facility. For the purpose of our testing, a distance of 1.5 feet from the bottom of the existing beds to the top of mounded groundwater under seasonal high groundwater conditions was used. The reduction in separation distance to groundwater is similar to other facilities in the State where variances were granted, or in those cases where advanced treatment systems are in use to provide advanced pathogen reduction prior to discharge of the effluent to disposal systems. Separation distance must be maintained under seasonal high groundwater conditions. However, these conditions did not exist in Spring 2012 when the testing was conducted. Therefore, the approach to account for the conditions at the time of testing by increasing the separation maintained during the testing based on well elevations in both on-site and USGS reference wells. The Guidance Manual allows a maximum unit flow rate of 1.2 gallons per day per square foot (gpd/sf) of bed bottom area for tertiary treated wastewater effluent. The Guidance Manual requires a minimum travel time from the point of effluent discharge of a bed to the closest point of concern (surface water or property line) of 21 days. The capacity of the existing beds considered, provided an estimated capacity ranging from 125,000 to 195,000 gpd under seasonal high groundwater conditions, depending on design and operational features. However, CT-DEEP disagreed with the results of the testing and contends that the existing effluent disposal system does not have sufficient capacity for the current or proposed system flows. This uncertainty in permitting is an important consideration in the evaluation of the local versus regional alternatives presented in this PER.

c) Reasonable Growth: Describe the reasonable growth capacity that is necessary to meet needs during the planning period. Facilities proposed to be constructed to meet future growth needs should generally be supported by additional

revenues. Consideration should be given to designing for phased capacity increases. Provide number of new customers committed to this project.

We projected the future flow and pollutant loadings at build-out conditions by estimating average dwelling and per-capita unit generation rates from existing data, and applying them to the projected sewer connections and estimated population at build out. Specifically, we developed per-connection and per-capita unit generation rates from influent flow and load data collected by the WLSD. The projected build-out sewer population was estimated to be 2,187 individuals using the total number of existing (697) and projected (164) sewer connections from the build-out analysis. This includes an assumption of 2.54 persons per connection, based on the average household size for the Town of Goshen from the 2010 US Census data. This projection represents an increase in the sewer population of approximately 416 people above the current sewer population of approximately 1,771. The future flow is important for understanding the need for ongoing I/I removal, and for determining the conceptual size and hydraulic capacity of the proposed facilities for the evaluation of local and regional alternatives. Pollutant loads are important for understanding the treatment requirements for evaluation of the local alternative. The flows and loads data was used to facilitate the comparison of local WPCF upgrades versus regional wastewater alternatives.

4) ALTERNATIVES CONSIDERED

This section should contain a description of the alternatives that were considered in planning a solution to meet the identified needs. Documentation of alternatives considered is often a Report weakness. Alternative approaches to ownership and management, system design (including resource efficient or green alternatives), and sharing of services, including various forms of partnerships, should be considered. In addition, the following alternatives should be considered, if practicable: building new centralized facilities, optimizing the current facilities (no construction), developing centrally managed decentralized systems, including small cluster or individual systems, and developing an optimum combination of centralized and decentralized systems.

Alternatives should be consistent with those considered in the NEPA, or state equivalent, environmental review. Technically infeasible alternatives that were considered should be mentioned briefly along with an explanation of why they are infeasible, but do not require full analysis. For each technically feasible alternative, the description should include the following information:

Local Alternative 1 – Upgrade of WLSD WPCF to MBR Process

a) Description: Describe the facilities associated with every technically feasible alternative. Describe source, conveyance, treatment, storage and distribution facilities for each alternative. A feasible system may include a combination of centralized and decentralized (on-site or cluster) facilities.

For Local Alternative 1, we focused on a new treatment plant utilizing the membrane bioreactor (MBR) process adjacent to the existing facility. The replacement WPCF would include a new headworks building with preliminary treatment (including screening and grit removal), new MBR process tanks and an MBR process building, modifications to the existing effluent dosing tank, installation of a new lateral sand filter, repurposing of the existing Operations Building and Operations and Maintenance Garage, abandonment of the existing sludge drying beds, new main electrical gear and emergency generator, and site fencing, restoration and paving.

b) Design Criteria: State the design parameters used for evaluation purposes. These parameters should comply with federal, state, and agency design policies

and regulatory requirements.

The design criteria used for Local Alternative 1 are based on TR-16 guidelines. The upgraded WPCF would consist of a membrane bioreactor (MBR). The MBR will significantly reduce effluent solids to protect the disposal system, and improve effluent dispersal efficiency. Although we believe Local Alternative 1 is viable, and that the disposal beds have adequate capacity for current and future flows, concurrence is needed from CT-DEEP on separation to groundwater, travel time and the average annual permitted flow limit. We believe Local Alternative 1, as proposed, meets the objectives and the CT-DEEP Guidance Manual, especially when the proposed level of treatment far exceeds CT- DEEP Guidelines for similar facilities, creating near reuse quality effluent, dramatically improving the quality of effluent discharged from the WPCF. However, CT-DEEP has not demonstrated a willingness to approve this concept without advanced full-scale testing and potential / subsequent input from Department of Public Health, which could be challenging to execute and monitor, as well as cost prohibitive. In addition, WLSD's aggressive I/I removal program will offset future sanitary flow as I/I is removed.

c) Map. Provide a schematic layout map to scale and a process diagram if applicable. If applicable, include future expansion of the facility.

The site layout for Local Alternative 1 is shown in Figure 3 (attached). The figure includes the location of the existing WPCF and unit processes, as well as the location of the proposed unit processes associated with Local Alternative 1.

d) Environmental Impacts: Provide information about how the specific alternative may impact the environment. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to each specific alternative evaluated. Include generation and management of residuals and wastes.

Local Alternative 1 will drastically improve the level of wastewater treatment to reuse quality. The improved water quality will result in state-of-the-art effluent prior to discharge to the on-site disposal system. This will improve groundwater quality, protect the Class GAA groundwater designation, and promote positive impacts to the environment. In addition, abandonment of on-site sludge disposal will result in improved site, groundwater and stormwater control measures.

e) Land Requirements: Identify sites and easements required. Further specify whether these properties are currently owned, to be acquired, leased, or have access agreements.

Local Alternative 1 includes use of the existing site. No new land acquisitions are needed to construct this local alternative. WLSD owns the entire treatment and disposal site.

f) Potential Construction Problems: Discuss concerns such as subsurface rock, high water table, limited access, existing resource or site impairment, or other conditions which may affect cost of construction or operation of facility.

Since the treatment system associated with Local Alternative 1 can be constructed adjacent to the existing WPCF, there are no anticipated construction coordination limitations. Upgrades to the effluent disposal system might occur in a phased approach, subject to State permitting input.

g) Sustainability Considerations: Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

Based on the size of the 90-acre site, Local Alternative 1 lends itself to exploration of renewable energy opportunities (i.e. solar) to help offset future operation and maintenance costs. However, these considerations were not explored in further detail, because we do not believe that CT-DEEP/DPH will issue a permit renewal for the site. Therefore, Local Alternative 1 is not recommended for further consideration.

i) Water and Energy Efficiency: Discuss water reuse, water efficiency, water conservation, energy efficient design (i.e. reduction in electrical demand), and/or renewable generation of energy, and/or minimization of carbon footprint, if applicable to the alternative. Alternatively, discuss the water and energy usage for this option as compared to other alternatives.

ii) Green Infrastructure: Discuss aspects of project that preserve or mimic natural processes to manage stormwater, if applicable to the alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

iii) Other: Discuss any other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the alternative, if applicable.

h) Cost Estimates: Provide cost estimates for each alternative, including a breakdown of the following costs associated with the project: construction, non-construction, and annual O&M costs. A construction contingency should be included as a non-construction cost. Cost estimates should be included with the descriptions of each technically feasible alternative. O&M costs should include a rough breakdown by O&M category (see example below) and not just a value for each alternative. Information from other sources, such as the recipient's accountant or other known technical service providers, can be incorporated to assist in the development of this section. The cost derived will be used in the life cycle cost analysis described in Section 5 a.

Example O&M Cost Estimate	
Personnel (i.e. Salary, Benefits, Payroll Tax, Insurance, Training)	
Administrative Costs (e.g. office supplies, printing, etc.)	
Water Purchase or Waste Treatment Costs	
Insurance	
Energy Cost (Fuel and/or Electrical)	
Process Chemical	
Monitoring & Testing	
Short Lived Asset Maintenance/Replacement*	
Professional Services	
Residuals Disposal	
Miscellaneous	
Total	

* See Appendix A for example list

Our opinion of the probable project cost for Local Alternative 1 is presented in Table 1 below, in FY2020 dollars. The anticipated annual O&M cost for Local Alternative 1 is presented in Table 2 below, in FY2020 dollars.

Table 1: Local Alternative 1 – Opinion of Probable Project Cost

Component	Opinion of Probable Cost
Headworks Screening	*$1,375,000*
Headworks Grit Removal	*$574,000*
MBR Process Equipment	*$3,200,000*
MBR Concrete	*$4,180,000*
Effluent Dosing Tank Modifications	*$65,000*
Lateral Sand Filter	*$6,892,000*
Main Electrical Gear	*$300,000*
Emergency Generator	*$300,000*
Process Building	*$1,250,000*
Site Fencing	*$40,000*
Site Restoration and Pavement	*$350,000*
Contractor Mobilization, Bonds, and Insurance (10%)	*$1,900,000*
Construction Contingency (15%)	*$2,800,000*
Construction Sub-Total	$23,226,000
Project Contingency (10%)	$2,329,760
Allowance for Engineering Services (20%)	$4,645,200
Allowance for Legal, Bond Counsel and Short-Term Interest (4%)	$929,040
Project Total	**$31,130,000**

Table 2: Local Alternative 1 – Opinion of Probable Annual Costs

Component	Opinion of Probable Cost
Operations Staff	$420,000
Insurance	$76,000
Office Lease & Other Expense	$20,900
Prof-Legal & Accounting & Computer	$52,700
Collection System Pump Station Electrical	$91,000
WPCF Process Electrical	$189,400
WPCF Non-Process Electrical	$12,000
Sludge Disposal	$61,000
Solids Handling Operations	$74,000
Chemicals	$311,000
Fuel	$12,000
Sub-Total of Annual O&M Costs	**$1,320,000**
Equipment Maintenance Fund	$50,000
Long-Term Equipment Replacement/Capital Fund	$100,000
Sewer Improvements Capital Fund	$50,000
Sub-Total of Annual Maintenance/Capital Funds	**$200,000**
Total	**$1,520,000**

Local Alternative 2 – Upgrade of WLSD WPCF to SBR Process

a) Description: Describe the facilities associated with every technically feasible alternative. Describe source, conveyance, treatment, storage and distribution facilities for each alternative. A feasible system may include a combination of centralized and decentralized (on-site or cluster) facilities.

For Local Alternative 2, we focused on a new treatment plant utilizing the sequencing batch reactor (SBR) process adjacent to the existing facility. The replacement WPCF would include a new headworks building with preliminary treatment (including screening and grit removal), new SBR process tanks and SBR process building, modifications to the existing effluent dosing tank, installation of a new lateral sand filter, repurposing of the existing Operations Building and Operations and Maintenance Garage, abandonment of the existing sludge drying beds, new main electrical gear and emergency generator, and site fencing, restoration and paving.

b) Design Criteria: State the design parameters used for evaluation purposes. These parameters should comply with federal, state, and agency design policies and regulatory requirements.

The design criteria used for Local Alternative 2 are based on TR-16 guidelines. The upgraded WPCF would consist of a sequencing batch reactor (SBR). The SBR will significantly reduce effluent solids to protect the disposal system, and improve effluent dispersal efficiency. Although we believe Local Alternative 2 is viable, and that the disposal beds have adequate capacity for current and future flows, concurrence is needed from CT-DEEP on separation to groundwater, travel time and the average annual permitted flow limit. We believe Local Alternative 2, as proposed, meets the objectives and the CT-DEEP Guidance Manual, especially when the proposed level of treatment far exceeds CT- DEEP Guidelines for similar facilities, creating near reuse quality effluent, dramatically improving the quality of effluent discharged from the WPCF. However, CT-DEEP has not demonstrated a willingness to approve this concept without advanced full-scale testing and potential / subsequent input from Department of Public Health, which could be challenging to execute and monitor, as well as cost prohibitive. In addition, WLSD's aggressive I/I removal program will offset future sanitary flow as I/I is removed.

c) Map. Provide a schematic layout map to scale and a process diagram if applicable. If applicable, include future expansion of the facility.

The site layout for Local Alternative 2 is shown in Figure 4 (attached). The figure includes the location of the existing WPCF and unit processes, as well as the location of the proposed unit processes associated with Local Alternative 2.

d) Environmental Impacts: Provide information about how the specific alternative may impact the environment. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to each specific alternative evaluated. Include generation and management of residuals and wastes.

Local Alternative 2 will drastically improve the level of wastewater treatment. The improved effluent quality will improve groundwater quality, protect the Class GAA groundwater designation, and promote positive impacts to the environment. In addition, abandonment of on-site sludge disposal will result in improved site, groundwater and stormwater control measures.

e) Land Requirements: Identify sites and easements required. Further specify

whether these properties are currently owned, to be acquired, leased, or have access agreements.

Local Alternative 2 includes use of the existing site. No new land acquisitions are needed to construct this local alternative. WLSD owns the entire treatment and disposal site.

f) Potential Construction Problems: Discuss concerns such as subsurface rock, high water table, limited access, existing resource or site impairment, or other conditions which may affect cost of construction or operation of facility.

Since the treatment system associated with Local Alternative 2 can be constructed adjacent to the existing WPCF, there are no anticipated construction coordination limitations. Upgrades to the effluent disposal system can also occur in a phased approach.

g) Sustainability Considerations: Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

Based on the size of the 90-acre site, Local Alternative 2 lends itself to exploration of renewable energy opportunities (i.e. solar) to help offset future operation and maintenance costs. However, these considerations were not explored in further detail, because we do not believe that CT-DEEP/DPH will issue a permit renewal for the site. Therefore, Local Alternative 2 is not recommended for further consideration.

i) Water and Energy Efficiency: Discuss water reuse, water efficiency, water conservation, energy efficient design (i.e. reduction in electrical demand), and/or renewable generation of energy, and/or minimization of carbon footprint, if applicable to the alternative. Alternatively, discuss the water and energy usage for this option as compared to other alternatives.

ii) Green Infrastructure: Discuss aspects of project that preserve or mimic natural processes to manage stormwater, if applicable to the alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

iii) Other: Discuss any other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the alternative, if applicable.

h) Cost Estimates: Provide cost estimates for each alternative, including a breakdown of the following costs associated with the project: construction, non-construction, and annual O&M costs. A construction contingency should be included as a non-construction cost. Cost estimates should be included with the descriptions of each technically feasible alternative. O&M costs should include a rough breakdown by O&M category (see example below) and not just a value for each alternative. Information from other sources, such as the recipient's accountant or other known technical service providers, can be incorporated to assist in the development of this section. The cost derived will be used in the life cycle cost analysis described in Section 5 a.

Example O&M Cost Estimate	
Personnel (i.e. Salary, Benefits, Payroll Tax, Insurance, Training)	
Administrative Costs (e.g. office supplies, printing, etc.)	
Water Purchase or Waste Treatment Costs	
Insurance	
Energy Cost (Fuel and/or Electrical)	

Process Chemical	
Monitoring & Testing	
Short Lived Asset Maintenance/Replacement*	
Professional Services	
Residuals Disposal	
Miscellaneous	
Total	

* See Appendix A for example list

Our opinion of the probable project cost for Local Alternative 2 is presented in Table 3 below, in FY2020 dollars. The anticipated annual O&M cost for Local Alternative 2 is presented in Table 4 below, in FY2020 dollars.

Table 3: Local Alternative 2 – Opinion of Probable Project Cost

Component	Opinion of Probable Cost
Headworks Screening	*$735,000*
Headworks Grit Removal	*$574,000*
SBR Process Equipment	*$3,020,000*
SBR Concrete	*$5,800,000*
Effluent Dosing Tank Modifications	*$65,000*
Lateral Sand Filter	*$6,892,000*
Main Electrical Gear	*$300,000*
Emergency Generator	*$300,000*
Process Building	*$600,000*
Site Fencing	*$40,000*
Site Restoration and Pavement	*$350,000*
Contractor Mobilization, Bonds, and Insurance (10%)	*$1,900,000*
Construction Contingency (15%)	*$2,900,000*
Construction Sub-Total	$23,476,000
Project Contingency (10%)	$2,349,760
Allowance for Engineering Services (20%)	$4,695,200
Allowance for Legal, Bond Counsel and Short-Term Interest (4%)	$939,040
Project Total	**$31,460,000**

Table 4: Local Alternative 2 – Opinion of Probable Annual Costs

Component	Opinion of Probable Cost
Operations Staff	$420,000
Insurance	$76,000
Office Lease & Other Expense	$20,900
Prof-Legal & Accounting & Computer	$52,700
Collection System Pump Station Electrical	$91,000
WPCF Process Electrical	$114,400
WPCF Non-Process Electrical	$12,000
Sludge Disposal	$51,000
Solids Handling Operations	$74,000
Chemicals	$156,000
Fuel	$12,000
Sub-Total of Annual O&M Costs	**$1,080,000**
Equipment Maintenance Fund	$50,000
Long-Term Equipment Replacement/Capital Fund	$100,000
Sewer Improvements Capital Fund	$50,000
Sub-Total of Annual Maintenance/Capital Funds	**$200,000**
Total	**$1,280,000**

As an alternative to on-site wastewater disposal, the options of decommissioning the WLSD WPCF and connecting to nearby communities with treatment at their respective WPCFs were also evaluated. In terms of proximity to the existing WLSD WPCF, the likeliest communities for connections are the City of Torrington and the Town of Litchfield.

Regional Alternative 1 – Decommission WLSD WPCF, Regionalization with City of Torrington

A PER was submitted on December 6, 2019 with this Regional Alternative 1 recommended as the proposed project. This project was designed and publicly bid with three (3) separate contracts with contract award amounts totaling $14,025,800. Following the bidding and prior to awarding of the construction contracts, issues that were being discussed and negotiated included tie-in fees to be paid to the City of Torrington and fees for police and/or flaggers. These negotiations led to a project that would not be sustainable. Regional Alternative 1 is reiterated in this PER for completeness, but will not be considered in the selection of a recommended project.

a) Description: Describe the facilities associated with every technically feasible alternative. Describe source, conveyance, treatment, storage and distribution facilities for each alternative. A feasible system may include a combination of centralized and decentralized (on-site or cluster) facilities.

Regional Alternative 1 involves pumping flows that would normally be treated at the WLSD WPCF to the City of Torrington's existing sanitary sewer collection system via a new pump station and force main route along Brush Hill Road, Old Middle Street (State Route 63), Pie Hill Road, East Street South and Goshen Road (State Route 4), with interconnection to the Torrington sewer system at Lover's Lane. Regional Alternative 1 also includes decommissioning of the existing WLSD WPCF.

b) Design Criteria: State the design parameters used for evaluation purposes. These parameters should comply with federal, state, and agency design policies and regulatory requirements.

For Regional Alternative 1, we assumed the following basis of design conditions:

- Future average annual flow rate of 125,000 gallons per day (gpd), or 87 gallons per minute (gpm);
- One pumping station;
- 8-inch diameter force main;
- Two pumping units (one duty pump) on variable frequency drives (VFDs).

c) Map: Provide a schematic layout map to scale and a process diagram if applicable. If applicable, include future expansion of the facility.

Regional Alternative 1 is shown in Figure 5 (attached).

d) Environmental Impacts: Provide information about how the specific alternative may impact the environment. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to each specific alternative evaluated. Include generation and management of residuals and wastes.

Similar to the Local Alternatives, Regional Alternative 1 will result in improved water quality. However, Regional Alternative 1 involves pumping the wastewater to the City of Torrington's WPCF for treatment and disposal. By no longer applying treated effluent at the existing WLSD WPCF site, this will protect the Class GAA groundwater designation, and similarly promote positive impacts to the environment. Abandonment of on-site sludge disposal will also result in improved site, groundwater and stormwater control measures.

e) Land Requirements: Identify sites and easements required. Further specify

whether these properties are currently owned, to be acquired, leased, or have access agreements.

Regional Alternative 1 includes abandonment of the existing WLSD WPCF. The existing WPCF will be used as a potential pump station site, and offices for administrative and operational staff will remain. WLSD owns the entire treatment and disposal site.

f) Potential Construction Problems: Discuss concerns such as subsurface rock, high water table, limited access, existing resource or site impairment, or other conditions which may affect cost of construction or operation of facility.

In order to better determine soil, groundwater and ledge/rock conditions along the pipe corridor, WLSD advanced soil borings and geoprobes at 100-foot increments along the Regional Alternative 1 pipe corridor during Summer 2015. The results indicated the presence of less rock/ledge than originally expected. This contributed to the refinement of the cost estimate for Regional Alternative 1 during the planning phase. Daily work-hour constraints on the large portions of the work in State Roads will result in slow construction progress for Regional Alternative 1.

g) Sustainability Considerations: Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

Based on the size of the 90-acre site, and the proposed abandonment of the effluent disposal system at the existing WPCF, Regional Alternative 1 lends itself to exploration of renewable energy opportunities (i.e. solar) to help offset future operation and maintenance costs.

i) Water and Energy Efficiency: Discuss water reuse, water efficiency, water conservation, energy efficient design (i.e. reduction in electrical demand), and/or renewable generation of energy, and/or minimization of carbon footprint, if applicable to the alternative. Alternatively, discuss the water and energy usage for this option as compared to other alternatives.

ii) Green Infrastructure: Discuss aspects of project that preserve or mimic natural processes to manage stormwater, if applicable to the alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

iii) Other: Discuss any other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the alternative, if applicable.

h) Cost Estimates: Provide cost estimates for each alternative, including a breakdown of the following costs associated with the project: construction, non-construction, and annual O&M costs. A construction contingency should be included as a non-construction cost. Cost estimates should be included with the descriptions of each technically feasible alternative. O&M costs should include a rough breakdown by O&M category (see example below) and not just a value for each alternative. Information from other sources, such as the recipient's accountant or other known technical service providers, can be incorporated to assist in the development of this section. The cost derived will be used in the life cycle cost analysis described in Section 5 a.

Example O&M Cost Estimate	
Personnel (i.e. Salary, Benefits, Payroll Tax, Insurance, Training)	
Administrative Costs (e.g. office supplies, printing, etc.)	
Water Purchase or Waste Treatment Costs	

Insurance	
Energy Cost (Fuel and/or Electrical)	
Process Chemical	
Monitoring & Testing	
Short Lived Asset Maintenance/Replacement*	
Professional Services	
Residuals Disposal	
Miscellaneous	
Total	

* See Appendix A for example list

Our opinion of the probable project cost for Regional Alternative 1 is presented in Table 5 below, in FY2020 dollars. These costs are based on actual pricing received when this alternative was previously bid (broken into three (3) separate construction contracts). Engineering design fees are not included as these were to be paid for directly by WLSD. The anticipated annual O&M cost for Regional Alternative 1 is presented in Table 6 below, in FY2020 dollars. This annual cost includes wastewater disposal fees estimated for Torrington, which include WLSD's portion of O&M as a percent of Torrington wastewater flows, and WLSD's portion of capital, as a percent of Torrington wastewater capacity.

Table 5: Regional Alternative 1 – Opinion of Probable Project Cost

Component	Opinion of Probable Cost
Contract No. 1	*$6,898,450*
Contract No. 2	*$4,235,350*
Contract No. 3	*$2,892,000*
Construction Sub-Total	$14,025,800
Contingency (5%)	$701,290
Police Details	$1,771,872
Tie-In Fee – Torrington	$2,429,000
Engineering Services	$1,202,562
SCADA Integration	$100,000
Miscellaneous Soft Costs	$955,156
Project Total	**$21,185,680**

Table 6: Regional Alternative 1 – Opinion of Probable Annual Costs

Component	Opinion of Probable Cost
Operations Staff	$420,000
Insurance	$76,000
Office Lease & Other Expense	$20,900
Prof-Legal & Accounting & Computer	$52,700
Collection System Pump Station Electrical	$100,400
WPCF Process Electrical	$0
WPCF Non-Process Electrical	$12,000
Sludge Disposal	$0
Solids Handling Operations	$0
Chemicals	$60,000
Fuel	$12,000
Sub-Total of Annual O&M Costs	**$754,000**
Equipment Maintenance Fund	$50,000
Long-Term Equipment Replacement/Capital Fund	$100,000
Sewer Improvements Capital Fund	$50,000
Sub-Total of Annual Maintenance/Capital Funds	**$200,000**
Wastewater Disposal to Regional WPCF	**$116,000**
Total	**$1,070,000**

Regional Alternative 2 – Decommission WLSD WPCF, Regionalization with Town of Litchfield (Pipe Route 1)

a) Description: Describe the facilities associated with every technically feasible alternative. Describe source, conveyance, treatment, storage and distribution facilities for each alternative. A feasible system may include a combination of centralized and decentralized (on-site or cluster) facilities.

Regional Alternative 2 involves pumping flows that would normally be treated at the WLSD WPCF to the Town of Litchfield's existing sanitary sewer collection system via a new pump station and force main route along Beach Street, Milton Road, and Constitution Way, with interconnection to the Litchfield interceptor sewer system along the easement on Whites Wood Road. No expansions of the

existing Litchfield sanitary sewer system are anticipated to be served by the new force main. The existing WLSD Plant Pump Station will be replaced with a new wet pit/dry pit pump station with odor control system.

Discussions with Litchfield indicated that there have been historical issues with the existing interceptor not having adequate conveyance capacity during major wet-weather events, and a hydraulic model was used to confirmed this. Regional Alternative 2 includes the construction of a wastewater storage tank to store wastewater flows from WLSD during high-flow events when Litchfield could not accommodate these flows in the existing interceptor. Flows from WLSD would be pumped into the system when interceptor flows subside.

A deferred component of Regional Alternative 2 includes the replacement of the existing Litchfield interceptor sewer (approximately 17,600 linear feet) that is downstream of the proposed new force main connection and is currently undersized to convey the additional flows from WLSD.

The existing Litchfield WPCF site is shown in Figure 7 (attached). Regional Alternative 2 includes required upgrades at the Litchfield WPCF to accept the additional WLSD flow. In addition to accommodating the proposed flow from WLSD, the proposed upgrades to the Litchfield WPCF include several elements to address existing limitations and operational needs. For example, the existing manual bar rack is ineffective at rag control, maintenance intensive and routinely surcharges the WPCF influent sanitary sewer. The hydraulics are further restricted via the sewage grinder which follows the manual bar rack. Further, the existing secondary clarifiers are undersized which reduces the nutrient removal capabilities of the WPCF. In addition to inhibiting the nutrient removal capabilities, the secondary clarifiers are challenging to operate during wet weather, high flow conditions. The permitted capacity of the Litchfield WPCF is 0.80 million gallons per day (mgd), but estimated/current observed capacity is approximately 0.60 mgd.

The proposed upgrades will not only provide necessary improvements to aging infrastructure at the Litchfield WPCF and increase the estimated/current capacity from 0.60 to the permitted capacity of 0.80 mgd, but will also incrementally increase the permitted capacity of the Litchfield WPCF from 0.80 mgd to 0.95 mgd. These upgrades will benefit the communities of Litchfield and Morris by increasing the capacity and reliability of the regional Litchfield WPCF.

The proposed upgrades to the Litchfield WPCF include the following major components:

- Installation of new headworks building with influent screen and washer compactor, and new grit removal system
- Extensions to raise the existing primary clarifier, aeration basin and secondary clarifier/post-anoxic basin walls above flood elevation
- Conversion of the existing secondary clarifier to an anoxic basin with new anoxic mixer and bridge, to provide additional total nitrogen removal capacity
- New secondary clarifier tank and required internals (mechanism, weirs, baffles)
- New return activated sludge (RAS) and waste activated sludge (WAS) pump building and new RAS and WAS pumping systems
- Electrical system upgrades and new emergency generator
- Site fencing, paving and restoration

The proposed upgrades to the Litchfield WPCF are shown in Figure 8 (attached). Further discussion with Litchfield indicated that the proposed Litchfield WPCF upgrades may occur in phases, and the Town may be initiating a more short-term upgrade to address their immediate needs. All components of recommended Litchfield WPCF upgrades have been assumed for the purposes of this PER, but may have to be reevaluated at the time of implementation. Regional Alternative 2 also includes decommissioning of the existing WLSD WPCF.

b) Design Criteria: State the design parameters used for evaluation purposes. These parameters should comply with federal, state, and agency design policies and regulatory requirements.

For Regional Alternative 2, we assumed the following basis of design conditions:

- Future average annual flow rate of 150,000 gallons per day (gpd), or 104 gallons per minute (gpm);
- One wet pit/dry pit pumping station;
- 6-inch diameter force main;
- Two pumping units (one duty pump) on variable frequency drives (VFDs), with room for a third future pump.

c) Map: Provide a schematic layout map to scale and a process diagram if applicable. If applicable, include future expansion of the facility.

Regional Alternative 2 is shown in Figure 6 (attached).

d) Environmental Impacts: Provide information about how the specific alternative may impact the environment. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to each specific alternative evaluated. Include generation and management of residuals and wastes.

Similar to the local alternatives, Regional Alternative 2 will result in improved water quality. However, Regional Alternative 2 involves pumping the wastewater to the Town of Litchfield's WPCF for treatment and disposal. By no longer applying treated effluent at the existing WLSD WPCF site, this will protect the Class GAA groundwater designation, and similarly promote positive impacts to the environment. Abandonment of on-site sludge disposal will also result in improved site, groundwater and stormwater control measures.

e) Land Requirements: Identify sites and easements required. Further specify whether these properties are currently owned, to be acquired, leased, or have access agreements.

Regional Alternative 2 includes abandonment of the existing WLSD WPCF. The existing WPCF will be used as a potential pump station and storage tank site, and offices for administrative and operational staff will remain. WLSD owns the entire treatment and disposal site. Utility easements may be required for the new force main piping.

f) Potential Construction Problems: Discuss concerns such as subsurface rock, high water table, limited access, existing resource or site impairment, or other conditions which may affect cost of construction or operation of facility.

In order to better determine soil, groundwater and ledge/rock conditions along the force main pipe corridors, soil borings and geoprobes will be conducted along the pipe corridors during the design phase. These investigations will contribute to the refinement of the cost estimate for Regional Alternative 2 during the design

phase.

g) Sustainability Considerations: Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

Based on the size of the 90-acre site, and the proposed abandonment of the effluent disposal system at the existing WPCF, Regional Alternative 2 lends itself to exploration of renewable energy opportunities (i.e. solar) to help offset future operation and maintenance costs. These considerations will be explored in greater detail during the design phase for Regional Alternative 2.

i) Water and Energy Efficiency: Discuss water reuse, water efficiency, water conservation, energy efficient design (i.e. reduction in electrical demand), and/or renewable generation of energy, and/or minimization of carbon footprint, if applicable to the alternative. Alternatively, discuss the water and energy usage for this option as compared to other alternatives.

ii) Green Infrastructure: Discuss aspects of project that preserve or mimic natural processes to manage stormwater, if applicable to the alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

iii) Other: Discuss any other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the alternative, if applicable.

h) Cost Estimates: Provide cost estimates for each alternative, including a breakdown of the following costs associated with the project: construction, non-construction, and annual O&M costs. A construction contingency should be included as a non-construction cost. Cost estimates should be included with the descriptions of each technically feasible alternative. O&M costs should include a rough breakdown by O&M category (see example below) and not just a value for each alternative. Information from other sources, such as the recipient's accountant or other known technical service providers, can be incorporated to assist in the development of this section. The cost derived will be used in the life cycle cost analysis described in Section 5 a.

Example O&M Cost Estimate	
Personnel (i.e. Salary, Benefits, Payroll Tax, Insurance, Training)	
Administrative Costs (e.g. office supplies, printing, etc.)	
Water Purchase or Waste Treatment Costs	
Insurance	
Energy Cost (Fuel and/or Electrical)	
Process Chemical	
Monitoring & Testing	
Short Lived Asset Maintenance/Replacement*	
Professional Services	
Residuals Disposal	
Miscellaneous	
Total	

* See Appendix A for example list

Our opinion of the probable project cost for Regional Alternative 2 is presented in Table 7 below, in FY2020 dollars. This cost includes anticipated upgrades required at the Town of Litchfield's existing WPCF to accommodate the increase in flows from WLSD. The anticipated annual O&M cost for Regional Alternative

2 is presented in Table 8 below, in FY2020 dollars. This annual cost includes wastewater disposal fees estimated for Litchfield, which include WLSD's portion of O&M as a percent of Litchfield wastewater flows.

Table 7: Regional Alternative 2 – Opinion of Probable Project Cost

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
WLSD Pump Station	$3,959,000	$0	$3,959,000	$0
WLSD Force Main	$7,950,000	$0	$7,950,000	$0
WLSD Storage Tank	$1,550,000	$0	$1,550,000	$0
Litchfield Interceptor Sewer Replacement	$11,440,000	$0	$0	$11,440,000
Decommissioning of WLSD WPCF	$580,000	$0	$580,000	$0
Litchfield WPCF Improvements				
Headworks Screen	*$700,000*	*$0*	*$0*	*$0*
Headworks Grit Removal	*$830,000*	*$0*	*$0*	*$0*
Primary Clarifier Wall Extension	*$160,000*	*$0*	*$0*	*$0*
Aeration Basin Wall Extension	*$330,000*	*$0*	*$0*	*$0*
Secondary Clarifier/Post-Anoxic Wall Extension	*$240,000*	*$0*	*$0*	*$0*
Secondary Clarifier Anoxic Basin Conversion	*$825,000*	*$0*	*$0*	*$0*
New Circular Secondary Clarifiers	*$3,420,000*	*$0*	*$0*	*$0*
RAS/WAS Pump Building	*$1,321,000*	*$0*	*$0*	*$0*
RAS Pumps	*$430,000*	*$0*	*$0*	*$0*
WAS Pumps	*$335,000*	*$0*	*$0*	*$0*
Site Pavement	*$110,000*	*$0*	*$0*	*$0*
Site Restoration	*$300,000*	*$0*	*$0*	*$0*
Site Fencing	*$60,000*	*$0*	*$0*	*$0*
Electrical System Upgrades	*$200,000*	*$0*	*$0*	*$0*
Emergency Generator	*$350,000*	*$0*	*$0*	*$0*
Contractor Mobilization, Bonds, and Insurance (10%)	*$900,000*	*$0*	*$0*	*$0*
Construction Contingency (~15%)	*$1,600,000*	*$0*	*$0*	*$0*

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
Litchfield (Regional) WPCF Improvements Total	$12,111,000	$6,746,000	$5,365,000	$0
Construction Sub-Total	$37,590,000	$6,746,000	$19,404,000	$11,440,000
Project Contingency (10%)	$3,759,000	$674,600	$1,940,400	$1,144,000
Allowance for Engineering Services (20%)	$7,518,000	$1,349,200	$3,880,800	$2,288,000
Allowance for Legal, Bond Counsel and Short-Term Interest (4%)	$1,504,000	$270,000	$776,000	$458,000
Project Total	**$50,371,000**	**$9,039,800**	**$26,001,200**	**$15,330,000**

Table 8: Regional Alternative 2 – Opinion of Probable Annual Costs

Component	Opinion of Probable Cost
Operations Staff	$420,000
Insurance	$76,000
Office Lease & Other Expense	$20,900
Prof-Legal & Accounting & Computer	$52,700
Collection System Pump Station Electrical	$96,400
WPCF Process Electrical	$0
WPCF Non-Process Electrical	$12,000
Sludge Disposal	$0
Solids Handling Operations	$0
Chemicals	$60,000
Fuel	$12,000
Sub-Total of Annual O&M Costs	**$750,000**
Equipment Maintenance Fund	$50,000
Long-Term Equipment Replacement/Capital Fund	$100,000
Sewer Improvements Capital Fund	$50,000

Component	Opinion of Probable Cost
Sub-Total of Annual Maintenance/Capital Funds	**$200,000**
Wastewater Disposal to Regional WPCF	**$200,000**
Total	**$1,150,000**

Regional Alternative 3 – Decommission WLSD WPCF, Regionalization with Town of Litchfield (Pipe Route 2)

a) Description: Describe the facilities associated with every technically feasible alternative. Describe source, conveyance, treatment, storage and distribution facilities for each alternative. A feasible system may include a combination of centralized and decentralized (on-site or cluster) facilities.

Regional Alternative 3 involves pumping flows that would normally be treated at the WLSD WPCF to the Town of Litchfield's existing sanitary sewer collection system via a new pump station and force main route along Beach Street, Milton Road, and Bantam Road (State Route 202), with interconnection to the Litchfield sewer system at High Bridge Road. No expansions of the existing Litchfield sanitary sewer system are anticipated to be served by the new force main. The existing WLSD Plant Pump Station will be replaced with a new wet pit/dry pit pump station with odor control system.

Discussions with Litchfield indicated that there have been historical issues with the existing interceptor not having adequate conveyance capacity during major wet-weather events, and a hydraulic model was used to confirmed this. Regional Alternative 3 includes the construction of a wastewater storage tank to store wastewater flows from WLSD during high-flow events when Litchfield could not accommodate these flows in the existing interceptor. Flows from WLSD would be pumped into the system when interceptor flows subside.

A deferred component of Regional Alternative 3 includes the replacement of the existing Litchfield interceptor sewer (approximately 17,600 linear feet) that is downstream of the proposed new force main connection and is currently undersized to convey the additional flows from WLSD.

The existing Litchfield WPCF site is shown in Figure 7 (attached). Regional Alternative 3 also includes required upgrades at the Litchfield WPCF to accept the additional WLSD flow. In addition to accommodating the proposed flow from WLSD, the proposed upgrades to the Litchfield WPCF include several elements to address existing limitations and operational needs. For example, the existing manual bar rack is ineffective at rag control, maintenance intensive and routinely surcharges the WPCF influent sanitary sewer. The hydraulics are further restricted via the sewage grinder which follows the manual bar rack. Further, the existing secondary clarifiers are undersized which reduces the nutrient removal capabilities of the WPCF. In addition to inhibiting the nutrient removal capabilities, the secondary clarifiers are challenging to operate during wet weather, high flow conditions. The permitted capacity of the Litchfield WPCF is 0.80 million gallons per day (mgd), but estimated/current observed capacity is 0.60 mgd.

The proposed upgrades will not only provide necessary improvements to aging infrastructure at the Litchfield WPCF and increase the estimated/current capacity from 0.60 to the permitted capacity of 0.80 mgd, but will also incrementally increase the permitted capacity of the Litchfield WPCF from 0.80 mgd to 0.95 mgd. These upgrades will benefit the communities of Litchfield and Morris by increasing the capacity and reliability of the regional Litchfield WPCF.

The proposed upgrades to the Litchfield WPCF include the following major components:

- Installation of new headworks building with influent screen and washer compactor, and new grit removal system
- Extensions to raise the existing primary clarifier, aeration basin and secondary clarifier/post-anoxic basin walls above flood elevation
- Conversion of the existing secondary clarifier to an anoxic basin with new anoxic mixer and bridge, to provide additional total nitrogen removal capacity
- New secondary clarifier tank and required internals (mechanism, weirs, baffles)
- New return activated sludge (RAS) and waste activated sludge (WAS) pump building and new RAS and WAS pumping systems
- Electrical system upgrades and new emergency generator
- Site fencing, paving and restoration

The proposed upgrades to the Litchfield WPCF are shown in Figure 8 (attached). Further discussion with Litchfield indicated that the proposed Litchfield WPCF upgrades may occur in phases, and the Town may be initiating a more short-term upgrade to address their immediate needs. All components of recommended Litchfield WPCF upgrades have been assumed for the purposes of this PER, but may have to be reevaluated at the time of implementation. Regional Alternative 3 also includes decommissioning of the existing WLSD WPCF.

b) Design Criteria: State the design parameters used for evaluation purposes. These parameters should comply with federal, state, and agency design policies and regulatory requirements.

For Regional Alternative 3, we assumed the following basis of design conditions:

- Future average annual flow rate of 150,000 gallons per day (gpd), or 104 gallons per minute (gpm);
- One wet pit/dry pit pumping station;
- 6-inch diameter force main;
- Two pumping units (one duty pump) on variable frequency drives (VFDs), with room for a third future pump.

c) Map: Provide a schematic layout map to scale and a process diagram if applicable. If applicable, include future expansion of the facility.

Regional Alternative 3 is shown in Figure 6 (attached).

d) Environmental Impacts: Provide information about how the specific alternative may impact the environment. Describe only those unique direct and indirect impacts on floodplains, wetlands, other important land resources, endangered species, historical and archaeological properties, etc., as they relate to each specific alternative evaluated. Include generation and management of residuals

and wastes.

Similar to the local alternatives, Regional Alternative 3 will result in improved water quality. However, Regional Alternative 3 involves pumping the wastewater to the Town of Litchfield's WPCF for treatment and disposal. By no longer applying treated effluent at the existing WLSD WPCF site, this will protect the Class GAA groundwater designation, and similarly promote positive impacts to the environment. Abandonment of on-site sludge disposal will also result in improved site, groundwater and stormwater control measures.

e) Land Requirements: Identify sites and easements required. Further specify whether these properties are currently owned, to be acquired, leased, or have access agreements.

Regional Alternative 3 includes abandonment of the existing WLSD WPCF. The existing WPCF will be used as a potential pump station and storage tank site, and offices for administrative and operational staff will remain. WLSD owns the entire treatment and disposal site. Utility easements may be required for the new force main piping.

f) Potential Construction Problems: Discuss concerns such as subsurface rock, high water table, limited access, existing resource or site impairment, or other conditions which may affect cost of construction or operation of facility.

In order to better determine soil, groundwater and ledge/rock conditions along the force main pipe corridors, soil borings and geoprobes will be conducted along the pipe corridors during the design phase. These investigations will contribute to the refinement of the cost estimate for Regional Alternative 3 during the design phase. Daily work-hour constraints on the portions of the work in State Roads will result in slow construction progress for Regional Alternative 3.

g) Sustainability Considerations: Sustainable utility management practices include environmental, social, and economic benefits that aid in creating a resilient utility.

Based on the size of the 90-acre site, and the proposed abandonment of the effluent disposal system at the existing WPCF, Regional Alternative 3 lends itself to exploration of renewable energy opportunities (i.e. solar) to help offset future operation and maintenance costs. These considerations will be explored in greater detail during the design phase for Regional Alternative 3.

i) Water and Energy Efficiency: Discuss water reuse, water efficiency, water conservation, energy efficient design (i.e. reduction in electrical demand), and/or renewable generation of energy, and/or minimization of carbon footprint, if applicable to the alternative. Alternatively, discuss the water and energy usage for this option as compared to other alternatives.

ii) Green Infrastructure: Discuss aspects of project that preserve or mimic natural processes to manage stormwater, if applicable to the alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

iii) Other: Discuss any other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the alternative, if applicable.

h) Cost Estimates: Provide cost estimates for each alternative, including a breakdown of the following costs associated with the project: construction, non-construction, and annual O&M costs. A construction contingency should be included as a non-construction cost. Cost estimates should be included with the descriptions of each technically feasible alternative. O&M costs should include a rough breakdown by O&M category (see example below) and not just a value for

each alternative. Information from other sources, such as the recipient's accountant or other known technical service providers, can be incorporated to assist in the development of this section. The cost derived will be used in the life cycle cost analysis described in Section 5 a.

Example O&M Cost Estimate	
Personnel (i.e. Salary, Benefits, Payroll Tax, Insurance, Training)	
Administrative Costs (e.g. office supplies, printing, etc.)	
Water Purchase or Waste Treatment Costs	
Insurance	
Energy Cost (Fuel and/or Electrical)	
Process Chemical	
Monitoring & Testing	
Short Lived Asset Maintenance/Replacement*	
Professional Services	
Residuals Disposal	
Miscellaneous	
Total	

* See Appendix A for example list

Our opinion of the probable project cost for Regional Alternative 3 is presented in Table 9 below, in FY2020 dollars. This cost includes anticipated upgrades required at the Town of Litchfield's existing WPCF to accommodate the increase in flows from WLSD. The anticipated annual O&M cost for Regional Alternative 3 is presented in Table 10 below, in FY2020 dollars. This annual cost includes wastewater disposal fees estimated for Litchfield, which include WLSD's portion of O&M as a percent of Litchfield wastewater flows.

Table 9: Regional Alternative 3 – Opinion of Probable Project Cost

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
WLSD Pump Station	$3,959,000	$0	$3,959,000	$0
WLSD Force Main	$12,860,000	$0	$12,860,000	$0
WLSD Storage Tank	$1,550,000	$0	$1,550,000	$0
Litchfield Interceptor Sewer Replacement	$11,440,000	$0	$0	$11,440,000
Decommissioning of WLSD WPCF	$580,000	$0	$580,000	$0
Litchfield WPCF Improvements				
Headworks Screen	*$700,000*	*$0*	*$0*	*$0*
Headworks Grit Removal	*$830,000*	*$0*	*$0*	*$0*
Primary Clarifier Wall Extension	*$160,000*	*$0*	*$0*	*$0*
Aeration Basin Wall Extension	*$330,000*	*$0*	*$0*	*$0*
Secondary Clarifier/Post-Anoxic Wall Extension	*$240,000*	*$0*	*$0*	*$0*
Secondary Clarifier Anoxic Basin Conversion	*$825,000*	*$0*	*$0*	*$0*
New Circular Secondary Clarifiers	*$3,420,000*	*$0*	*$0*	*$0*
RAS/WAS Pump Building	*$1,321,000*	*$0*	*$0*	*$0*
RAS Pumps	*$430,000*	*$0*	*$0*	*$0*
WAS Pumps	*$335,000*	*$0*	*$0*	*$0*
Site Pavement	*$110,000*	*$0*	*$0*	*$0*
Site Restoration	*$300,000*	*$0*	*$0*	*$0*
Site Fencing	*$60,000*	*$0*	*$0*	*$0*
Electrical System Upgrades	*$200,000*	*$0*	*$0*	*$0*
Emergency Generator	*$350,000*	*$0*	*$0*	*$0*
Contractor Mobilization, Bonds, and Insurance (10%)	*$900,000*	*$0*	*$0*	*$0*
Construction Contingency (~15%)	*$1,600,000*	*$0*	*$0*	*$0*
Litchfield (Regional) WPCF Improvements Total	$12,111,000	$5,365,000	$6,746,000	$0
Construction Sub-Total	$42,500,000	$5,365,000	$25,695,000	$11,440,000
Project Contingency (10%)	$4,251,000	$537,000	$2,570,000	$1,144,000

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
Allowance for Engineering Services (20%)	$8,500,000	$1,073,000	$5,139,000	$2,288,000
Allowance for Legal, Bond Counsel and Short-Term Interest (4%)	$1,701,000	$215,000	$1,028,000	$458,000
Project Total	**$56,952,000**	**$7,190,000**	**$34,432,000**	**$15,330,000**

Table 10: Regional Alternative 3 – Opinion of Probable Annual Costs

Component	Opinion of Probable Cost
Operations Staff	$420,000
Insurance	$76,000
Office Lease & Other Expense	$20,900
Prof-Legal & Accounting & Computer	$52,700
Collection System Pump Station Electrical	$96,400
WPCF Process Electrical	$0
WPCF Non-Process Electrical	$12,000
Sludge Disposal	$0
Solids Handling Operations	$0
Chemicals	$60,000
Fuel	$12,000
Sub-Total of Annual O&M Costs	**$750,000**
Equipment Maintenance Fund	$50,000
Long-Term Equipment Replacement/Capital Fund	$100,000
Sewer Improvements Capital Fund	$50,000
Sub-Total of Annual Maintenance/Capital Funds	**$200,000**
Wastewater Disposal to Regional WPCF	**$200,000**
Total	**$1,150,000**

5) SELECTION OF AN ALTERNATIVE

Selection of an alternative is the process by which data from the previous section, "Alternatives Considered" is analyzed in a systematic manner to identify a recommended alternative. The analysis should include consideration of both life cycle costs and non-monetary factors (i.e. triple bottom line analysis: financial, social, and environmental). If water reuse or conservation, energy efficient design, and/or renewable generation of energy components are included in the proposal provide an explanation of their cost effectiveness in this section.

a) Life Cycle Cost Analysis. A life cycle present worth cost analysis (an engineering economics technique to evaluate present and future costs for comparison of alternatives) should be completed to compare the technically feasible alternatives. Do not leave out alternatives because of anticipated costs; let the life cycle cost analysis show whether an alternative may have an acceptable cost. This analysis should meet the following requirements and should be repeated for each technically feasible alternative. Several analyses may be required if the project has different aspects, such as one analysis for different types of collection systems and another for different types of treatment.

i) The analysis should convert all costs to present day dollars;

ii) The planning period to be used is recommended to be 20 years, but may be any period determined reasonable by the engineer and concurred on by the state or federal agency;

iii) The discount rate to be used should be the "real" discount rate taken from Appendix C of OMB circular A-94 and found at (www.whitehouse.gov/omb/circulars/a094/a94_appx-c.html);

iv) The total capital cost (construction plus non-construction costs) should be included;

v) Annual O&M costs should be converted to present day dollars using a uniform series present worth (USPW) calculation;

vi) The salvage value of the constructed project should be estimated using the anticipated life expectancy of the constructed items using straight line depreciation calculated at the end of the planning period and converted to present day dollars;

vii) The present worth of the salvage value should be subtracted from the present worth costs;

viii) The net present value (NPV) is then calculated for each technically feasible alternative as the sum of the capital cost (C) plus the present worth of the uniform series of annual O&M (USPW (O&M)) costs minus the single payment present worth of the salvage value (SPPW(S)): NPV = C + USPW (O&M) – SPPW (S).

ix) A table showing the capital cost, annual O&M cost, salvage value, present worth of each of these values, and the NPV should be developed for state or federal agency review. All factors (major and minor components), discount rates, and planning periods used should be shown within the table;

x) Short lived asset costs (See Appendix A for examples) should also be included in the life cycle cost analysis if determined appropriate by the consulting engineer or agency. Life cycles of short lived assets should be tailored to the facilities being

constructed and be based on generally accepted design life. Different features in the system may have varied life cycles.

The opinions of probable project costs were escalated to the years of implementation for the comparison of alternatives. A summary of the escalated opinions of probable project costs is presented in Table 11.

Table 11: Opinions of Probable Project Cost, Escalated to Years of Implementation

Alternative	Opinion of Probable Cost	Anticipated WLSD Portion	Anticipated Litchfield Portion
Local Alternative 1 (MBR Process)	$34,450,000	$34,450,000	$0
Local Alternative 2 (SBR Process)	$34,810,000	$34,810,000	$0
Regional Alternative 1 (Torrington)	$23,440,000	$23,440,000	$0
Regional Alternative 2 (Litchfield – Less Deferred Interceptor)	$38,800,000	$28,800,000	$10,000,000
Regional Alternative 3 (Litchfield – Less Deferred Interceptor)	$46,050,000	$36,050,000	$10,000,000

The costs presented below are for WLSD sewer users only.

- Local Alternative 1: Our opinion of probable project cost for Local Alternative 1 is $34,450,000 (FY2023 dollars). The anticipated annual WLSD O&M cost (FY2023 costs) for Local Alternative 1 is $1,661,000.
    - Local Financing: Based on a locally-financed 20-year 100% loan at an interest rate of 3.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Local Alternative 1 following construction is $3,989,000. This represents an average annual cost per WLSD homeowner that is 11.1 times the average State sewer rate. The annual sewer rate would be 7.5% of median household income.
    - CWF Funding: Based on a 20-year loan from the State's Clean Water Fund (CWF) Program at an interest rate of 2.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Local Alternative 1 following construction is $3,782,000. This represents an average annual cost per WLSD homeowner that is 10.5 times the average State sewer rate. The annual sewer rate would be 7.1% of median household income.
    - USDA-RD Funding: Based on a 40-year loan from USDA-RD at an interest rate of 2.250%, with a grant of 45%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Local Alternative 1 following construction is $2,425,000. This represents an average annual cost per WLSD homeowner that is 6.7 times the average State sewer rate. The annual sewer rate would be 4.5% of median household income.
- Local Alternative 2: Our opinion of probable project cost for Local Alternative 2 is $34,810,000 (FY2023 dollars). The anticipated annual WLSD O&M cost (FY2023 costs) for Local Alternative 2 is $1,398,700.
    - Local Financing: Based on a locally-financed 20-year 100% loan at an interest rate of 3.0%, the estimated "Year 1" annual cost (annual

capital payment and O&M costs) for Local Alternative 2 following construction is $3,751,000. This represents an average annual cost per WLSD homeowner that is 10.4 times the average State sewer rate. The annual sewer rate would be 7.0% of median household income.

  - CWF Funding: Based on a 20-year loan from the State's Clean Water Fund (CWF) Program at an interest rate of 2.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Local Alternative 2 following construction is $3,542,000. This represents an average annual cost per WLSD homeowner that is 9.9 times the average State sewer rate. The annual sewer rate would be 6.6% of median household income.
  - USDA-RD Funding: Based on a 40-year loan from USDA-RD at an interest rate of 2.250%, with a grant of 45%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Local Alternative 2 following construction is $2,170,000. This represents an average annual cost per WLSD homeowner that is 6.0 times the average State sewer rate. The annual sewer rate would be 4.1% of median household income.

- Regional Alternative 1: Our opinion of probable project cost for Regional Alternative 1 is $23,440,000 (FY2023 dollars). The anticipated annual WLSD O&M cost (FY2023 costs) for Regional Alternative 1 is $1,169,300.
  - Local Financing: Based on a locally-financed 20-year 100% loan at an interest rate of 3.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 1 following construction is $2,762,000. This represents an average annual cost per WLSD homeowner that is 7.7 times the average State sewer rate. The annual sewer rate would be 5.2% of median household income.
  - CWF Funding: Based on a 20-year loan from the State's Clean Water Fund (CWF) Program at an interest rate of 2.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 1 following construction is $2,621,000. This represents an average annual cost per WLSD homeowner that is 7.3 times the average State sewer rate. The annual sewer rate would be 4.9% of median household income.
  - USDA-RD Funding: Based on a 40-year loan from USDA-RD at an interest rate of 2.250%, with a grant of 45%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 1 following construction is $1,698,000. This represents an average annual cost per WLSD homeowner that is 4.7 times the average State sewer rate. The annual sewer rate would be 3.2% of median household income.
- Regional Alternative 2: Our opinion of probable project cost for Regional Alternative 2 is $38,800,000 (FY2023 dollars). The anticipated annual WLSD O&M cost (FY2023 costs) for Regional Alternative 2 is $1,257,000.
  - Local Financing: Based on a locally-financed 20-year 100% loan at an interest rate of 3.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 2 following construction is $3,334,000. This represents an average annual cost per WLSD homeowner that is 9.3 times the average State sewer rate. The annual sewer rate would be 6.2% of median household income.

- CWF Funding: Based on a 20-year loan from the State's Clean Water Fund (CWF) Program at an interest rate of 2.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 2 following construction is $3,150,000. This represents an average annual cost per WLSD homeowner that is 8.8 times the average State sewer rate. The annual sewer rate would be 5.9% of median household income.
- USDA-RD Funding: Based on a 40-year loan from USDA-RD at an interest rate of 2.250%, with a grant of 45%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 2 following construction is $1,940,000. This represents an average annual cost per WLSD homeowner that is 5.4 times the average State sewer rate. The annual sewer rate would be 3.6% of median household income.

- Regional Alternative 3: Our opinion of probable project cost for Regional Alternative 3 is $46,050,000 (FY2023 dollars). The anticipated annual WLSD O&M cost (FY2023 costs) for Regional Alternative 3 is $1,257,000.
  - Local Financing: Based on a locally-financed 20-year 100% loan at an interest rate of 3.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 3 following construction is $3,829,000. This represents an average annual cost per WLSD homeowner that is 10.7 times the average State sewer rate. The annual sewer rate would be 7.2% of median household income.
  - CWF Funding: Based on a 20-year loan from the State's Clean Water Fund (CWF) Program at an interest rate of 2.0%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 3 following construction is $3,600,000. This represents an average annual cost per WLSD homeowner that is 10.0 times the average State sewer rate. The annual sewer rate would be 6.7% of median household income.
  - USDA-RD Funding: Based on a 40-year loan from USDA-RD at an interest rate of 2.250%, with a grant of 45%, the estimated "Year 1" annual cost (annual capital payment and O&M costs) for Regional Alternative 3 following construction is $2,098,000. This represents an average annual cost per WLSD homeowner that is 5.8 times the average State sewer rate. The annual sewer rate would be 3.9% of median household income.
- Life Cycle Costs: For the alternatives presented above, Regional Alternative 1 has the lowest capital cost. Since the non-monetary factors are more critical to the Town and regulatory and funding agencies, a detailed life cycle cost analysis would not provide any meaningful insight for the selection of the preferred alternative. Non-cost factors are analyzed further below.

A summary of the cost per EDU, and the average annual sewer cost as a percent of MHI for the alternatives in "Year 1" (FY2023), is shown in Tables 12A and 12B below.

Table 12A: Alternatives Summary Table – Cost per EDU in FY2023

Alternative	Local Financing	CWF Funding	USDA-RD Funding
Local Alternative 1	$5,723	$5,426	$3,479
Local Alternative 2	$5,382	$5,082	$3,113
Regional Alternative 1	$3,963	$3,760	$2,436
Regional Alternative 2	$4,783	$4,518	$2,783
Regional Alternative 3	$5,494	$5,165	$3,010

Table 12B: Annual Sewer Cost as a Percent of MHI Income in FY2023

Alternative	Local Financing	CWF Funding	USDA-RD Funding
Local Alternative 1	7.5%	7.1%	4.5%
Local Alternative 2	7.0%	6.6%	4.1%
Regional Alternative 1	5.2%	4.9%	3.2%
Regional Alternative 2	6.2%	5.9%	3.6%
Regional Alternative 3	7.2%	6.7%	3.9%

Evaluation criteria were developed for assistance in selection of the recommended alternative. The matrix analysis that was utilized to determine the recommend alternative is summarized in Table 13 below. The matrix has been provided to compare key Project parameters including project capital and operational costs and develop a recommendation of a preferred alternative for implementation.

Table 13: Matrix Analysis – Recommended Alternative

Criteria	Local Alternative 1	Local Alternative 2	Regional Alternative 1	Regional Alternative 2	Regional Alternative 3
	Score	Score	Score	Score	Score
Capital Costs	4	3	5	2	1
Annual O&M Costs	3	3	5	4	4
Local versus Regional O&M	1	1	5	5	5
Local versus Regional Treatment & Disposal	1	1	5	5	5
Local versus Regional Management	1	1	5	5	5

Criteria	Local Alternative 1	Local Alternative 2	Regional Alternative 1	Regional Alternative 2	Regional Alternative 3
	Score	Score	Score	Score	Score
Consolidation of NPDES Permits	1	1	5	5	5
Permitting	1	1	3	5	4
Inter-Municipal Agreements	5	5	2	4	4
Availability of Funding Sources (grant/loan)	3	3	1	5	5
Total	**20**	**19**	**36**	**40**	**38**

The ranking criteria range from 5, being best, to 1, being worst. Based on this analysis Regional Alternative 2 is recommended.

b) Non-Monetary Factors: Non-monetary factors, including social and environmental aspects (e.g. sustainability considerations, operator training requirements, permit issues, community objections, reduction of greenhouse gas emissions, wetland relocation) should also be considered in determining which alternative is recommended and may be factored into the calculations.

WLSD is an entity comprised of only 697 residential dwellings, led by volunteers and active citizen participation. Although WLSD has a strong operations team that maintains its current WPCF and collection system systems, the local alternative includes complex treatment and disposal systems, which are maintenance intensive. There will also be additional levels of monitoring and compliance associated with the local alternative, if it were approved by CT-DEEP/DPH, which is uncertain. The regional alternatives, on the other hand, include a simple pumping system and conveyance pipeline, leaving the details associated with treatment to the City of Torrington or the Town of Litchfield and their respective O&M staffs. Therefore, the long-term simplicity of the regional alternatives is superior to the local alternatives relative to non-monetary considerations.

6) PROPOSED PROJECT (RECOMMENDED ALTERNATIVE)

The engineer should include a recommendation for which alternative(s) should be implemented. This section should contain a fully developed description of the proposed project based on the preliminary description under the evaluation of alternatives. Include a schematic for any treatment processes, a layout of the system, and a location map of the proposed facilities. At least the following information should be included as applicable to the specific project:

Regional Alternative 2 was selected for the cost and non-cost factors described above.

Preliminary Project Design.

i) Drinking Water:

- Water Supply: Include requirements for quality and quantity. Describe recommended source, including site and allocation allowed.

Not applicable.

- Treatment: Describe process in detail (including whether adding, replacing, or rehabilitating a process) and identify location of plant and site of any process discharges. Identify capacity of treatment plant (i.e. Maximum Daily Demand).

  Not applicable.

- Storage: Identify size, type and location.

  Not applicable.

- Pumping Stations: Identify size, type, location and any special power requirements. For rehabilitation projects, include description of components upgraded.

  Not applicable.

- Distribution Layout: Identify general location of new pipe, replacement, or rehabilitation: lengths, sizes and key components.

  Not applicable.

ii) Wastewater/Reuse:

- Collection System/Reclaimed Water System Layout: Identify general location of new pipe, replacement or rehabilitation: lengths, sizes, and key components.

  WLSD upgraded its entire collection system as part of the recently completed I/I Removal, I/I Rehabilitation, and Pump Stations/SCADA Upgrade Projects. A series of 6-inch diameter force mains (ductile iron and PVC based on system pressures) will be used to convey untreated wastewater from the existing WPCF site to the Town of Litchfield's collection system. No expansions of the existing Litchfield sanitary sewer system are anticipated to be served by the new force main.

- Pumping Stations: Identify size, type, site location, and any special power requirements. For rehabilitation projects, include description of components upgraded.

  The proposed Regional Alternative 2 includes a new wet pit/dry pit pump station for conveyance of untreated wastewater from the WLSD WPCF to the Litchfield sewer system. The pump station will include a new wetwell, valve pit and odor control system, and new controls and generator equipment that will be installed in existing buildings. Space will be included for installation of a third future pump, if necessary.

- Storage: Identify size, type, location and frequency of operation.

  The proposed Regional Alternative 2 includes a wastewater storage tank to hold WLSD flows during wet-weather events when the existing Litchfield interceptor is at capacity and cannot accept additional flows. The preliminary hydraulic modeling indicates a 1.0 million gallon storage tank is required.

- Treatment: Describe process in detail (including whether adding, replacing, or rehabilitating a process) and identify location of any treatment units and site of any discharges (end use for reclaimed water). Identify

capacity of treatment plant (i.e. Average Daily Flow).

The proposed Regional Alternative 2 will incorporate use of the existing Litchfield WPCF for wastewater treatment and disposal. Therefore, there are no new treatment systems being constructed as part of the proposed Project.

iii) Solid Waste:

- Collection: Describe process in detail and identify quantities of material (in both volume and weight), length of transport, location and type of transfer facilities, and any special handling requirements.

  Not applicable.

- Storage: If any, describe capacity, type, and site location. Processing. If any, describe capacity, type, and site location.

  Not applicable.

- Disposal: Describe process in detail and identify permit requirements, quantities of material, recycling processes, location of plant, and site of any process discharges.

  Not applicable.

iv) Stormwater:

- Collection System Layout: Identify general location of new pipe, replacement or rehabilitation: lengths, sizes, and key components.

  Not applicable.

- Pumping Stations: Identify size, type, location, and any special power requirements.

  Not applicable.

- Treatment: Describe treatment process in detail. Identify location of treatment facilities and process discharges. Capacity of treatment process should also be addressed.

  Not applicable.

- Storage: Identify size, type, location and frequency of operation.

  Not applicable.

- Disposal: Describe type of disposal facilities and location.

  Not applicable.

- Green Infrastructure: Provide the following information for green infrastructure alternatives:

  - Control Measures Selected. Identify types of control measures selected (e.g., vegetated areas, planter boxes, permeable pavement, rainwater cisterns).
  - Layout: Identify placement of green infrastructure control measures, flow paths, and drainage area for each control measure.
  - Sizing: Identify surface area and water storage volume for

each green infrastructure control measure. Where applicable, soil infiltration rate, evapotranspiration rate, and use rate (for rainwater harvesting) should also be addressed.

- Overflow: Describe overflow structures and locations for conveyance of larger precipitation events.

  Not applicable.

b) Project Schedule: Identify proposed dates for submittal and anticipated approval of all required documents, land and easement acquisition, permit applications, advertisement for bids, loan closing, contract award, initiation of construction, substantial completion, final completion, and initiation of operation.

The anticipated project schedule is as follows:

Milestone	Date
Start of Design	7/1/2020
Final Design and Permitting Complete	6/30/2021
Advertisement for Bids	7/1/2021
Contract Award	9/30/2021
Initiation of Construction	11/1/2021
Loan Closing	8/31/2022
Initiation of Operation	2/28/2023
Substantial Completion of Construction	4/30/2023
Final Completion of Construction	5/1/2023

c) Permit Requirements: Identify any construction, discharge and capacity permits that will/may be required as a result of the project.

Planning and Zoning and Land Use permits may be required by the Town of Goshen and the Town of Litchfield. However, since there are no proposed sewer connections along the proposed force mains in Litchfield and Goshen, we do not anticipate changes to the Plans of Conservation and Development. Discussions will have to take place with CT-DEEP with regard to the transferring of NPDES permit allocations for flows and loads from WLSD's WPCF to Litchfield's WPCF, and increasing the capacity of the Litchfield WPCF.

d) Sustainability Considerations (if applicable).

i) Water and Energy Efficiency: Describe aspects of the proposed project addressing water reuse, water efficiency, and water conservation, energy efficient design, and/or renewable generation of energy, if incorporated into the selected alternative.

The WLSD residents use very little water, and these conservative use patterns are expected in the future. For example, the sanitary flow is estimated at 65,000 gpd. That's only 93 gpd per customer, based on the 697 existing sewer connections.

The proposed pumping systems at the proposed pump station will include high-efficiency motors, variable frequency drives to reduce power consumption, and remote monitoring to improve overall system efficiencies.

ii) Green Infrastructure: Describe aspects of project that preserve or mimic natural

processes to manage stormwater, if applicable to the selected alternative. Address management of runoff volume and peak flows through infiltration, evapotranspiration, and/or harvest and use, if applicable.

Not applicable.

iii) Other: Describe other aspects of sustainability (such as resiliency or operational simplicity) that are incorporated into the selected alternative, if incorporated into the selected alternative.

The proposed pump station will be equipped with emergency generator, quick connect piping and bypass header to facilitate proactive measures during extreme weather conditions and extended power outages.

e) Total Project Cost Estimate (Engineer's Opinion of Probable Cost): Provide an itemized estimate of the project cost based on the stated period of construction. Include construction, land and right-of-ways, legal, engineering, construction program management, funds administration, interest, equipment, construction contingency, refinancing, and other costs associated with the proposed project. The construction subtotal should be separated out from the non-construction costs. The non-construction subtotal should be included and added to the construction subtotal to establish the total project cost. An appropriate construction contingency should be added as part of the non-construction subtotal. For projects containing both water and waste disposal systems, provide a separate cost estimate for each system as well as a grand total. If applicable, the cost estimate should be itemized to reflect cost sharing including apportionment between funding sources. The engineer may rely on the owner for estimates of cost for items other than construction, equipment, and engineering.

Our opinion of probable project costs for the proposed Project is provided in Table 14 below. The costs presented in this table were developed without benefit of final design drawings and may not reflect actual installed costs; these costs are to be used for planning purposes, only. Opinions of probable costs have been developed based on similar recent projects and equipment manufacturers' cost data. Line item costs are to be considered installed costs, including contractor OH&P and start-up and operator training. The opinion of cost includes soft costs such as engineering and contingency. The total costs for the Project have been escalated to the expected years of implementation and construction. Pending preliminary design and discussions with the Town of Litchfield, it is possible that portions of the Litchfield (Regional) WPCF Improvements may be deferred as part of a future project.

Table 14: Proposed Project (Regional Alternative 2) – Opinion of Probable Project Cost

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
WLSD Pump Station	*$4,200,000*	*$0*	*$4,200,000*	*$0*
WLSD Force Main	*$8,500,000*	*$0*	*$8,500,000*	*$0*
WLSD Storage Tank	*$2,100,000*	*$0*	*$2,100,000*	*$0*
Litchfield Interceptor Sewer Replacement	*$12,642,000*	*$0*	*$0*	*$12,642,000*

Component	Opinion of Probable Cost	Potential Litchfield Portion of Costs	Potential WLSD Portion of Costs	Deferred to Phase 2 (Future Project)
Decommissioning of WLSD WPCF	*$640,000*	*$0*	*$640,000*	*$0*
Litchfield (Regional) WPCF Improvements	*$13,470,000*	*$7,500,000*	*$5,970,000*	*$0*
Construction Sub-Total	$41,552,000	$7,500,000	$21,410,000	$12,642,000
Project Contingency (10%)	$4,163,000	$750,000	$2,141,000	$1,272,000
Final Design Phase	*$3,345,150*	*$600,000*	*$1,733,800*	*$1,011,350*
Bidding and Negotiating Phase	*$209,100*	*$37,500*	*$108,200*	*$63,400*
Construction Phase	*$2,090,750*	*$375,000*	*$1,083,600*	*$632,150*
Post-Construction Phase	*$209,100*	*$37,500*	*$108,200*	*$63,400*
Resident Project Representative	*$2,508,800*	*$450,000*	*$1,300,200*	*$758,600*
Allowance for Engineering Services (20%)	$8,362,900	$1,500,000	$4,334,000	$2,528,900
Allowance for Legal, Bond Counsel and Short-Term Interest (~4%)	$1,692,100	$250,000	$915,000	$527,100
Project Total	**$55,770,000**	**$10,000,000**	**$28,800,000**	**$16,970,000**

f) Annual Operating Budget: Provide itemized annual operating budget information. The owner has primary responsibility for the annual operating budget, however, there are other parties that may provide technical assistance. This information will be used to evaluate the financial capacity of the system. The engineer will incorporate information from the owner's accountant and other known technical service providers.

Table 15: Proposed Operating Budget FY2019-FY2020

Operating Budget Component	Proposed Operating Budget
Personnel	$417,500
Power & Heat	$90,500
Plant & Collection System Maintenance	$95,000
Other Expense	$45,680

Operating Budget Component	Proposed Operating Budget
Office Lease & Other Expense	$20,900
Insurance	$76,000
Prof-Legal & Accounting & Computer	$52,700
Debt Service – Principal	$10,196
Debt Service – Interest	$18,891
Contribution to Capital Fund	$458,811
Total Proposed Operating Budget	**$1,286,178**

i) Income: Provide information about all sources of income for the system including a proposed rate schedule. Project income realistically for existing and proposed new users separately, based on existing user billings, water treatment contracts, and other sources of income. In the absence of historic data or other reliable information, for budget purposes, base water use on 100 gallons per capita per day. Water use per residential connection may then be calculated based on the most recent U.S. Census, American Community Survey, or other data for the state or county of the average household size. When large agricultural or commercial users are projected, the Report should identify those users and include facts to substantiate such projections and evaluate the impact of such users on the economic viability of the project.

The Woodridge Lake Sewer District will meet operation and maintenance costs and the debt service for this capital cost by Ad Valorem (taxation).

ii) Annual O&M Costs: Provide an itemized list by expense category and project costs realistically. Provide projected costs for operating the system as improved. In the absence of other reliable data, base on actual costs of other existing facilities of similar size and complexity. Include facts in the Report to substantiate O&M cost estimates. Include personnel costs, administrative costs, water purchase or treatment costs, accounting and auditing fees, legal fees, interest, utilities, energy costs, insurance, annual repairs and maintenance, monitoring and testing, supplies, chemicals, residuals disposal, office supplies, printing, professional services, and miscellaneous as applicable. Any income from renewable energy generation which is sold back to the electric utility should also be included, if applicable. If applicable, note the operator grade needed.

Table 16: Proposed Project (Regional Alternative 2) – Opinion of Probable Annual Costs FY2023

Component	Opinion of Probable Cost
Operations Staff	$459,000
Insurance	$84,000
Office Lease & Other Expense	$23,000
Prof-Legal & Accounting & Computer	$58,000
Collection System Pump Station Electrical	$100,000
WPCF Process Electrical	$0
WPCF Non-Process Electrical	$14,000
Sludge Disposal	$0
Solids Handling Operations	$0
Chemicals	$66,000
Fuel	$14,000
Sub-Total of Annual O&M Costs	**$818,000**
Equipment Maintenance Fund	$55,000
Long-Term Equipment Replacement/Capital Fund	$110,000
Sewer Improvements Capital Fund	$55,000
Sub-Total of Annual Maintenance/Capital Funds	**$220,000**
Wastewater Disposal to Regional WPCF	**$219,000**
Total	**$1,257,000**

iii) Debt Repayments: Describe existing and proposed financing with the estimated amount of annual debt repayments from all sources. All estimates of funding should be based on loans, not grants.

The financing and debt payment options as well as their impacts to the anticipated sewer rates as a percentage of the Median Household Income are provided in Table 17.

Table 17: Financing Options and Impacts to Fiscal 2023 Enterprise Fund

Financing Type	Interest Rate	Term	Annual O&M	Annual Debt Service	Total Enterprise Budget	EDUs	Annual Cost Per EDU	MHI	%MHI
Conventional	3.000%	20	$1,257,000	$2,077,000	$3,334,000	697	$4,783	$76,705	6.2%
CWSRF	2.000%	20	$1,257,000	$1,893,000	$3,150,000	697	$4,519	$76,705	5.9%
USDA RD	2.250%	40	$1,257,000	$683,000	$1,940,000	697	$2,783	$76,705	3.6%

iv) Reserves: Describe the existing and proposed loan obligation reserve requirements for the following:

- Debt Service Reserve – For specific debt service reserve requirements consult with individual funding sources. If General Obligation bonds are proposed to be used as loan security, this section may be omitted, but this should be clearly stated if it is the case.

  The requested loans will be secured by the full faith and credit of the WLSD.

- Short-Lived Asset Reserve – A table of short lived assets should be included for the system (See Appendix A for examples). The table should include the asset, the expected year of replacement, and the anticipated cost of each. Prepare a recommended annual reserve deposit to fund replacement of short-lived assets, such as pumps, paint, and small equipment. Short-lived assets include those items not covered under O&M, however, this does not include facilities such as a water tank or treatment facility replacement that are usually funded with long-term capital financing.

  All costs presented in this PER include yearly reserve deposits to cover short-lived and longer-term assets to ensure WLSD is planning for ongoing and future needs. The “Equipment Maintenance Fund” line item is included to cover all required repair, rehabilitation and/or replacement of short-lived assets (pumps, controls, etc.).

  The “Long-Term Equipment Replacement/Capital Funds” line item is included to cover all larger capital projects, and the “Sewer Improvements Capital Fund” is included to address the WLSD’s aging sewer system through continued improvements over time.

7. CONCLUSIONS AND RECOMMENDATIONS

Provide any additional findings and recommendations that should be considered in development of the project. This may include recommendations for special studies, highlighting of the need for special coordination, a recommended plan of action to expedite project development, and any other necessary considerations.

Regional Alternative 2 represents the most advantageous alternative for WLSD of the alternatives considered. It also provides numerous benefits to the Litchfield WPCF and the communities of Litchfield and Morris that contribute their wastewater flows to the WPCF. It also has the clearest permitting and construction path leading to implementation. However, both the local and regional alternatives are expensive to WLSD

residents, and are unaffordable absent generous grants and favorable financing terms. WLSD is optimistic that USDA-RD can present an aggressive grant option, together with the long-term financing option offered by USDA-RD for these types of projects.

Figures

0 1,250 2,500 5,000 7,500 Feet

N

Goshen

Torrington

Litchfield

Morris

Plant Pump Station

WPCF

WPCF

WPCF

Legend

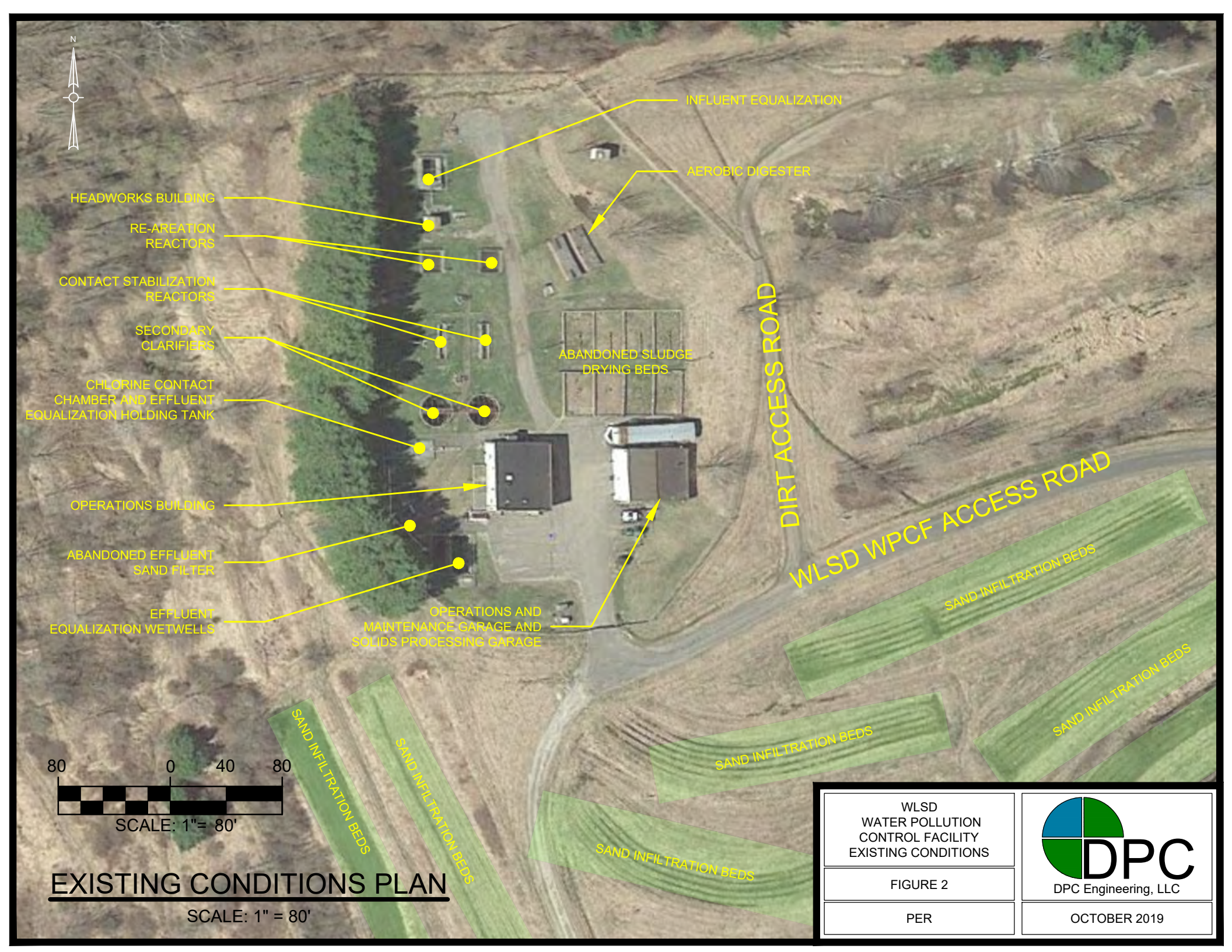
- WPCF — Torrington WPCF
- WPCF — Litchfield WPCF
- WPCF — WLSD WPCF
- Parcel

Woodridge Lake Sewer District

Figure 1
Geographic Overview of PER Components

DPC Engineering, LLC

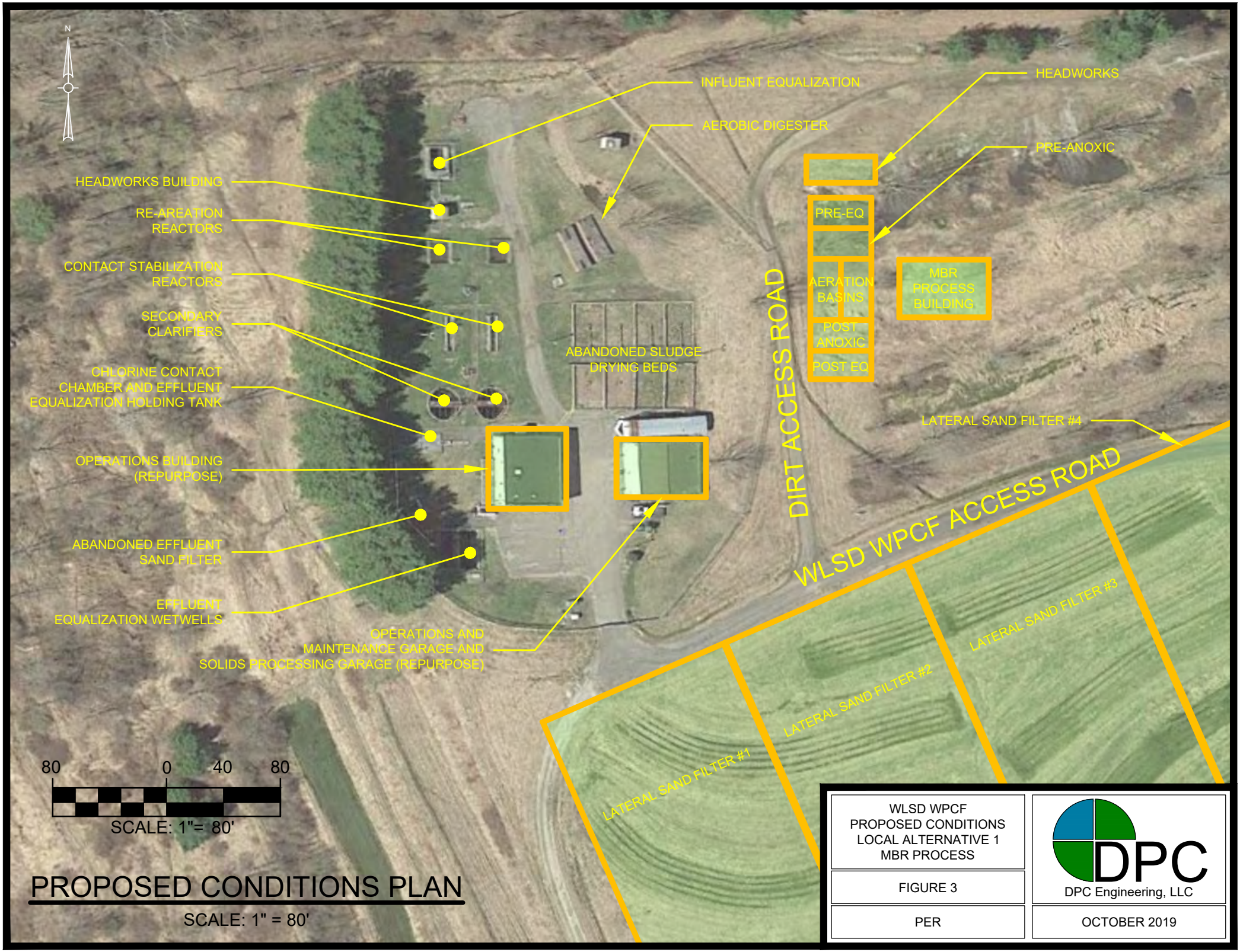
JOB NO: WLSD	DRAWN BY: GF
DATE: October 22, 2019	



EXISTING CONDITIONS PLAN

SCALE: 1" = 80'

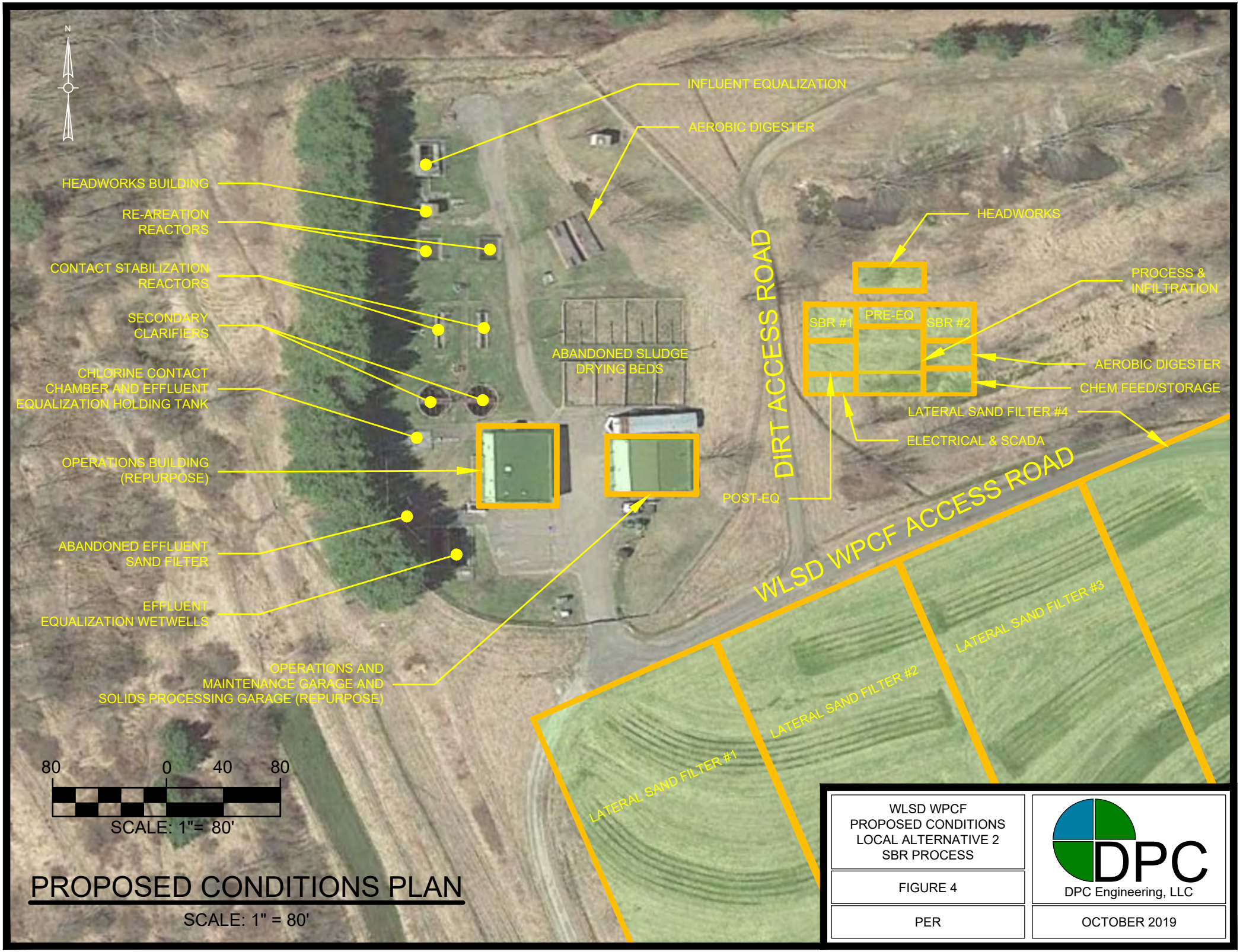
WLSD WATER POLLUTION CONTROL FACILITY EXISTING CONDITIONS	DPC DPC Engineering, LLC
FIGURE 2	
PER	OCTOBER 2019



PROPOSED CONDITIONS PLAN

SCALE: 1" = 80'

WLSD WPCF PROPOSED CONDITIONS LOCAL ALTERNATIVE 1 MBR PROCESS	DPC DPC Engineering, LLC
FIGURE 3	
PER	OCTOBER 2019



PROPOSED CONDITIONS PLAN

SCALE: 1" = 80'

WLSD WPCF PROPOSED CONDITIONS LOCAL ALTERNATIVE 2 SBR PROCESS	DPC DPC Engineering, LLC
FIGURE 4	
PER	OCTOBER 2019

0 1,200 2,400 4,800 7,200 Feet

N

Goshen/Torrington Town Line

Legend

- PS Proposed Pump Station
- Regional Alternative 1
- PS Existing Pump Station
- Existing Gravity Sewer
- Exitsting Force Main
- WLSD Sewer Service Area
- Parcel

Woodridge Lake Sewer District

Figure 5
Regional Alternative 1:
WLSD WPCF to Torrington
Sewer System

DPC Engineering, LLC

JOB NO: WLSD	DRAWN BY: JR
DATE: April 23, 2016	

0 750 1,500 3,000 4,500 Feet

N

Plant Pump Station

PS

Milton Rd
Sherbrook Dr
Wellsford Dr
E Hyerdale Dr
Ives Rd
Town Hill Rd
Brush Hill Rd
Brush Hill Rd Bare Hill Rd
East St S
Beach St
State Hwy 63
Old Middle St
Pumping Station Rd
Weed Rd
Deming Rd
Lucas Rd
Dresden Ct E
Brynmoor Dr
Woodale Ct
E Hyerdale Dr
Marshepaug Rd
Dresden Cir
Bexley Ct
Wynwood Ct
Paxton Ct
Milton Rd
Shear Shop Rd
Bear Swamp Rd
Brynmoor Ct
Crossman Rd
Newcomb Rd
Hemlock Hill Rd
Brooks Rd
State Hwy 63
Deming Rd
Litchfield Hollow Dr
Norfolk Rd
Shear Shop Rd
Maple St
Goodhouse Rd
Seherr Thoss Dr
Mike Rd
Seherr-Thoss Dr
Hutchinson Pkwy
Beach St
Goshen Rd
State Hwy 63
Norfolk Rd
Milton Rd
Potash Rd
Milton Rd
Maple St
Headquarters Rd
Saw Mill Rd
Butternut Rd
Carriage Ln
Beach St
N Lake St
Goshen Rd
Un Drway
Maple St
Fox Crossing Ln
Osborn Ln
Osborn Rd
Milton Rd
Beach St
Talmadge Ln
State Hwy 63
Prospect St
N Lake St
Sheldon Ln
Sheldon Ln
Westwood Ln
North St
Old Hollow Rd
Litwin Rd
Ripley Rd Brush Hill Rd
Schaeffer Rd
Duck Pond Rd
Baldwin Hill Rd
Litchfield Ponds Rd
Spencer St
West St
Prospect Mountain Rd
Maple Ridge
Lewis Rd
Knox Rd
Brush Hill Road No 1
Brush Hill Rd
Kilravock Dr
Un Drway
Dudley Rd
Maple St
Un Drway
Dudley Rd
Un Drway
Cathole Rd
Cathole Rd
US Hwy 202
Bantam Rd
Plumb Hill Rd
Constitution Way
Westleigh Dr
Milton Rd
US Hwy 202
West St
Meadow St
Commons Dr
Woodruff St
Russell St
Apple Ln
Whites Wood Rd
Gallows Ln
Westover St
S Lake St
Harris Rd
Ongley Rd
Prospect Mountain Rd
Donahue Rd Exd
Donahue Rd
Un Drway
Cathole Rd
Case Ave
Doyle Rd
Vanderpoel Ave
Bantam Ter
US Hwy 202
Maple St
US Hwy 202
Bissell Rd
White Hall Rd
Whites Wood Rd
Mattatuck Trl
Webster Rd
Tulip Dr
Luzi Dr
State Hwy 209
Seminole Cir
Highland Ave
Roosevelt Ave
Roosevelt Ave Exd
High Bridge Rd
White Hall Rd
Old Mount Tom Rd
Old Turnpike Rd
Willis Dr
Bantam Rd
US Hwy 202
Mill St
Mill St
Circle Dr
Bantam Lake Rd
State Hwy 209
W Morris Rd
WPCF
Stoddard Rd
N Shore Rd
N Shore Rd
Lennox Hill Rd
Looking Glass Hill Rd
Van Winkle Rd

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri

Legend

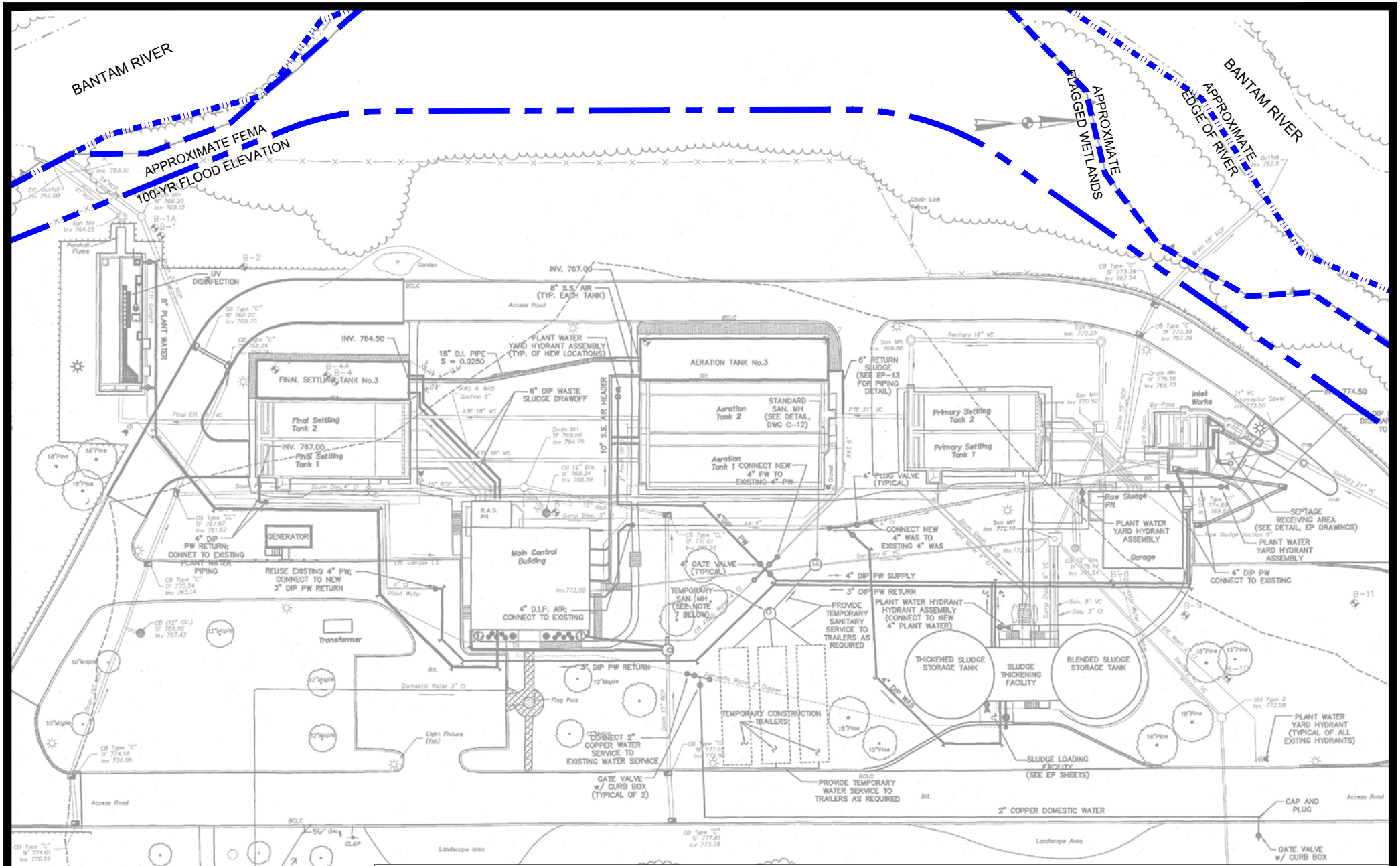
- PS — Pump Station
- Regional Alternative 2
- Regional Alternative 3
- Existing Gravity Sewer
- WPCF — Water Pollution Control Facility
- State Wellhead Protection Area
- State Watershed Area
- Parcel

Woodridge Lake Sewer District

Figure 6
Regional Alterative 2 & 3:
WLSD WPCF to Litchfield Sewer System

DPC Engineering, LLC

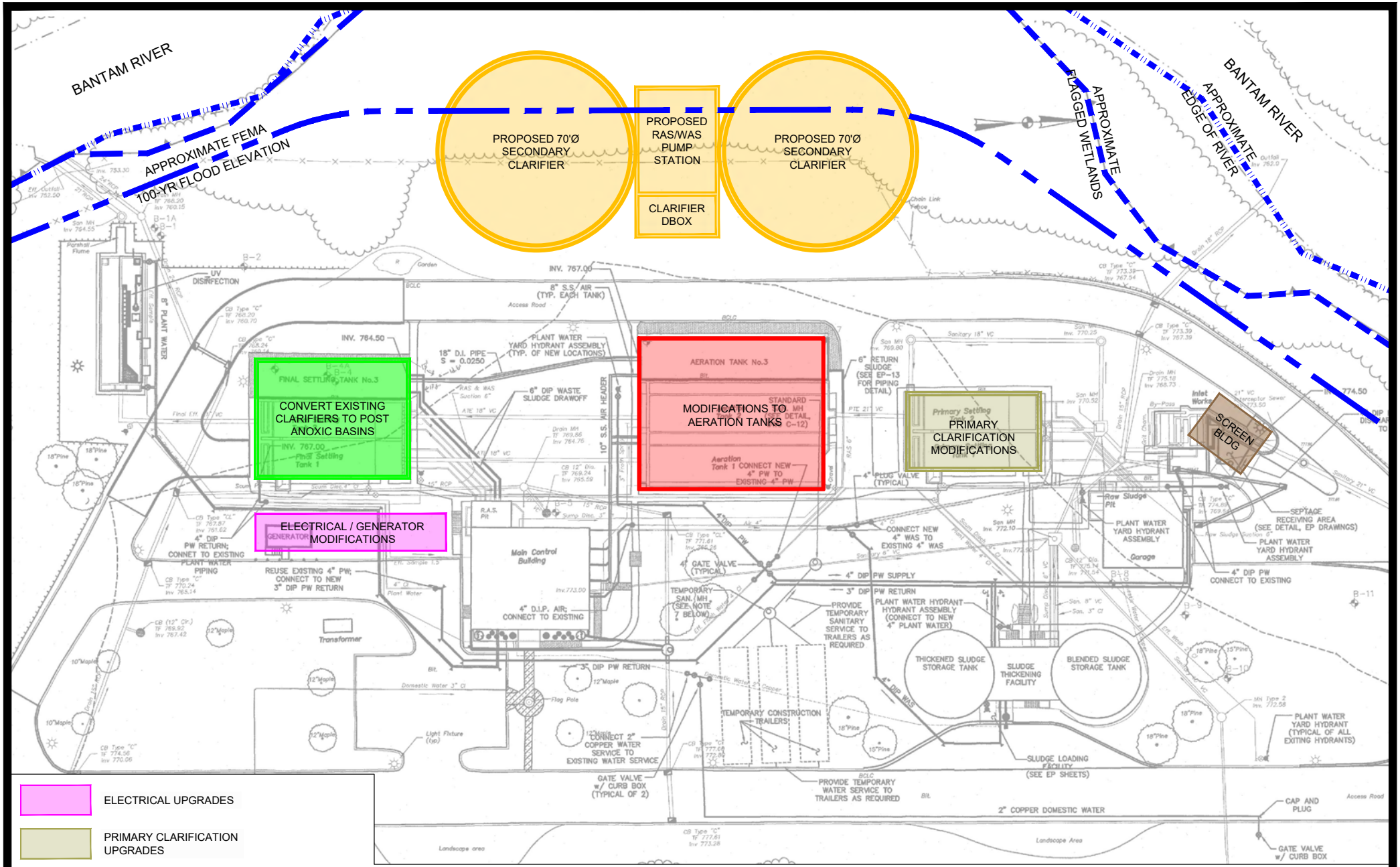
JOB NO: WLSD	DRAWN BY: GF
DATE: March 2020	



EXISTING CONDITIONS PLAN

SCALE: 1" = 50'

LITCHFIELD WATER POLLUTION CONTROL FACILITY	DPC Engineering, LLC
FIGURE 7	
USDA-RD: PER	November 2019



0.95 MGD CONCEPT PLAN

SCALE: 1" = 50'

LITCHFIELD WATER POLLUTION CONTROL FACILITY	DPC Engineering, LLC
FIGURE 8	
USDA-RD: PER	November 2019

Appendix A
WLSD WPCF Permit

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING HARTFORD, CONNECTICUT 06115

PERMIT

Woodridge Lake Sewer District
Goshen, Connecticut 06757

Attention: Mr. Russell H. Jackson
Chairman

SP: 0000179

Re: DEP/WPC-055-002
Town of Goshen
Bantam River Watershed

Gentlemen:

This PERMIT is issued in accordance with Section 25-54i of the Connecticut General Statutes, as amended. The Commissioner of Environmental Protection (hereinafter "the Commissioner") has found that the system installed for the treatment of the discharge will protect the waters of the state from pollution.

The Commissioner, acting under Section 25-54i hereby permits the Woodridge Lake Sewer District to discharge treated municipal sewage in accordance with the following conditions:

1) The wastewater shall be collected, treated and discharged in accordance with the plans and specifications approved by the Director of Water Compliance and Hazardous Substances on January 13, 1972, September 28, 1972, and January 15, 1973.

2) The discharge described in this permit shall not exceed and shall otherwise conform to the specific terms and general conditions specified herein:

A) Discharge Serial No. 001
Groundwaters in the Watershed of Bantam River
Average Daily Flow - 40,000 gallons per day

Parameter	Monthly Average Quantity	Monthly Average Concentration	Minimum Percentage Removal Efficiency
Biochemical Oxygen Demand$_5$	3.03 kg/day	20 mg/l	90%
Suspended Solids	1.52 kg/day	10 mg/l	90%

1) The discharge shall be required to meet the more stringent of the monthly average concentrations or minimum removal efficiency requirements for each parameter.

2) The monthly average quantities and monthly average concentrations specified above shall not be exceeded by a factor of 1.5 during any week.

3) The above concentrations shall apply to the filtered wastewater prior to discharge to the groundwaters.

4) The pH of the discharge shall not be less than 6.5 nor greater than 8.0 at any time.

5) The discharge shall not contain more than 0.1 milliliters per liter settleable solids.

6) The total chlorine residual of the effluent shall not be less than 0.5 mg/l nor greater than 3.0 mg/l at any time.

3) The discharge shall be monitored and the results reported to the Director of Water Compliance and Hazardous Substances before the 10th of each month according to the following schedule:

A) Influent

Parameter	Minimum Frequency of Sampling	Sample Type
Biochemical Oxygen Demand$_5$	One per Month	Composite
Suspended Solids	One per Month	Composite
Temperature	Four per Month	Grab
pH	Four per Month	Grab
Settleable Solids	Four per Month	Grab
Total Phosphorus	One per Month	Composite
Organic Nitrogen as N	One per Month	Composite
Ammonia Nitrogen as N	One per Month	Composite
Nitrite-Nitrate as N	One per Month	Composite

a) Record the total flow during the period of composite sample collection and the instantaneous flow at the time of each aliquot sample collection, and the instantaneous flow at the time of grab sample collection.

b) Any grab sample or composite sample required to be taken less frequently than daily shall be taken during the period of Monday through Friday, inclusive. Composite samples and grab samples shall be taken between 6 a.m. and 6 p.m.

B) Discharge Serial No. 001 (Effluent)

Parameter	Minimum Frequency of Sampling	Sample Type
Biochemical Oxygen Demand$_5$	One per Month	Composite
Suspended Solids	One per Month	Composite
Dissolved Oxygen	Four per Month	Grab

Parameter	Minimum Frequency of Sampling	Sample Type
Chlorine Residual	Twice per Working Day	Grab
Temperature	Four per Month	Grab
pH	Four per Month	Grab
Settleable Solids	Four per Month	Grab
Total Phosphate as P	One per Month	Composite
Organic Nitrogen as N	One per Month	Composite
Ammonia Nitrogen as N	One per Month	Composite
Nitrite-Nitrate as N	One per Month	Composite

a) Record and report on a daily basis the minimum, maximum and total flow of the discharge.

b) Record the total flow during the period of composite sample collection and the instantaneous flow at the time of each aliquot sample collection, and the instantaneous flow at the time of grab sample collection.

c) Any grab sample or composite sample required to be taken less frequently than daily shall be taken during the period of Monday through Friday inclusive. Composites and grab samples shall be taken between 6 a.m. and 6 p.m.

4) The following operational parameters shall be monitored and the results reported to the Director of Water Compliance and Hazardous Substances before the 10th of each month according to the following schedule:

Parameter	Location	Minimum Frequency of Sampling	Sample Type
Dissolved Oxygen	Each Aeration Unit	Daily	Grab
Suspended Solids	Each Aeration Unit	Daily	Grab
Sludge Volume Index	Each Aeration Unit	Daily	Grab
Temperature	Each Digestion Unit	Weekly	Grab
pH	Each Digestion Unit	Weekly	Grab
Total Solids	Each Digestion Unit	Weekly	Grab
Percent Volatile Solids	Each Digestion Unit	Weekly	Grab

a) Record the gallons of septage discharged to the treatment facility for the month.

b) Record the pounds of dry solids discharged to and removed from the solids handling system on a monthly basis.

c) Record the chlorine dosages in pounds and mg/l on a daily basis.

d) Record the number of sand filters in use and number of filters backwashed on a daily basis.

Parameter	Minimum Frequency of Sampling	Sample Type
Depth to Groundwater	Quarterly	Instantaneous Measurement
pH	Quarterly	Grab
Total Phosphate as P	Quarterly	Grab
Organic Nitrogen as N	Quarterly	Grab
Ammonia Nitrogen as N	Quarterly	Grab
Nitrite-Nitrate as N	Quarterly	Grab

6) The treatment facilities shall not be bypassed at any time.

The Water Compliance Unit Sewerage Facilities Services Section, (Telephone No. 566-2409 or 566-2373) shall be notified during normal working hours, Monday through Friday 8:30 a.m. and 4:30 p.m. and in writing within 72 hours, of each occurrence of an emergency diversion or bypass of untreated or partially treated sewage, or failure of any major component of the treatment facilities which would reduce the quality of the effluent. The report shall contain:

a) The cause of the diversion or bypass or treatment component failure.

b) The time the incident occurred and the anticipated time which it is expected to continue or, if the condition has been corrected, the duration.

c) The steps being taken to reduce and minimize the effect on the receiving waters.

d) The steps that will be taken to prevent reoccurrence of the conditions in the future.

7) The disposal of screenings, sludges and other solids or oils and other liquid chemical wastes shall be at locations approved in accordance with the provisions of Chapter 474a and/or Chapter 361a of the Connecticut General Statutes or to waste haulers licensed under Chapter 474a of the Connecticut General Statutes.

8) An alternate power source adequate to operate the treatment facility and collection system,as approved by the Director of Water Compliance and Hazardous Substances in the plans and specifications dated January 13, 1973, September 28, 1972 and January 15, 1973, shall be maintained to insure that no discharge of untreated or partially treated wastewater will occur during a failure of the primary power source.

9) No industrial wastewater or cooling water shall be discharged to the wastewater collection system.

10) No sanitary wastewater discharge from other than a single family residence shall be discharged to the wastewater collection system without obtaining a permit from the Department of Environmental Protection.

10) No sanitary wastewater discharge from other than a single family residence shall be discharged to the wastewater collection system without obtaining a permit from the Department of Environmental Protection.

11) The discharger shall submit to the Director of Water Compliance and Hazardous Substances before the 10th of each month a listing for the previous month of all new discharges authorized to be connected to the wastewater collection system.

This PERMIT is the reissuance of the PERMIT issued on November 15, 1976 under Section 25-54i and shall expire on October 16, 1982. The PERMIT shall be subject to all the Section 25-54i General Conditions dated November 3, 1975 which are hereby incorporated into this PERMIT.

Entered as a PERMIT of the Commissioner the 22nd day of December, 1977.

Stanley J. Pac
COMMISSIONER

Appendix B
WLSD Consent Order

STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COPY

STATE OF CONNECTICUT
VS.
WOODRIDGE LAKE SEWER DISTRICT

IN THE MATTER OF A CONSENT ORDER BETWEEN WOODRIDGE LAKE SEWER DISTRICT AND THE COMMISSIONER OF ENVIRONMENTAL PROTECTION

CONSENT ORDER

WHEREAS, the Commissioner of Environmental Protection (hereinafter, "the Commissioner") is charged with the responsibility of protecting the environment of the State from pollution.

WHEREAS, Woodridge Lake Sewer District maintains and operates a sewage treatment facility and owns land off Route 63 in the Town of Goshen, Connecticut.

WHEREAS, the agreement to this Consent Order and to undertake the activities herein shall not be construed as an admission of any alleged pollution by Woodridge Lake Sewer District or by its officers, directors, employees or agents.

WHEREAS, the Commissioner and Woodridge Lake Sewer District desire to protect the environment and avoid prolonged litigation.

NOW THEREFORE, it is hereby agreed that:

1) The Commissioner has jurisdiction of the subject matter herein and of the parties consenting hereto under Sections 22a-6, 22a-424, 22a-427, 22a-430, 22a-431, 22a-432 of the Connecticut General Statutes.

2) Woodridge Lake Sewer District by agreeing to the issuance of this Consent Order waives any further right it may have for an appeal on the subject of this Consent Order.

3) Woodridge Lake Sewer District agrees to implement the following to the satisfaction of the Commissioner:

   A) Establish and implement a groundwater quality monitoring program by redeveloping existing wells and installing additional monitoring wells.

   B) Develop and install a distribution system that will uniformly distribute effluent from the Woodridge Lake Sewer District treatment plant to the ridge and furrow land application system.

   C) Develop an Operation and Maintenance manual for the land application of effluent.

Phone:
165 Capitol Avenue • Hartford, Connecticut 06106

D) Investigate the hydraulic capacity of the ridge and furrow system.

4) Woodridge Lake Sewer District agrees to undertake the actions described in paragraph 3 above in accordance with the following schedule:

A) On or before June 30, 1989 submit for the review and approval of the Commissioner of Environmental Protection an engineering report which describes the proposed location and depths of groundwater monitoring wells to comply with paragraph 3(A).

B) On or before June 30, 1989 submit for the review and approval of the Commissioner of Environmental Protection a scope of study report which describes the investigations necessary to comply with paragraphs 3(B) and (D).

C) On or before August 31, 1989 verify to the Commissioner of Environmental Protection that the sampling program approved under paragraph (A) above has begun.

D) On or before September 30, 1989 submit for review and approval of the Commissioner of Environmental Protection an engineering report with plans and specifications describing the design of the distribution system to comply with paragraph 3(B).

E) On or before October 31, 1989 verify to the Commissioner of Environmental Protection that construction of the facilities approved under paragraph (D) above has begun.

F) On or before December 31, 1989 verify to the Commissioner of Environmental Protection that the construction approved under paragraph (D) has been completed and the facility is in operation.

G) On or before December 31, 1989 submit for review and approval of the Commissioner of Environmental Protection an Operation and Maintenance Manual.

H) On or before August 31, 1990 submit for review and approval of the Commissioner of Environmental Protection an engineering report detailing the hydraulic capacity of the land application system.

5) Until such time as the directives of paragraph 3(A),(B), and (C) are completed and put into service, the Woodridge Lake Sewer District shall operate and maintain the existing water pollution control facility in full compliance with Permit No. SP0000179 issued December 22, 1977 with the exception that paragraph 2 and 5 are further modified to read:

2) The discharge described in this permit shall not exceed and shall otherwise conform to the specific terms and general conditions specified herein:

A) Discharge Serial No. 001
Groundwaters in the Watershed of Bantam River
Average Daily Flow - 100,000 gallons per day

Parameter	Monthly Average Quantity	Monthly Average Concentration	Minimum Percentage Removal Efficiency
Biochemical Oxygen Demand$_5$	3.03 kg/day	20mg/l	90%
Suspended Solids	1.52 kg/day	10mg/l	90%

1) The discharge shall be required to meet the more stringent of the monthly average-concentrations or minimum removal efficiency requirements for each parameter.

2) The monthly average quantities and monthly average concentrations specified above shall not be exceeded by a factor of 1.5 during any week.

3) The pH of the discharge shall not be less than 6.5 nor greater than 8.0 at any time.

4) The discharge shall not contain more that 0.1 milliliters per liter settleable solids.

5) The above limitations shall apply to the filtered wastewater prior to discharge to the groundwaters.

5) Two groundwater monitoring wells in the vicinity of the disposal beds in use during the month shall be monitored and the results reported to the Director before the 10th of March, June, September, and December according to the following schedule:

Parameter	Minimum Frequency of Sampling	Sample Type
Depth to Groundwater	Quarterly	Instantaneous Measurement
pH	Quarterly	Grab
Total Phosphate as P	Quarterly	Grab
Organic Nitrogen as N	Quarterly	Grab
Ammonia Nitrogen as N	Quarterly	Grab
Nitrite-Nitrate as N	Quarterly	Grab

6) If any document required to be submitted to the Commissioner pursuant to this Consent Order is disapproved by the Commissioner, it shall be

6) If any document required to be submitted to the Commissioner pursuant to this Consent Order is disapproved by the Commissioner, it shall be resubmitted, with the deficiencies corrected, within 30 days of receipt of notice of disapproval.

7) Nothing herein shall at any time preclude the Commissioner from instituting any other legal proceeding to address any violation of law or to prevent or abate pollution, and nothing herein shall relieve Woodbridge Lake Sewer District of its obligations under federal, state and local law.

8) In the event that Woodridge Lake Sewer District becomes aware that it may not comply, or may not comply on time, with any requirement of this order or any document approved hereunder, Woodridge Lake Sewer District, shall immediately inform the Commissioner, and shall take all reasonable steps to ensure that any noncompliance or delay is avoided, or, if unavoidable, is minimized to the greatest extent possible. Notification shall not excuse noncompliance or delay. In so notifying the Commissioner, Woodridge Lake Sewer District, shall state the reasons for the noncompliance or delay and propose, for the review and written approval of the Commissioner, dates by which compliance will be achieved, and Woodridge Lake Sewer District shall comply with the dates approved by the Commissioner.

9) This Consent Order may be modified for cause upon the written consent of the parties, except that the Commissioner may allow additional time for compliance in accordance with paragraph 8.

10) The undersigned certify that they are fully authorized by the party or parties they represent to enter into the terms and conditions of this Consent Order and to bind legally the party or parties accordingly.

11) The terms of this Consent Order shall apply to and be binding upon the parties hereto and their successors and assigns.

12) Woodridge Lake Sewer District agrees to pay to the Department of Environmental Protection a penalty of $2,250 for failure to submit fifteen groundwater monitoring reports between 1985 and 1988, as required by the permit. Said penalty shall be paid by bank or certified check payable to the Connecticut Department of Environmental Protection, and shall reference the Consent Order No. found below and delivered to:

Joseph Wettemann
Sanitary Engineer
Department of Environmental Protection
122 Washington Street
Hartford, CT 06106

13) Any document required to be submitted to the Commissioner under this order shall be signed by a duly authorized officer of Woodridge Lake District and by the person who is responsible for preparing such document for the consultant, who shall certify as follows: "I have personally examined and am familiar with the information submitted in this document and all attachments and certify under penalty of law that based on reasonable investigation, including my inquiry of those individuals immediately responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief."

Failure to comply with this order shall subject Woodridge Lake Sewer District to an injunction and penalties under Chapters 439 and 446k of the Connecticut General Statutes. In addition, any false statement made to the Commissioner in any information submitted pursuant to this order shall be punishable as a criminal offense under Section 22a-438 of the Connecticut General Statutes or, in accordance with Section 22a-6, under Section 53a-157 of the Connecticut General Statutes.

Entered as a Consent Order of the Commissioner of Environmental Protection on this 27th day of July, 1989.

for Leslie Carothers
Commissioner

Woodridge Lake District hereby consents to the entry of this Consent Order without further notice.

BY William L. Donaldson
Its duly authorized agent

CONSENT ORDER NO. WC4856
DEP/WPC-055-002
TOWN OF GOSHEN
SENT CERTIFIED MAIL-RRR
DISCHARGE CODE Z
LAND RECORDS

MAILED TO:
WOODRIDGE LAKE SEWER DISTRICT
P.O. BOX 248
GOSHEN, CT 06756

CC: THOMAS C. WHITE
HIRAM A. TUTTLE, P.E.