WRIGHT-PIERCE
Engineering a Better Environment

Water
Wastewater
Infrastructure

November 30, 2015
W-P Project No. T10699

Mr. Anthony T. Plante, Town Manager
Town of Windham
8 School Road
Windham, ME 04062

Subject: Proposed Scope and Fee
Wastewater Management Planning

Dear Mr. Plante:

Thank you for the opportunity to meet with you and the Wastewater Management Planning Advisory Committee (WWMPAC) on November 4, 2015 to discuss a scope of work for advancing the important task of wastewater management planning for the Town of Windham. Since our meeting, we revised our proposed scope of service for the wastewater management planning study (Rev 2) and emailed that revised scope to the WWMPAC for review on November 13, 2015.

We have also been in contact with Robert Gerber (now affiliated with Ransom Consulting, Inc.) and he/they are interested in contracting directly with the Town to provide hydrogeological consulting services to support this project as described in the Wright-Pierce scope and as further detailed in the Ransom Consultants proposed scope.

Attached to this letter, please find the following:

1. Wright-Pierce Wastewater Management Planning Scope, Town of Windham, Maine, November 25, 2015 (Revision 3)
2. Ransom Consultants, Inc. Proposed Scope for Windham Wastewater Study

For Item 1 above (Wright-Pierce services), we would suggest a lump sum fee of $49,000 for Tasks 1A through 1M and another lump sum fee of $15,000 to complete Tasks 2A through 2E (total of $64,000 for Tasks 1A through 2E). For Task 3, we would suggest the Town budget a range of $25,000 to $40,000. The cost for Task 4 could vary widely depending upon the number of sites to be investigated, and the findings of the specific evaluations. We would suggest that the Town establish a preliminary budget of $50,000 to $75,000 for this effort for Wright-Pierce services. Completion of Task 4 will also require additional funding for hydrogeological services.

For Item 2 above (Ransom services), we would recommend that the Town contact Robert Gerber (robert.gerber@ransomenv.com) and Nicholas Sabatine (nsabatine@ransomenv.com) at Ransom ((207) 772-2891) and request a contract with a final scope and fee for Ransom Tasks 1 through 4 which Ransom

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has estimated at $14,000. In the future, the Town could enter into a contract amendment for Ransom Tasks 5 through 6 (estimated fee varies from $3,200 for one site up to $13,200 for six sites), and Phase 2 (Ransom terminology) work (cost TBD).

We have prepared the table below to summarize the estimated costs.

W-P Tasks	Ransom Tasks	Wright-Pierce Fee	Estimated Ransom Fee[(1)]	Total Estimated Fee
1A-1M	1-4	$49,000	$14,000	$63,000
2A- 2E	5-6	$15,000	$13,200[(2)]	$28,200
3A-3F	N/A	$25,000 to $40,000	N/A	$25,000 to $40,000
4A-4F	Phase 2	$50,000 to $75,000	TBD[(3)]	TBD[(3)]

1. As noted in the Ransom Proposed Scope, costs for meetings have not been included in the estimated fees
2. Assumes 6 sites to be evaluated
3. Fee estimate to be confirmed after W-P Task 3 is completed.

If you have any questions or comments, please let us know. It is our desire to provide meaningful services to the Town of Windham and we are, of course, willing to adjust scope and fee to meet your objectives and budget constraints. If it would be helpful, we can prepare a draft agreement for Tasks 1A through 1M and 2A through 2E for your review and presentation to the Town Council. We are also willing to be present at the Town Council meeting to answer any questions.

Sincerely,

WRIGHT-PIERCE

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CAD/NPC/cad
Attachments

Wastewater Management Planning Scope
Town of Windham, Maine
Prepared by Wright-Pierce
November 25, 2015 (Revision 3)

BACKGROUND

Several years ago, the Town of Windham developed a program to provide sewer service to the North Windham Route 302 corridor, Regional School Unit (RSU) #14 in Windham Center, and its surrounding areas, with transport of approximately 700,000 gallons per day (gpd) of wastewater (Phase 1) to the Portland Water District wastewater treatment facility in Westbrook some 14-15 miles distant. The program also forecast considerably higher flows in future phases to accommodate build-out in the service area. In November 2012 voters strongly rejected this program, primarily based on cost ($37.8 million).

The Town now seeks to develop a smaller-scale project to serve the North Windham study area. The overall goals are to protect the local groundwater aquifer and to enable more concentrated development in the area. Many basic planning issues must be addressed to ensure that the project addresses documented needs, makes use of appropriate treatment and disposal sites and is cost-effective.

OVERVIEW

Wastewater planning typically involves the following steps:

1. Assessment of needs
2. Identification and evaluation of alternatives to meet the needs
3. Formulation of a recommended plan for implementation

1. ASSESSMENT OF NEEDS

Task 1.A. Assemble and review all prior reports and information that are relevant to the current effort. Discuss past work in kick-off meeting with the Wastewater Management Planning Advisory Committee (WWMPAC).

Task 1.B. Acquire from the Town Assessor a geo-referenced database of information for each property in the study area. Data will include address, lot area, date of building permit issuance, nature of development (residential, commercial, public, etc.), size of facility (e.g., number of bedrooms, square feet of commercial area), properties on private wells, etc.

Task 1.C. Town to obtain water use records from the Portland Water District (PWD) for all properties in the study area that are served by public water. The records will cover the most recent 3 years of water use. W-P will review the data and adjust for anomalies. For properties relying on private wells, W-P will estimate their water used based on the average usage of similar properties on public water. W-P will develop a spreadsheet-based summary of water use data for each property including annual and quarterly averages. The Town will input the summarized PWD water usage records into the geo-referenced GIS database.

Task 1.D. Utilizing GIS, summarize current overall water use in the study area into the following categories:

- Single-family residential—2 bedroom
- Single-family residential—3 bedroom
- Single-family residential—4 bedroom
- Multi-family residential—5 and fewer units
- Multi-family residential—6 and more units
- Commercial—restaurant
- Commercial—retail
- Commercial—office
- Commercial—lodging
- Other categories as appropriate.

Estimate the total water use by category and the average per-lot water use by category and unit flow (e.g., gpd/ft^2).

Task 1.E. Estimate the consumptive water use for each category of land use (the amount of water used on the property that does not become wastewater, such as water used for irrigation, car washing, etc.). Estimate the current wastewater generation rate for each property in the study area by subtracting the consumptive use from the total water use. Using GIS, prepare a map that shows the intensity of wastewater generation across the study area (e.g., gpd/acre).

Task 1.F. In collaboration with the Town Planner and Windham Economic Development Corporation with respect to development trends and current and possible future zoning, use the data generated in the previous tasks to project future water use and wastewater generation rates for the study area. Consider both vacant land development and the re-development of properties where development is now constrained by the need for on-lot septic systems. Create a GIS-based map of projected future wastewater flow by "sewershed". (It may be advisable to consider more than one future scenario, including one that assumes continued on-lot wastewater disposal, satellite treatment at a remote location, and a combination of these alternatives.)

Task 1.G. Work with the Town's hydrogeologist to review past work to determine the extent of the groundwater aquifer in North Windham and to summarize historic water quality data. In collaboration with the Town and its hydrogeologist, establish an acceptable concentration of groundwater nitrogen.

Task 1.H. Estimate the nitrogen loads associated with current on-site wastewater disposal. Allowances will be made for other anthropogenic nitrogen sources such as lawn/garden fertilization and storm water disposal, as well as atmospheric nitrogen in precipitation. Provide nitrogen loading estimates to the hydrogeologist to be used to correlate nitrogen loads to nitrogen concentrations in the aquifer. The Town's hydrogeologist will use this information to establish the maximum allowable nitrogen load from the study area that allows the groundwater nitrogen concentration to stay below the threshold concentration.

Task 1.I. Work with Town officials to determine if there are properties in the study area with deficient on-site wastewater disposal system that require action regardless of nitrogen loading issues. Those systems may be considered "deficient" if they do not provide adequate protection of the public health, if they are subject to excessive repair costs or septage pumping cost, or are otherwise problematic to the owners or neighbors.

Task 1.J. Estimate the current and futures volumes of wastewater that require management for nitrogen removal and/or off-site disposal in order to protect aquifer quality and/or to facilitate desired growth density. Prepare a GIS-based map that shows the location of the wastewater flow requiring management. Segment the study area into potential sewersheds.

Task 1.K. Prepare a concise report to document the methodology and findings of Tasks 1.A through 1.J. Review a draft of that report with the WWMPAC and make appropriate modifications based on committee comments.

Task 1.L. Participate in a Town Council workshop session to present the draft report and solicit comments, and gain consensus on the assessment of needs.

Task 1.M. Incorporate comments into a final needs assessment report.

2. DEVELOP NITROGEN CONTROL ORDINANCE AND IDENTIFY TREATMENT ALTERNATIVES, LAND-BASED DISPOSAL ALTERNATIVES AND POSSIBLE DISPOSAL SITES TO MEET THE NEEDS

Task 2.A. Conduct meeting with MEDEP to review the needs assessment report, and the proposed scope of study for the remainder of the project. This meeting will also provide an opportunity to review regulatory issues associated with the full range of alternatives under consideration.

Task 2.B. Obtain example nitrogen control ordinances from other communities and develop a draft ordinance for consideration by the Town of Windham.

Task 2.C. Based upon the identified needs for nitrogen mitigation and anticipated flows and loads, conduct a screening level evaluation of source control nitrogen removal treatment systems that are suitable for both cluster systems and on-lot nitrogen removal including, but not limited to:

- Membrane bioreactors (MBRs)
- Sequencing batch reactors (SBRs)
- Rotating biological contactors (RBCs)
- Conventional activated sludge
- Amphidrome
- Bioclere
- SeptiTech and FAST (subsidiaries of Bio-Microbics)
- Nitrex
- Recirculating sand filters.

Screening criteria will include capital and O&M costs per gallon of wastewater treated (life cycle costs), constructability, reliability, ease of operations, expandability, potential for odors, etc.

We will also review and screen emerging groundwater remediation technologies and their feasibility to address the Windham needs (e.g., permeable reactive barriers, enhanced in situ biological denitrification, etc.).

Task 2.D. Based upon the location of wastewater generation determined in the needs assessment, identify parcels of land potentially suitable for land-based effluent disposal systems. Initial screening will be conducted using readily available information on parcel availability (public and private), zoning restrictions, proximity to areas with elevated levels of nitrogen in groundwater/surface water, past geological and hydrogeological investigations, and information on surface and subsurface geology. W-P will review and

interpret guidance from the Town's hydrogeologist on the most and least favorable areas for wastewater disposal. Identify up to six sites.

Task 2.E. Based upon results of Task 2.D, conduct a screening level evaluation of various land-based disposal systems including but not limited to subsurface leaching, rapid infiltration, spray irrigation, drip dispersal, and wicks for suitability at each location with respect to soils, land area available, aesthetics, anticipated effluent flow for disposal, regulatory acceptability, construction cost, O&M cost, etc. Select up to three options for further evaluation.

3. EVALUATION OF TREATMENT, COLLECTION AND LAND-BASED DISPOSAL ALTERNATIVES AND DEVELOP PRELIMINARY RECOMMENDED PLAN

Task 3.A. Based upon results of Tasks 2.C – 2.E above, develop conceptual plans for location(s) of cluster system(s) to meet the needs for nitrogen removal or displacement, for the areas targeted for concentrated development.

Task 3.B. Evaluate collection system options and feasibility. Consider proximity of areas to be served with proposed cluster system and potential effluent disposal locations (Task 2.D). Develop conceptual layout of possible gravity sewers, low pressure sewers pump stations and force mains. Develop planning level cost estimates for each option.

Task 3.C. Conduct a workshop meeting with the WWMPAC to review the collection system, treatment system and effluent disposal options and regulatory measures with the goal of establishing a "short list" of the most promising alternatives, i.e., composite plans made up of various combinations of structural facilities (e.g., collection, treatment, disposal) and regulatory controls. Example composite plans could include:

- All private on-site mitigation through non-structural measures (e.g. nitrogen reduction ordinance)
- Multiple independent cluster (collection/treatment/land-based disposal) systems
- Single collection system and treatment facility and one or more disposal locations

The WWMPAC will decide if further input is required from the Town Council, other committees or the public.

Task 3.D. Based upon screening level evaluation of alternatives and the results of Task 3.C, perform a more detailed evaluation of alternatives with the goal of developing a recommended structural and non-structural (regulations) plan for consideration by the WWMPAC. Defined criteria for the evaluation will be established with input from the WWMPAC, and monetary and non-monetary scoring criteria will be established to guide

W-P and WWMPAC to the preferred solution. Capital, O&M and life cycle cost estimates will be developed for the recommended plan.

Task 3.E. Conduct a workshop meeting with the WWMPAC to review the evaluation and the preliminary recommended plan. The WWMPAC will decide of further input is required from the Town Council, other committees or the public.

Task 3.F. Arrange for and attend meeting with Portland Water District staff to present the findings of the evaluation and the anticipated plan for management of wastewater in Windham. Discuss PWD's interest in owning, operating and/or maintaining public infrastructure, assuming that is recommended, including gravity sewers, pump stations, force mains, treatment units and effluent disposal systems. Discuss procedures required for charter revisions should PWD not be interested in ownership and operation of any public wastewater systems in Windham.

4. RECOMMENDED IMPLEMENTATION PLAN

Task 4.A. Based upon results of Task 2.D, coordinate with the Town's hydrogeologist to conduct preliminary field investigations to ascertain soil permeability/percolation rates and the depth to groundwater in the most promising sites based upon the needs identified in the needs assessment. Field investigation work to be completed by the Town's hydrogeologist – costs for this work not included in this scope. Field work on three sites assumed.

Task 4.B. Review results of hydrogeologist's preliminary field work and incorporate results into the recommended plan. Meet with MEDEP to review recommended plan and hydrogeological data, and to determine regulatory requirements. Estimate scope and cost to perform more detailed hydrogeologic field investigation and modeling necessary to confirm feasibility and support discharge permitting.

Task 4.C. Based upon previously conducted work, prepare a recommended wastewater management plan that will include, at a minimum, the following:

- Plan details and anticipated costs
- Local ordinances and administration requirements to support the plan
- Additional consultation with other entities having jurisdiction (i.e., Portland Water District)
- Public or private ownership, or combination of both
- Public/private funding options
- External project funding options and funding scenarios for ranges of possible grant and loan terms that may be anticipated.

- Internal funding options including user fees, general taxation, connection fees, betterment or other special assessments, etc.
- Permitting plan

Task 4.D. Present the draft recommended plan to WWMPAC for review and comment.

Task 4.E. Update draft recommended plan and present to Town Council. Based upon feedback from Town Council, update plan and submit to Maine DEP for review.

Task 4.F. Prepare final report, and identify plan for public approval of any necessary funding to advance the wastewater management plan for Windham.

Ransom Proposed Scope for Windham Wastewater Study

Task	Ransom Data Requirements	Ransom Scope, Deliverables, and Estimates
Task 1: Compile and update all past data on water quality and water table elevation in the North Windham aquifer. Issue a brief memorandum summarizing current status, with emphasis on groundwater concentrations of nitrogen species and contaminants related to road de-icing (chloride, specific conductance, etc.)	Any town collected water quality data, geologic logs, location maps, and water quality logs.	Ransom will collect any new USGS data not in our database to add to our database. We will add town data to our database, and provide a summary report which will include "plume" maps of the aquifer. $4,000
Task 2: Develop a watershed map to define the extent of the North Windham aquifer as it relates to the wastewater planning study area. Show the existing aquifer protection overlay district and explain its relevance to the wastewater study.	Identification of study area. Which areas are they concerned about for water quality? Which area would we look at for potential disposal sites? We will require the most recent town zoning shapefiles.	Ransom will provide groundwater contour maps and flowlines so they can understand the direction of movement through the study area. This will be done without any new calibration, using only the existing model, which we will need to "resurrect" and overview. $5,000
Task 3: Establish the threshold concentrations of nitrate in the aquifer that will be used to determine if nitrogen loading should be controlled and the degree to which it should be controlled.		Ransom has already made a recommendation to manage the nitrate water quality in the aquifer to an average of 5 mg/L. No cost unless the town wants an elaborate justification of this.
Task 4: Working with the Town's wastewater engineer, relate the historic increases in groundwater nitrate concentrations with the historic increase in nitrogen loading from on-site disposal wastewater in the study area. Use this analysis to establish	Ransom will need the location and average flow rates (or at least design flow rates) for the major sources, like the big stores and restaurants.	This will require sensitivity modeling with the aquifer model. We will derive what the nitrate load was that reached the water table at each location. Ransom will determine how many mg/L of nitrate reaches the water table. $5,000

an allowable nitrogen loading to protect the aquifer.		
Task 5: Identify locations within or near the study area where effluent disposal of treated wastewater are most preferred, and identify those areas where effluent disposal are to be avoided.	Part I: Identify locations of all private wells in the study area. Part II: of the areas Ransom identifies for large in-ground systems, which ones would the town make an effort to obtain through eminent domain or purchase.	Part I: Ransom will set up a 300' radius in GIS around private wells. Using model results of flow directions and understanding of dilution rates in those areas, Ransom will predict where we think it is possible to locate large in-ground systems, not considering real estate availability. Part II: for the areas that the town requests us to review, Ransom will perform dilution and mounding simulations. Ransom will generate plume maps and graphs with predicted concentrations with time assuming existing sources are removed and the new disposal area is added. $2,000 for each area.
Task 6: Identify areas in or near the study area where soils and depth-to-groundwater are amendable to disposal of treated wastewater.		Ransom will generate an unsaturated zone isopach map. Ransom will map available soils data (from NRCS soils map and wetlands data, surficial geology, and U.S. Fish and Wildlife) to locate suitable soils. $1,200
Phase 2: Conduct evaluations of specific sites for effluent disposal facilities to allow the wastewater engineer to select disposal technologies and to establish design loading rates.		Part I: Ransom will drill borings, install piezometers, conduct in-situ permeability testing, and take background water quality samples. Ransom will take sand samples of saturated and unsaturated zone and do sieve analysis to get permeability correlated with grain size. Part II: Ransom will recalibrate the groundwater model with new local data and simulate one or more designs of the disposal area to determine both final mounding and plume characteristics. We will not estimate the cost of this until we know how large an area we are considering.

Note: Costs for meetings have not been included within this table and will be billed at using our standard Fee Schedule under our regular Terms and Conditions.