

SCOPE OF SERVICES

Woodridge Lake Sewer District Facilities Plan Update December 16, 2010, Revised January 27, 2011



OVERVIEW AND PURPOSE

The Woodridge Lake Sewer District (WLS D) owns and operates a collection system and water pollution control facility (WPCF) in Goshen. These facilities serve approximately 650 existing users in an area surrounding Woodridge Lake. Approximately 150 additional lots in the District remain undeveloped of which 43 will never require sewer service.

The majority of facilities in the WLS D system were constructed in the early 1970's and, although the system has been maintained over the years, aspects of the system require modification, upgrade or replacement. The District has an outstanding Consent Order with the Connecticut Department of Environmental Protection (DEP) that was issued in 1989 that requires, as a minimum, upgrade of the WPCF effluent distribution and disposal system.

The WLS D is faced with wastewater collection and treatment facilities needs related to both disposal and system performance. The enclosed scope of services is divided into a series of tasks to provide a step-by-step framework to define the condition of existing wastewater infrastructure, determine the District's needs and identify recommended solutions.

WLS D has previously completed system assessments and planning efforts that will serve as valuable background to further facilities planning. Substantial portions of these previously prepared documents remain valid and will be updated to reflect the current regulatory requirements and technological advances available to address WLS D's challenges.

To support the immediate needs of the District in meeting its goals, W&C has been attending meetings, gathering background information and performing other related tasks. These efforts have included communication and coordination with DEP, an initial disposal field evaluation, and an initial regionalization review. The work described has been completed pending response from DEP relative to questions posed during our meeting on September 27th.

Based on our understanding of the current status of the WLS D wastewater facilities, we propose that the facilities planning effort include the following major tasks:

1. Project Development and Management
2. Meetings and Coordination
3. Define Service Area, Flows and Pollutant Loadings
4. Collection System Capacity Management Evaluation (Infiltration and Inflow)
5. Collection System SCADA System Evaluation
6. Groundwater Disposal System Evaluation
7. Treatment Facility Evaluation
8. Regionalization Alternatives Evaluation
9. Financial Evaluation
10. Public Participation Program
11. Finalize Facilities Plan Report

We have divided the project into a series of tasks that work in concert to address the various challenges facing the District. Each of these tasks incorporates meaningful coordination and interaction with WLS D volunteers and staff as well as with other key stakeholders, as appropriate.



OUTLINE OF WORK – Facilities Plan

Task 1. Project Development and Management

- 1.1 Work with WLSLSD to develop the various components of the project scope including review of previous engineering reports, site visits and meetings as necessary to review and negotiate the scope of work.
- 1.2 Provide project management of services necessary for completion of the facilities plan.
- 1.3 Provide assistance to coordinate the application for grant funding and develop and submit periodic requests for grant monies through the course of the facilities plan.

Task 2. Meetings and Coordination

Regular interaction between WLSLSD, W&C and CTDEP is critical to maintain the project schedule and develop a recommended treatment and disposal solution. Specific tasks to be performed will include:

- 2.1 Conduct biweekly meetings with WLSLSD to review project status, discuss issues related to the Facilities Plan Update and outline scheduled activities. For the purpose of estimating, 18 meetings have been assumed.
- 2.2 Prepare for and attend meetings on an approximately monthly basis with DEP and WLSLSD, as appropriate; to obtain information, request policy clarification, inform DEP on Facilities Plan Update progress and to discuss reviews of submitted materials. For the purpose of estimating, 6 meetings are assumed
- 2.3 Meet with City of Torrington staff, the Town of Goshen and other community partners, as well as other appropriate municipal officials to review the potential of WLSLSD connection to an alternate municipal Water Pollution Control Facility (WPCF) through an inter-municipal agreement. For the purpose of estimating, 6 meetings are assumed.
- 2.4 Conduct various site visits as appropriate at the WLSLSD's facilities including:
 - 2.4.1 The Woodridge Lake Sewer District (WLSLSD) Water Pollution Control Facility (WPCF) (2 visits)
 - 2.4.2 The WLSLSD WPCF disposal area (1 visit)
 - 2.4.3 The WLSLSD wastewater collection system (2 visits)

Task 3. Define Service Area, Environmental Assessment, Flows & Pollutant Loadings

Utilize available/existing information to develop background information for the Facilities Plan Update related to service area and collection system mapping and in accordance with DEP requirements for wastewater facilities planning. Develop existing flows, design flows and pollutant loadings to evaluate treatment and/or conveyance system requirements. Specific tasks to be performed include:

- 3.1 Utilize existing electronic files provided by the WLSLSD to develop mapping that defines the Woodridge Lake Sewer District service area, the location of the existing collection system and the connected and unconnected parcels in the service area. Compile mapping of the WLSLSD service area related to zoning, sensitive resources, conservation restrictions, historical districts and flood zones. Utilize this mapping to demonstrate to DEP the limits of sewer service now and in the future, how the service area relates to State Office of Policy and Management (OPM) plans of Conservation & Development and the potential for increase in wastewater flows and pollutant loadings in the service area. Local plans of Conservation & Development will be reviewed relative to the sewer service area and conflicts will be identified.
- 3.2 Determine existing flows and pollutant mass loads generated in the collection system and processed at the treatment plant from historical WPCF data in electronic format provided by WLSLSD. W&C will statistically evaluate flows and loads to define limiting conditions that correlate to relevant operational frequencies and likely permit requirements. W&C will project future flows by using existing flows and loads, adjusted to account for build-out of the sewer service area.
- 3.3 Summarize existing and proposed service area and flows/loads in the Draft Facilities Plan Update

Report.

- 3.4 Conduct limited field survey of existing service area features such as benchmarks, manholes, pump stations, treatment system tanks and topography as necessary to complete District and system mapping.



Task 4. Collection System Capacity Management (Infiltration and Inflow Evaluation)

WLS D has been active in the reduction of inflow and infiltration (I/I) through various methodologies including manhole and television inspections. W&C will review previous I/I work, conduct additional investigations to quantify the current I/I and determine a recommended course of action for further improvements. Specific task to be performed include:

- 4.1 Estimate the relative magnitude of I/I in the system sub-basins based on previous I/I investigation work documented; existing mapping information; and a review of one year of pump station data compared to existing publicly available groundwater and precipitation data. For each subarea, define the likely source (i.e. infiltration or inflow) and prioritization of the problem.
- 4.2 Review compiled manhole inspections and enter information into a database for reference.
- 4.3 Conduct additional investigation for the priority areas identified as having excessive infiltration rates, to include:
 - 4.3.1 Flow isolation at each manhole-to-manhole segment between the hours of 12 AM and 6 AM. Flow isolation efforts shall include up to 5 miles of flow isolation during high groundwater season.
 - 4.3.2 Use flow isolation results to narrow the focus of additional CCTV inspections. Conduct CCTV inspection on those pipe segments that exhibit excessive I/I rates during high groundwater season. CCTV inspection will be conducted on up to 2.5 miles of pipe.
 - 4.3.3 Develop a database of flow isolation and TV results. Database shall include a rating scale of 1-5 for pipe condition and urgency of repair. A rating of "1" shall be used for the highest priority repairs. Database shall include recommendations for rehabilitation.
- 4.4 Conduct additional investigation for the priority areas identified as having excessive inflow rates, to include:
 - 4.4.1 Smoke testing of the entire subarea and documentation of suspected inflow sources. A maximum of 5 miles is assumed for this task. One week and 24 hr. notification of residents is included.
 - 4.4.2 Dye testing of up to 25 locations in low areas, specifically residences with grinder pumps, to identify suspected inflow sources via roof drains. One week notification of residents is included.
 - 4.4.3 Building inspections in the priority inflow subareas that also meet the site conditions favorable for sump pumps. Building inspections shall include two attempts to enter up to 400 buildings. It is assumed a WLS D staff member will be present for all building inspections. One week and 24 hr. notification of residents is included.
- 4.5 Develop an electronic tracking system to document the results of the field investigations. Include specific locations (e.g., manhole number or address), defects observed, I/I observed, and recommendations.
- 4.6 Conduct a cost comparison to take into account the cost of the recommended construction and the overall costs to the District for sewer service provided through the following treatment alternatives and make recommendations for the best alternative based on long-term costs and environmental factors consistent with the overall goals of the District:
 - 4.6.1 An upgraded WPCF with groundwater recharge
 - 4.6.2 Torrington WPCF



- 4.7 Develop long term capacity management, operation and maintenance (CMOM) plan that will systematically identify and reduce I/I in the system, aid in tracking SOPs, and streamline records management to track future O&M of the system.
- 4.8 Incorporate the Collection System Capacity Management Evaluation into the Draft Facilities Plan Update Report.
- 4.9 The I/I scope is based on the following assumptions:
 - 4.9.1 Adequate mapping in electronic format is available to develop a system segregation plan.
 - 4.9.2 Not all subareas will be investigated for infiltration and/or inflow. As assessment of the priority areas will be made prior to the beginning of each stage of field work.
 - 4.9.3 Limits on work amounts are presented to give an estimate of level of effort. Some investigatory techniques may be adjusted in scale, based on field condition, with the agreement of the owner.
 - 4.9.4 Smoke testing, flow isolation, CCTV, and dyes testing assume a 95% access rate. Building inspections assumes a 50% interior access rate.
 - 4.9.5 Access to roof drains is available from ground level or with the assistance of a short ladder.
 - 4.9.6 Building inspections will be conducted by a two-person crew at all times. One crew member will be WLSO staff.

Task 5. Collection System Supervisory Control and Data Acquisition (SCADA) System Evaluation

The existing collection system serving the WLSO does not include communication between the pumping stations and a central communications hub such as at the WPCF. A SCADA system can provide real-time information to more effectively manage and monitor I/I removal efforts as well as to improve system monitoring and improve staff response time. A SCADA assessment will serve as the first step to determine the appropriate extent of SCADA system improvements and will include:

- 5.1 An assessment of existing conditions to determine instrumentation and equipment monitoring requirements at each site.
- 5.2 Development of improvements at each remote site
- 5.3 Evaluate of alternatives to develop a communications system network that will serve as the backbone of the SCADA System.
- 5.4 Conduct radio path study to determine the potential for wireless communications between the key collection system sites
- 5.5 Incorporate the SCADA System evaluation and recommendations into the Draft Facilities Plan Update Report.

Task 6. Groundwater Disposal System Evaluation

The Nathan L. Jacobson & Associates, Inc. (NLJ) report indicated that the WLSO disposal system was not adequate to handle the flows from the water pollution control facility. This is a fundamental area of concern for the CTDEP around which many of the state's facilities improvement requirements are based. W&C will verify the methodology and results of the NLJ investigations and perform a load test to more definitively determine the capacity of the existing disposal field.

If the current disposal system is determined to be inadequate, WLSO will need to find an alternate wastewater disposal scheme. Through our initial investigations, we have identified a possibility that a high conductivity zone (high K zone) may be found in the column of geological materials. This zone may exist at the interface of the bedrock and the overlying glacial till. Typically, such a high K zone is composed of a sandy layer at the bottom of the till and a highly fractured layer at the top of the bedrock. Presence of a highly permeable layer with a high K zone offers the potential location to discharge treated effluent that is not limited by the overlying till soils. If we find this high K zone, we will be able to discharge significant flows at the site. A field investigation is required to better understand the surficial geology at the disposal site, identify a high K zone, and determine the existing capacity for the disposal field to accept flow. W&C will

utilize existing and newly acquired information to develop a recommended approach to disposal system improvements at the Brush Hill site, which will meet DEP requirements in a cost-effective manner for the District. DEP will receive updates during each phase of field testing and will be notified in advance of field work. Specific tasks to be performed will include:



- 6.1 Review previously collected information including regional scale geologic mapping. Existing mapping will be confirmed via focused field verification (one site walk with two geologists) in preparation for a subsequent field exploration program. Collect and review data from recently installed rain gauge.
- 6.2 Comprehensive review of the data in the original design report and the subsequent NLJ Report. This review will include a detailed cross-check of the subsurface reports, identification of the test locations, review of available field investigation reports and evaluation of the numerical testing results (K values). This review will result in an understanding of the basis for NLJ conclusions and a validation/invalidation of the NLJ opinion of the existing site capacity.
- 6.3 Develop a site map of the till thickness from existing data called an "isopach map": The isopach map will comprise contours with lines of equal thickness of soils over the site's bedrock. The isopach map will be used to select locations for test pit exploration and identify potential relationships between the presence and conductivity of any high K zone and the thickness of the till cover.
- 6.4 Interview District operators to develop a clear understanding of the nuances of the disposal system operation and historical incidents of failure (if any are known). Once the field operation is clearly understood, we will design a load test that will determine the actual capacity of the disposal system. The load testing approach will be submitted to DEP for review and approval prior to implementation. Testing will take place during periods when seasonal high groundwater conditions typically occur.
- 6.5 Set staff gauges and transducers in the beds (an estimated 20-30 staff gauges will be utilized) to determine water levels before, during and after the loading tests both under and down gradient of the beds being tested. Survey control of these staff gauges will be captured in a subsequent task. Work with WLSO operations staff to prepare the beds, which will likely include scraping of the beds to remove vegetation and organic material.
- 6.6 Conduct field flow tests on the WLSO disposal system during seasonal high groundwater conditions. Selected beds will be isolated to most effectively determine the loading capacity of each component of the field. Four discrete load tests will be performed for 48 hours or until groundwater mounding equilibrium is reached. Collect data, photo-document the test conditions and take various field measurements. Field load tests that exceed 48 hours in duration will utilize WLSO staff to assist with groundwater monitoring.
- 6.7 The field test data will be compiled, analyzed, graphics will be developed and an opinion of actual hydraulic loading capacity of the field will be determined. This information will be incorporated into the Draft Facilities Plan (Task 6.13).
- 6.8 Develop a detailed approach for subsurface investigations and field testing (i.e. plan of exploration). The plan will be designed to evaluate subsurface hydraulic conductivity and associated potential for groundwater disposal of treated effluent. This detailed approach will be submitted to CTDEP in advance of initiating field investigations. One meeting with CTDEP is anticipated to review and fine-tune the plan of exploration.
- 6.9 Upon CTDEP concurrence, conduct three days of test pit exploration (we anticipate a minimum of eight test pits, more if time allows) to determine the presence of a highly conductivity zone (i.e. high K zone). We will install well pipe in test pits prior to backfill so we can perform groundwater and/or water quality sampling at a future date. Perform four days test borings and borehole pressure tests to confirm if this layer has the ability to accept and transmit significant quantities of wastewater. If possible, MBE/WBE subcontractors will be used for equipment rental and/or drilling.
- 6.10 Perform hydraulic conductivity testing of soil layers that exhibit favorable hydraulic capacity during periods when seasonal high groundwater conditions typically occur. The hydrogeologic evaluation program will utilize the test pits and borings to establish the extent of a conductive soil layer across the site. Conduct one or more extended loading tests to simulate wastewater disposal and verify the



capacity of the new disposal option. WPCF staff may be required to support the loading test efforts.

- 6.11 Conduct field survey to determine the locations and elevations of the field exploration sites. This will include horizontal and vertical survey of test wells, test pits and test borings locations as well as the elevation of the surface water in the adjacent Bantam River. This information will be required in the preparation of future site maps and reports.
- 6.12 Commence regular field measurement of groundwater elevations prior to field testing. Field measure and analyze the groundwater levels in the monitoring wells on two separate occasions during testing. This information will be utilized in the hydrogeologic analysis of the new disposal option.
- 6.13 Prepare written documentation to include in the Draft Facilities Plan documenting the field investigations, analysis and recommendations of the subsurface investigation program. The written documentation will also include cost estimates for each recommendation.

Task 7. Treatment Facility Evaluation

The WLSD has performed an Engineering Study of wastewater collection, treatment and disposal alternatives. This study was submitted to DEP in March 2005 and included an evaluation of implementing either a new Sequencing Batch Reactor (SBR) facility or a Single Sludge Two Stage Modified Lutzack-Ettinger (MLE) treatment system. W&C will perform a detailed review of the previously evaluated treatment systems, update the projected costs and identify and evaluate up to three (3) additional alternative systems capable of achieving the proposed treatment limits. Evaluation of wastewater treatment alternatives will include:

- 7.1 Identify document effluent permit requirements based on regulations, recent discussions with DEP staff and information determined during Task 4.
- 7.2 Evaluate components of existing treatment system to determine ability to incorporate into upgraded facility.
- 7.3 Conduct process sizing of alternatives to upgrade the liquid and solids processing capacity of the facility for the discharge requirements identified during Task 4. Layout drawings and schematics of viable alternatives will be developed and incorporated into the Draft Facilities Plan Update.
- 7.4 Develop a electronic process model of the WPCF liquid treatment system.
- 7.5 Identify improvements necessary to upgrade the SCADA system at the WPCF
- 7.6 Identify existing and potential sources of odor generation at the WPCF and evaluate viable odor control alternatives.
- 7.7 Develop capital and life cycle costs of the viable treatment alternatives. Life cycle costs, including capital, operating, and maintenance and financing costs will be incorporated into the economic evaluation of alternatives.
- 7.8 Evaluate and develop a recommended staffing plan for the treatment and/or conveyance systems using recognized standards and our experience operating similar facilities.
- 7.9 Incorporate the treatment process evaluation, financial evaluation and recommendations into the Draft Facilities Plan Update Report.

Task 8. Regionalization Alternatives Evaluation

The February 2005 Engineering Study identified three options for tying into the City of Torrington sewer system. The evaluation of regionalization options will include:

- 8.1 Review the Torrington connection options, evaluate if any alternative connections are warranted (including Litchfield), update the costs and perform a life cycle cost analysis (LCA) that quantifies the capital, operations and maintenance costs associated with long-term operations of a regional solution.
 - 8.1.1 Develop information regarding incidental costs that may be incurred as a result of interconnection, such as heightened I/I removal requirements imposed by the Torrington WPCA and staffing requirements associated with continued collection system operation.



- 8.1.2 Incorporate the evaluation of regional connection options, financial evaluation and recommendations into the Draft Facilities Plan Update Report. The evaluation of regionalization options will be compared to the disposal system and treatment upgrade alternatives in the Draft Facilities Plan Update Report.
- 8.1.3 Contact the Town of Goshen and other community partners to understand their current wastewater needs, current inter-municipal agreements, and other regionalization options as may be appropriate.

Task 9. Financial Evaluation

W&C will evaluate the financial aspects of the various alternatives for wastewater collection, conveyance, treatment and disposal on a life-cycle basis to determine the recommended plan of improvements and assist WLS D in developing a financing plan to fund the recommended improvements.

- 9.1 Work with the WLS D to identify federal and state offsetting funding programs that can be leveraged to support the recommended system improvements.
- 9.2 Develop a separate funding memorandum that summarizes various funding options with an assessment of the likelihood of success of accessing each funding source. The memorandum will include a summary of project delivery strategies and recommendations on the optimal delivery methodology. The document will also include a recommended phasing plan designed to provide the WLS D the best chance of succeeding to deliver the entire project with the maximum offsetting funding.
- 9.3 Facilitate a follow-up meeting with the WLS D team to present the funding memorandum and strategize on how to proceed. Key funding agency contacts and meetings, as appropriate, will occur during the facilities planning process. Filings that may be required during the facilities planning process for project design and implementation will be prepared for District submission.

Since the funding requirements will be entirely dependent upon the capital approach (in-District vs. intermunicipal) that the WLS D adopts, this work must be scheduled to occur at key milestones during the facilities planning, at which time the technical details will likely be set. Since the financial picture is critical to ensuring the fundability of a technical solution, this task will likely need to occur prior to the facilities plan being finalized and endorsed by DEP.

Task 10. Public Participation and Education Program

W&C will assist WLS D to conduct a public participation and education program to inform the taxpayers of the history and current operation of wastewater facilities as well as the development and presentation of recommended improvements. Specific tasks to be performed will include:

- 10.1 Assist WLS D conduct three public meetings to present the facilities planning process and inform and educate the public and solicit input about project alternatives, costs, offsetting agency contributions and local share alternatives. The public meetings will also present the components of the recommended plan.
- 10.2 Assist WLS D conduct a public hearing to present the Draft Facilities Plan and obtain formal public comments in accordance with state public hearing requirements.
- 10.3 Present the Draft Facilities Plan to local commissions as appropriate. These commissions may include Planning and Zoning, Inland Wetlands and Water Pollution Control Authority
- 10.4 Incorporate a summary of the public participation process into the Draft Facilities Plan Update Report

Task 11. Finalize Facilities Plan Report

W&C will work with WLS D and DEP to address comments to the Draft Facilities Plan Update Report and issue the Final Facilities Plan Update Report.

Summary of Fees:

The following is the preliminary breakdown of fees and expenses associated with each of the facilities planning tasks:



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| 1. Project Development and Management | \$15,000 |
| 2. Meetings and Coordination | \$44,000 |
| 3. Define Service Area, Flows and Pollutant Loadings | \$33,500 |
| 4. Collection System Capacity Management Evaluation | \$194,000 |
| 5. Collection System SCADA System Evaluation | \$27,000 |
| 6. Groundwater Disposal System Evaluation | \$98,000 |
| 7. Treatment Facility Evaluation | \$44,000 |
| 8. Regionalization Alternatives Evaluation | \$37,500 |
| 9. Financial Evaluation | \$18,500 |
| 10. Public Participation Program | \$36,500 |
| 11. <u>Finalize Facilities Plan Report</u> | <u>\$15,000</u> |
| TOTAL | \$563,000 |