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**Orange County Decentralized  
Wastewater Demonstration  
Project**

**Draft Workplan**

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## **INTRODUCTION**

This draft workplan is intended to cover the entire project, with the exception of the Start-up tasks and Mountain Lodge Park study, which were covered under Stone's original contract with OCWA. The workplan includes services performed by Stone Environmental and its subcontractors (Stone Team) as well as the Orange County Water Authority (OCWA) and municipal partners. Many of the tasks described require coordination among the Stone Team, OCWA, the Village of Greenwood Lake, and the Town of Warwick. This workplan has been developed from the perspective that all of these entities are part of a common Project Team. Based on discussions to date, certain tasks are assigned to OCWA, where OCWA's involvement is critical to the success of the project. These tasks are also listed separately in the section titled "Tasks Led or Assisted by OCWA and Municipal Partners".

This workplan includes the required elements of OCWA's agreements with the Environmental Protection Agency (EPA) and the New York State Energy Research and Development Authority (NYSERDA). The workplan describes the detailed tasks to carry out the two grant agreements and provides a structure that should be useful to all project partners. The first task described by this workplan is Task 4, project management and grant administration. Tasks 1-3 relate to project start up and to the Mountain Lodge Park assessment, which were described in Stone Environmental's contract with OCWA.

## **TASK 4. PROJECT MANAGEMENT AND GRANT ADMINISTRATION**

### **4.1/4.2 2008/2009 Project Management and Grant Administration**

Stone Environmental will provide project management. Stone's project management will include applying reasonable standards of quality and care in performance of tasks conducted by Stone and its subcontractors, tracking costs incurred by Stone and its subcontractors and managing these within the allocated funds, tracking progress against a schedule of tasks (attached), communicating project status to OCWA, working cooperatively with OCWA to implement changes to this workplan as required and resolve any conflicts that may develop in the course of the project, and managing performance of contract obligations in furtherance of OCWA's best interests.

Grant administration will be the responsibility of OCWA. OCWA will prepare requests for reimbursement for submission to EPA Region 2 and NYSERDA. OCWA will process invoices for services and expenses submitted to it by Stone Environmental and firms hired by OCWA to provide labor and materials for construction of wastewater treatment demonstration systems. OCWA will track matching funds and in-kind services contributed by municipal partners, as well as its own funds and services offered in furtherance of the project. OCWA will negotiate any necessary contract amendments or time extensions with the funding agencies.

### **4.3 NEPA/SEQR Compliance**

In the NYSERDA/EPA project kick-off meeting held November 14 in Goshen, NY, representatives of NYSERDA, EPA, and OCWA offered assistance in preparing filings or providing legal review to meet the requirements of NEPA and SEQR. The EPA representative offered assistance in preparing a filing under NEPA. The NYSERDA representative stated that NYSERDA may have previously made a State Environmental Quality Review (SEQR) determination relative to this project, but this was not definite, and she offered to forward any related documents to OCWA. The Acting Director of OCWA indicated that the Orange County Law Department could review the SEQR requirements and assist in making a determination about the applicability of SEQR in this project. OCWA, with any assistance required of the granting agencies and other departments of Orange County, will initiate and oversee any tasks required to comply with NEPA and SEQR. The Stone Team will assist OCWA by providing appropriate supporting documents, as requested.

## **TASK 5. ASSESSMENT AND PLANNING**

### **5.1 Greenwood Lake Wastewater Needs Assessment**

The needs assessment will consist of two steps: 1) a data-driven needs analysis using GIS, and 2) a targeted needs assessment, which will result in the selection of three potential demonstration sites.

The needs analysis will involve manipulation of spatial data layers in a GIS environment to define parcels lacking adequate area or site conditions for wastewater dispersal. GIS data layers used in the analysis will include parcels, building footprints, aerial imagery, topography, soils, stream networks, and other data layers. System inspection data from the Village of Greenwood Lake's septic information management database will be linked to the parcel data.

GIS tools will be used to analyze existing parcels for suitable onsite wastewater system area. Mandated setbacks from lakes, wetlands, streams, steep slopes (>25%), property lines, wells, and existing features (e.g., building footprints) will be subtracted from total parcel areas to yield a calculated available area.

Known soil properties will yield long-term acceptance rates for each soil type in the study area using NRCS soils data and rates listed in the state and local regulations. Onsite system design assumptions using the effluent loading rates and typical design properties will yield appropriate onsite system construction area estimates for each parcel.

For each parcel in the assessment area, the available area will be compared to the area required for wastewater dispersal. Parcels on which the available area is less than the required area will be identified as "area limited". Parcels will be identified as being unconstrained by area when the available area is greater than or equal to the required area.

Additional GIS analysis will be conducted on developed and undeveloped parcels to determine relative suitability for onsite wastewater treatment. Soil properties, topography, depth to seasonal

high groundwater, and depth to bedrock will be used to identify areas with one or more limiting factors.

The data-driven needs analysis will aid in the identification of potential demonstration sites. In conjunction with the evaluation of appropriate wastewater treatment technologies (Task 6.3), the needs assessment will also serve as the basis for the Greenwood Lake Wastewater Management Plan (Task 12) by providing a parcel-level analysis with recommended solutions.

## **5.2 Identification of Candidate Demonstration Sites**

In the project kick-off meeting held November 14, 2007, EPA, NYSERDA, and OCWA representatives clarified that the project team may select as demonstration sites the two most appropriate sites identified through the needs assessment, reconnaissance, and outreach in the Village of Greenwood Lake and the Town of Warwick. Both sites may be in the Village of Greenwood Lake or the Town of Warwick, or one site may be in the Village and the other in the Town. The Village Hall, ball field, and public beach sites previously identified are considered potential sites, but there is no requirement that any of these sites be used. There are no requirements for the demonstration sites other than that they be consistent with the intent of demonstrating decentralized wastewater management solutions that are broadly applicable in the Greenwood Lake watershed. There is, however, a strong preference that one of the demonstration systems be a cluster system, serving three or more year-round residences. Priority will also be given to replacement of failed or inadequate systems, correcting known sources of improperly treated wastewater.

Data gathered during the needs assessment will be used to target specific areas of need within the study area. In cooperation with the Village of Greenwood Lake and/or the Town of Warwick, homeowners in areas highlighted through the needs assessment will be contacted to gauge their interest in participation and, if amenable, request permission to conduct a site visit. Stone and/or other team members will visit sites to assess their practicality as demonstration sites. Site visits will be documented with field notes and photos to aid the site selection process. The list of potential sites will be narrowed to three based on their strengths as demonstration sites and considering economic factors, through dialogue among the Stone Team, OCWA, the Village of Greenwood Lake, and the Town of Warwick. This short list of three candidate demonstration sites will be presented to the NYSERDA project manager for review.

## **5.3 Legal Arrangements for Demonstration Site Testing**

The Orange County Water Authority will lead establishment of agreements with owners of the candidate demonstration site properties granting right of entry for site testing. OCWA may collaborate with the Orange County Law Department and the Planning Department to prepare agreements that are legally valid and acceptable to the property owners. Right-of-ways will be obtained from adjoining property owners for personnel or equipment to access candidate

demonstration sites without road frontage, as required. Brief visual inspection where no field testing is conducted may be performed with verbal approval by a property owner.

#### **5.4 Consultation with Regulators**

Discussions with regulators in the Orange County Department of Health and the New York State Department of Environmental Conservation (NYSDEC) will commence in the early stages of the project so that there will be sufficient time to evaluate what types of systems are likely to be permitted and to influence decision makers regarding the acceptability of different treatment options. Our approach will be to solve potentially contentious permitting issues before submitting permit applications, such that approval of the designs is a formality. We expect to engage in an extended dialogue with the regulators in 2008, in concert with the Tasks 5.1 to 5.3 above.

#### **5.5 QAPP and QAPP Amendments**

A quality assurance performance plan (QAPP) will be prepared for review by NYSED and review and approval by EPA. The QAPP will describe collection and analysis of primary data as well as the use of monitoring data provided by others. Site characterization methods described in the QAPP will include soil interpretation (i.e., test pits), soil sampling and analysis, and percolation testing. The QAPP will describe the monitoring plan for the demonstration systems, water analysis methods, and data analysis techniques. Quality assurance measures will include collection of duplicate samples of approximately 10% of the total sample load, quality control checks of any transcribed data, and the quality assurance measures in force at the selected analytical laboratory.

A Quality Assurance Project Plan should not be a static document. In nearly all projects, data collection activities change as new information is considered and methods are refined. If necessary, the QAPP will be amended at the outset of monitoring, after selection of the demonstration sites and treatment systems. The QAPP may be further amended as necessary through the monitoring phase. Amendment to the QAPP will be sent to EPA for review; however, we will not delay scheduled activities in the event we do not receive a timely response.

### **TASK 6. SYSTEM DESIGN AND PERMITTING**

#### **6.1 Characterization of Candidate Demonstration Sites**

The suitability of existing soils for wastewater dispersal will be evaluated at three candidate demonstration system sites by interpreting the soil profile in test pits, performing percolation tests, and analyzing the chemical composition of soil samples.

At each site, test pits will be excavated in a minimum of two widely spaced locations. The number and location of test pits will depend on soil variability, topography, potential drainfield size, and other factors. Stone scientists will direct the digging, which may be accomplished by a hired excavator or by an operator with the Village of Greenwood Lake or the Town of Warwick. The test

pits will be excavated in a manner that minimizes the possibility of danger to the evaluator (e.g., the pits may be tiered to prevent cave-in). Prior to digging, an underground utilities locating service will be contacted to mark buried utilities in the area of the proposed absorption field.

Test pits will be dug to a depth of eight feet or a minimum of four feet below the bottom of the proposed absorption area, whichever is deeper, or until refusal is met. Soil evaluations will be conducted using the procedures in the Individual Residential Wastewater Treatment Systems Design Handbook, New York State Department of Health (1996) and the Field Book for Describing and Sampling of Soils, USDA-NRCS. Soil and geologic conditions that will be characterized include:

- Soil type (including texture, structure, color, and mottling)
- Groundwater level (both current and historic)
- Depth to bedrock
- Presence of highly fractured or channeled rock substrata
- Soil hydraulic conductivity

Unless the site is clearly unsuitable based on the test pit or percolation test data, soil samples will be collected at each potential demonstration system site from the area of the proposed drainfield to evaluate the phosphorus sorption (binding) potential of the soils. Analyses of the soil's extractable iron and aluminum, calcium, and magnesium content, pH, and cation exchange capacity will be performed. These data will be used to evaluate whether the phosphorus sorption potential of soils appears to be adequate to renovate phosphorus released in wastewater or whether the phosphorus removal needs to be enhanced through the wastewater treatment train or dispersal field.

## **6.2 Evaluation of Phosphorus Removal Approaches**

Phosphorus loading from onsite wastewater systems may be reduced through several approaches. The sources of phosphorus inside the home or business may be reduced by substituting phosphorus free detergents for detergents containing phosphorus, by eliminating garbage macerators, and by separating grey water from blackwater, for instance through the use of composting toilets. Reducing water use in the home or business may also allow the treatment system and drainfield to operate more efficiently, enhancing phosphorus removal. Designing the drainfield to maximize the soil volume available for treatment (e.g., through pressure dosing effluent in the shallow soil horizon) will also enhance renovation of treated effluent and increase phosphorus sorption in the soils. Drainfields may also be amended with materials (e.g., expandable clay aggregates, iron rich byproducts of steel manufacturing, crushed brick, et cetera) that have a higher phosphorus sorption potential than native soils. Finally, a phosphorus removal component, utilizing either a media with high phosphorus sorption capacity or chemical additions to precipitate phosphorus, may be inserted in the treatment train, between an advanced wastewater treatment unit and the drainfield.

The Stone Team will consider the available approaches for phosphorus management in onsite systems and determine which among them are most promising for application in the Greenwood Lake watershed. We will use Stone's 2005 report to the National Decentralized Capacity Development Project, titled *Micro-Scale Evaluation of Phosphorus Management: Alternative Wastewater Systems Evaluation*, as the basis for this evaluation, and supplement this information with recent information reported in the literature and by treatment system vendors. The outcome of this task will be a targeted review of phosphorus management approaches applicable in the Greenwood Lake watershed, with a brief description of each approach and a table comparing their advantages and disadvantages. This review will guide selection of the demonstration system treatment trains and will be incorporated in the final report.

### **6.3 Selection of Decentralized Wastewater Treatment Options**

Combinations of treatment system components arranged in series comprise a treatment train. We will evaluate different combinations of wastewater treatments system components that are potentially suitable for the specific demonstration sites, evaluating each treatment train based on the following list of factors:

- Phosphorus reduction
- Reliability
- Availability
- Capital and operations and maintenance costs
- Energy consumption
- Site, use, and public acceptance considerations
- Environmental factors
- Monitoring requirements
- Operations and maintenance requirements

A matrix of these factors will be developed to communicate the relative advantages and disadvantages of the treatment alternatives and to aid in the technologies selection process.

Opportunities to minimize energy consumption will be considered in the technologies selection and system design stages. Energy saving options may include avoidance of pumps and controls through gravity-flow designs and careful attention to pump sizing where pumps are needed.

The top three technologies for each specific site will be summarized for stakeholders. The project team will make the final technology selection for each site, based on the available data and input from stakeholders, and submit the selections to the NYSERDA project manager for approval.

#### **6.4 Legal/Financial Arrangements for Demonstration Sites**

The Orange County Water Authority will be responsible for developing and executing agreements with owners of properties included in the wastewater demonstration systems. OCWA may collaborate with the Orange County Law Department and the Planning Department to prepare agreements that are legally valid and acceptable to the property owners. OCWA is currently considering changes in its mandate that could include the Water Authority owning or managing shared wastewater treatment infrastructure. This demonstration project could serve as a test case in the event OCWA develops an ownership or management interest in wastewater infrastructure. Alternately, EPA and NYSEDA have agreed that systems installed using project funds may be turned over to private ownership, with appropriate arrangements made for long-term operation and maintenance and assurances of access to the demonstration systems. Further, for any system intended for private ownership, OCWA must demonstrate that the total cost and environmental impact of building the decentralized system will be less than the cost of a conventional system.

#### **6.5 Final Selection of Demonstration Sites**

Based on the results of the detailed site characterization and the wastewater treatment train evaluation, the success of negotiations with involved property owners, and input from the Project Team, a final selection of two demonstration sites will be made. OCWA and the Stone Team will make the final selection of demonstration sites.

#### **6.6 Topographic Survey**

Site plans of each demonstration site will be prepared to aid in design and permitting of the demonstration systems. Within 50 feet of proposed facilities, transmission lines, and prospective effluent dispersal areas, digital topographic mapping available from OCWA will be used. Topographic data will be suitable for the preparation of mapping at 1" = 40'-scale with a 2-foot contour interval. Photo identifiable points will be field located, as required by the photogrammetrist. Photo identifiable points will be tied horizontally into the North American Datum of 1983 (NAD 83) and vertically to North American Vertical Datum of 1988 (NAVD 88). In the vicinity of proposed improvements, relevant information that does not appear on photographs will be added through field survey and shown on the site plans. Data obtained by survey will include:

- Elevations of existing septic tank influent and effluent piping and septic tank manways
- Approximate locations of underground utilities such as water, gas, electric, and telephone
- House numbers, pole numbers, visible utilities, tanks, electrical equipment, large individual trees, hedges, edge of woods, walls, fences, driveway and type, walks and types, light poles/posts, signs, et cetera
- Wetland boundary flags and other significant features
- Iron pins and other monumentation

One bench mark will be established at each decentralized demonstration site and shown on the aerial mapping.

Elevations will be taken at key points at the proposed wastewater collection, treatment, and disposal facilities to verify the accuracy of elevation contours in the topographic mapping.

Assessor's mapping (supplied by OCWA) will be used as a basis for property lines and right-of-way lines. The locations of property and right-of-way lines will be added to the site plans based on occupancy, features depicted on the aerial mapping, monumentation obtained in the field, and other research. Property boundary research is anticipated to be limited to digitization of available assessors mapping to delineate the property boundaries and rights-of-way for each decentralized demonstration system. The names and addresses of each property owner provided by the assessor's office or OCWA will be added to the site plans.

### **6.7 Wetlands Consulting**

Three tasks will be performed to evaluate potential impacts to wetlands:

- Review statewide wetlands mapping in the proximity of the prospective demonstration system sites. (It is intended that proposed demonstration system sites will be outside the 100' upland wetland review area boundary)
- Conduct a site visit with a certified soils scientist to scope the extent and quality of wetlands in the vicinity of proposed wastewater treatment facilities and pipe routes as required.
- Delineate wetlands boundaries in the vicinity of proposed wastewater treatment facilities and pipe routes as required. Wetlands boundaries will be delineated up to approximately 50 feet from roads and proposed wastewater dispersal sites, or to the upland review distance. One (1) day of wetlands boundary delineation by a certified soils scientist is assumed to be required.
- Prepare a wetlands function and values report for each area of wetlands disturbance as required. Four (4) reports are assumed to be required.

### **6.8 Design of Demonstration Systems**

The Stone Team will develop detailed designs for each demonstration system and prepare contract documents, as follows.

1. Evaluate flows and confirm design criteria
  - a. Review flow allocations for prospective systems based on published data for building use. Should the Village of Greenwood Lake's Village Hall site be selected, flows established through preliminary investigations conducted in 2005 by Stone will be utilized.
2. Subsequent to selection of the treatment train, the Stone Team design of the facilities as necessary to produce construction documents for bidding. These Contract Documents will be composed of: an Engineers Joint Contract Documents Committee (EJCDC) contract "front end" General Conditions (or OCWA's contract "front end" if appropriate), Supplementary Provisions, Technical Specifications, Bid form, and Contract Drawings. Five (5) copies of the draft Contract Documents will be transmitted to OCWA for review and comment at the 90%

completion milestone. Technical specifications will be prepared for each item of work in accordance with the 16 division Construction Specification Institute (CSI) Masterspec format. Drawings will be 24" x 36" in size and will include the following items:

- a. Current and proposed topography, wetlands, regulated areas and other features from the site topographic survey.
  - b. Site layout of proposed facilities at a scale of 1" = 10'.
  - c. Construction details, including typical sections for infrastructure installation, restoration, with payment limits.
  - d. Proposed limits of disturbance, erosion and sedimentation controls, applicable zoning setbacks from property lines and surficial features, and adjacent upland wetlands review area and FEMA 100-year floodplain boundaries.
  - e. Electrical, mechanical, and structural details (applicable plan, layout and section views, electrical and controls one line diagrams) for wastewater treatment facilities, equipment, tanks, pump chambers, and utilities. Primary electrical service upgrades will also be evaluated for their ability to operate wastewater treatment facility equipment.
3. Meetings: We will conduct a meeting or teleconference with OCWA to address questions and comments from its 90% review of the Contract Documents.

### **6.9 Local/County/State Permitting**

The Stone Team will assist obtaining necessary permits for construction of demonstration systems, as follows:

1. As stated, we have assumed that the demonstration systems will not be sited within 100 feet of a wetland area. However, if siting of a system within a wetland or buffer area regulated by the municipality, NYSDEC or ACOE becomes necessary, then we will provide assistance obtaining wetland or wetland buffer disturbance permits for the project.
2. Prepare U.S. Army Corps of Engineers (ACOE) permit notification for a Programmatic General Permit. We have assumed that the extent of the work will not trigger a NYSDEC 401 Water Quality Certification.
3. Provide assistance with permit applications to the Planning and Zoning Boards of the Village of Greenwood Lake and the Town of Warwick, and attend meetings as required (two meetings are anticipated).
4. Provide assistance to prepare SPDES permit for subsurface discharge as required, based on projected flows from the proposed demonstration systems. A SPDES permit for minor

projects is anticipated to be required by NYSDEC if design subsurface discharge wastewater flows exceed 1,000 gallons per day.

5. Coordinate with the Orange County Department of Health and provide assistance for OCWA to obtain necessary permits regarding construction of the demonstration systems.

Permitting fees as applicable for items 1-5 above will be borne by OCWA.

The responsibility for preparing an application and obtaining a local building permit for construction of facilities, road opening permit and other local construction related permits as required will be assigned to the Contractor through the bid documents.

### **TASK 7. SYSTEM CONSTRUCTION**

A portion of the EPA and NYSERDA funding must be reserved by OCWA to cover costs of construction labor and materials. Because we do not know at this time what types of systems will be installed and the conditions of the demonstration sites that will be selected, we can not know the actual costs of installing the demonstration systems. To determine an amount of money for OCWA to reserve, we developed cost estimates for hypothetical wastewater treatment scenarios. The construction costs indicated in the project budget will be retained by OCWA from the available EPA and NYSERDA funds, to be paid to vendors and installers hired by OCWA. The amount retained by OCWA for construction includes labor and materials only. It does not include many other costs associated with construction of the demonstration systems; in particular, system design, certain permitting tasks, preparation of bid documents, construction management, and monitoring of demonstration systems are covered by the funds allocated to the Stone Team and by in-kind services provided by OCWA and the municipal partners.

The combined cost of the two demonstration system scenarios is \$120,000. The scenarios assumed for the demonstration systems are described as follows:

#### **System #1**

The scenario assumed for the first demonstration site is a cluster system serving three individual, year-round residences with three bedrooms each. The scenario assumes that new septic tanks will need to be installed at each home and that septic tank effluent will need to be pumped up using STEP pumps to a common holding tank. A pump installed in the holding tank would discharge to a common treatment unit, a textile filter system composed of multiple pods. Effluent from the textile filter pods would pass to treatment chambers specifically designed for phosphorus removal (some treated effluent may be recirculated back to the holding tank for additional treatment). From there, the effluent would pass to a drainfield where it would be dosed at a shallow depth into existing soils through pressurized drip lines. This scenario includes appropriate control panels and floats, valves, fittings, and piping. Costs resulting from unusual site conditions or other challenging situations arising from specific sites or designs have not been included in these estimates.

The estimated cost of Scenario #1 is: \$80,000.

This scenario assumes that certain conditions will exist:

- The three homes or buildings to be served by this system will be close to one another and to the chosen treatment and disposal site.
- An extensive collection system is not required to reach the chosen system site.
- Public property or private property accessible to OCWA at no cost will be used for the treatment and dispersal areas. No property easement or acquisition costs are included for this scenario.
- The chosen dispersal area will be suitable for a conventional or advanced drainfield, installed in native soil, without the need for additional soil or other material to be purchased, transported, or applied.
- It is assumed that the system will provide treatment for residential-strength wastewater. Industrial, restaurant, or other high-strength wastewater may need additional treatment steps that are not considered in this scenario.
- Surface restoration is assumed to involve minor regrading and seeding of disturbed ground and only minor patching of disturbed pavements.

### **System #2**

The second scenario is a proposed replacement of the wastewater systems serving the two municipal buildings on Church Street in the Village of Greenwood Lake. The Police Station, Fire Station, Municipal Court, and Village Offices are housed in these buildings. This scenario was developed in 2005 as part of previous work that Stone had done in preparation for a demonstration system. While this scenario may not be implemented, it represents the scale of the proposed Scenario #2 demonstration system.

In 2005, the facilities were calculated to have a combined maximum daily wastewater flow of 755 gallons per day. The design called for the replacement and abandonment of the two existing septic tanks and drainfields, but did not budget costs associated with backfilling or removing the existing tanks.

Raw wastewater from both buildings would be collected in a new common septic tank. Effluent would then flow into a recirculation tank. A pump housed in the recirculation tank would pump effluent through a treatment chamber. The amount of water in the recirculation tank would then determine whether the treated water would pass back into the recirculation tank for further treatment or on to the phosphorus capture device and discharge basin. Treated water would then be pumped from the discharge basin on to the drainfield for final treatment and dispersal. Due to space

limitations on the municipal building property, the drainfield was designed to be a leaching bed or bottomless sand filter.

The estimated cost of Scenario #2 is: \$40,000.

This scenario assumes that:

- A small building or group of buildings will be served
- Wastewater strength will be typical of a residence or office building
- Collection, treatment, and dispersal will all take place on the same property
- Costs not associated with the treatment system itself will be the responsibility of the property owner (landscaping, pavement patching, utility line relocation, et cetera)
- There will be no property or easement acquisition costs in this scenario
- Treatment and dispersal will occur in native soil

## **7.1 Bidding Process**

The Stone Team will provide OCWA with ten (10) sets of contract documents (plans and specifications) to be used by OCWA in soliciting bids from qualified vendors and system installers. OCWA will use the bid documents to solicit quotes from vendors and installers of decentralized wastewater treatment systems.

The Stone Team will provide assistance to OCWA as requested through the bidding process as described below:

1. Answer bidder questions and issue addenda related to questions and interpretations of the contract documents as required.
2. Review Bids and Prepare Recommendation Letter: Copies of received bids will be reviewed for errors and omissions. The apparent low bidder will be evaluated to confirm qualifications and financial standing to complete the project. A recommendation letter will be drafted, summarizing this review and evaluation. A meeting or teleconference will be conducted with OCWA to review the draft recommendation prior to finalizing the letter.

## **7.2 Construction Management w/ As-built Drawings**

### **7.2.1 Construction Administration Assistance**

The Stone Team will provide construction administration services, including the following tasks throughout the duration of the anticipated 90-day construction period.

- a. Conduct Meetings: A pre-construction meeting and progress meetings with OCWA and the Contractor will be conducted at the site at intervals appropriate to the various stages of construction to observe, as an experienced and qualified design professional, the progress and

quality of the executed work of the Contractor and to determine if such work is proceeding in accordance with the Contract Documents. For the purposes of this proposal, it is assumed that a total of (8) eight progress meetings will be held over the 90-day construction period.

- b. Conduct Site Observations: Perform occasional site observation visits by a project engineer to observe progress when work is proceeding and evaluate the progress and quality of the executed work of Contractor(s), and determine in general if such work is proceeding in accordance with the Contract Documents. A total of ten (10) separate site observations are included.
- c. The Stone Team shall not be responsible for the means, methods, techniques, sequences or procedures of construction selected by Contractor(s) or the safety precautions and programs incident to the work of Contractor(s), but shall not knowingly allow any unsafe methods without notifying the Contractor of same. The Stone Team shall not be responsible for the acts or omissions of any Contractor, or subcontractor, or any of the Contractor(s) or subcontractors' agents or employees or any other persons (except Stone Team's own employees and agents) at the site or otherwise performing any of the Contractor(s)' work; however, nothing contained herein shall be construed to release the Stone Team from liability for failure to perform properly duties undertaken by the Stone Team in the Contract Documents. The Stone Team will take reasonable steps to insure that Contractor(s), subcontractor(s) and their agents shall fully comply with the Contract Documents.
- d. Review Submittals and Documents: Review and take appropriate action in respect of submitted Shop Drawings and samples, the results of tests and inspections and other data that each contractor is required to submit. Our review will be limited to determining conformance with the design of the Project and compliance with the information given in the Contract Documents. Receive and review (for general content as required by the Specifications) maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection which are to be assembled by the Contractor in accordance with the Contract Documents.
- e. Issue Interpretations and Clarifications: Issue instructions from Owner to Contractor; issue necessary interpretations and clarification of the Contract Documents and in connection therewith prepare change orders as required; have authority as Owner's representative, to require special inspection or testing of the work; act as initial interpreter of the requirements of the Contract Documents, and judge the acceptability of the work thereunder and make recommendations on all claims of Owner and Contractor relating to the acceptability of the work or the interpretation of the requirements of the Contract Documents pertaining to the execution and progress of the work. If necessary, prepare field orders or change orders addressing minor changes in the contract requirements. This work is limited to a reasonable

effort for minor construction issues and does not include additional effort that may be needed to resolve significant issues or disputes with the Contractor.

- f. **Review Applications for Payment:** Based on Stone Team's on-site observations as an experienced and qualified design professional and on review of application for payment and the accompanying data and schedules, determine the amounts owed to Contractor and recommend in writing payments to Contractor in such amounts; such recommendations of payment will constitute a representation to Owner, based on such observations and review, that the work has progressed to the point indicated, that, to the best of Stone Team's knowledge, information and belief, the quality of such work is in accordance with the Contract Documents.
- g. **Conduct Substantial Completion Inspections:** Conduct two substantial completion inspections to determine if the Project is substantially complete and if the work has been completed in accordance with the Contract Documents and if the Contractor has fulfilled all of his obligations thereunder so that the Stone Team may recommend, in writing, final payment and give written notice to Owner and the Contractor that the work is acceptable. Draft a punch list of remaining items to be addressed for final completion for issuance with a Certificate of Substantial Completion.
- h. **Conduct Final Completion Inspection:** Conduct a final completion inspection to determine if punch list items from the substantial completion inspection have been addressed and confirm that the work has been completed in accordance with the Contract Documents and that the Contractor has fulfilled all of his obligations thereunder so that Stone Team may recommend, in writing, final payment to the Contractor and may give written notice to Owner and the Contractor that the work is acceptable by issuance of a final completion notice letter.
- i. **Prepare Closeout Documents:** Prepare copies of Contractor's project closeout documents into packaged binders including record drawings, in print and electronic AutoCAD format, and daily inspection reports maintained by the resident representative. Record drawings will be prepared by modifying record drawings prepared by the Contractor and will be incorporated into project closeout binders. Two (2) copies of the binders and record documents will be provided to the Owner, and one (1) set of reproducible record drawing mylars.

### **7.2.2 Construction Resident Representation**

A full-time resident representative will be furnished and directed by the Stone Team during periods of on-site construction activity to provide reports on progress of the work and on the Contractor's general compliance or non-compliance with the contract terms through on-site observation of the work.

Four (4) weeks of full-time presence (40 hours per week) at the site is included in this proposal, which will be scheduled to begin with the contractor's mobilization to the site. Following substantial completion, two (2) weeks of part-time presence (20 hours per week) at the site will be provided to monitor completion of punch list items. Additional time resulting from Contractor's lack of progress in accordance with the Contract Times, work on Saturdays, or other periods of overtime work requiring technical oversight are not included in this scope. Work requiring resident representation outside of the periods and time budget proposed above will be billed on a time and materials basis with the Owner's prior written approval.

Resident representative responsibilities will include spot-checks of Contractor's grading and installation of critical structures, but will not include confirmation of all grades for all areas or structures. It is understood that the Contractor will provide appropriate, working surveying equipment for use under this task. This work will not include horizontal layout of equipment or structures beyond spot-checks of locations by measurement with a fiberglass tape to existing structures shown on the drawings.

It is assumed that these inspections will be performed only during the 4 weeks of full-time presence at the site.

The Contractor will remain responsible for following any erosion prevention and sediment control practices specified in the Contract Documents including actual installation, maintenance and removal of erosion and sediment controls.

### **7.3 Operations and Maintenance Manuals**

The Stone Team will work with the vendors, regulators, installers, and operators to create Operation and Maintenance (O&M) Manuals for each demonstration system. These manuals will include:

- Brief descriptions of each component of the treatment cycle
- As-built plans of the system and its components (vendors will provide figures of their products)
- Manufacturer manuals for individual system components
- Documentation of regulatory requirements for maintenance
- A detailed checklist or walk-through tool describing operation of the system and regular maintenance procedures
- Forms to record system data and observations
- Templates for O&M reports
- Blank laboratory sample forms
- A system history log
- A list with contact information for vendors, homeowners, operators, and regulators

Manufacturer recommended maintenance schedules and regulatory requirements will figure heavily in the development of these manuals. Each manual will provide system specific information for system users, system operators, and regulators.

#### **7.4 Operation and Maintenance Procedures**

The onsite wastewater treatment system advanced treatment and phosphorus removal system vendor will provide operation and maintenance of those components for a period of one year, per OCWA's construction contract documents. The Stone Team will train a local septic tank service provider for operation and maintenance of the septic tanks and dispersal fields. This will consist of inspecting the septic tank (measuring depth of solids accumulation) and distribution system at approximately quarterly site visits.

### **TASK 8. MONITORING**

#### **8.1 Water Use Monitoring**

Water usage will be monitored using existing water meters serving each facility. Water use data will be supplemented with wastewater flow data. Wastewater flows at the demonstration sites will either be calculated or measured directly.

Meter readings will be recorded a minimum of once per month. Readings may be taken by the Stone Team, the treatment system operator, homeowners, or an employee of the Village of Greenwood Lake or the Town of Warwick, as appropriate. If the selected demonstration technology includes an internet accessible data log as part of the controller, the Stone Team will download the data more frequently. Forms will be created to aid in accurate documentation.

Stone Environmental will be the clearinghouse for all collected data. Stone will designate an employee to be the contact person for volunteers and operators collecting system data. Water usage data and/or wastewater flow data will be summarized and provided to interested parties. These summaries will be available on the project website and as part of the final report.

#### **8.2 Groundwater Quality Monitoring**

Three groundwater monitoring wells will be installed at each demonstration site. The depth and location of each monitoring well will be determined by site-specific hydrogeologic conditions. One monitoring well will be installed upgradient from the absorption area and two will be installed downgradient. The Stone Team will site each monitoring well on property accessible to the team for installation and sampling. The downgradient wells will be sited in locations that most effectively capture the potentially nutrient-enriched groundwater plume from the demonstration system absorption area. Locations will be selected that are a reasonable distance from neighboring wells or wastewater treatment systems.

A Stone Team member will be present to observe installation of the monitoring wells. The wells will be constructed according to applicable local or state rules, but at a minimum will follow Stone Environmental's Standard Operating Procedures and will be cased, grouted, and fitted with a secure cap to prevent tampering. After installation, the wells will be developed with a pump or comparable method. Each well will be mapped in the system as-built drawings

Each monitoring well will be sampled at the time of the demonstration systems startup and then quarterly for one full year (5 times total). Samples will be collected by the Stone Team or a trained contractor, as appropriate.

Groundwater samples will be analyzed for:

- Total Phosphorus
- Total Dissolved Phosphorus
- Soluble Reactive Phosphorus
- Chloride

Samples will be taken under chain-of-custody to EnviroTest Laboratories, Inc. (formerly STL Newburgh) in Newburgh, NY (approximately 30 miles away). Samples will be transported on ice to maintain a temperature of 4°C.

A minimum of 10% of the total sample load will be collected in duplicate for quality control purposes. Stone Environmental will retain originals of all laboratory reports and chain-of-custody documents.

### **8.3 Soil Pore-Water Monitoring**

After construction of the drainfield and all grading work has been completed, the Stone Team will install shallow-placed suction lysimeters to monitor soil pore-water (water held within the soil matrix) directly under the drainfield. Two lysimeters will be installed directly underneath the drainfield of each demonstration system. Each lysimeter will be installed by hand-auger at a roughly 45 degree angle, so that the lysimeter will not touch the constructed part of the drainfield, but will end up 12 inches directly below a point where the treated wastewater leaves the drainfield and enters the soil. One or more lysimeters will be installed outside the drainfield at each site to monitor background conditions.

The suction lysimeters will be used to collect soil pore-water at the time of demonstration system startup and then quarterly for one full year (5 times total). Samples will be collected by the Stone Team or a trained contractor, as appropriate. Soil pore water samples will be analyzed for:

- Total Phosphorus
- Total Dissolved Phosphorus
- Soluble Reactive Phosphorus

- Chloride

Samples will be taken under chain-of-custody to EnviroTest Laboratories, Inc. (formerly STL Newburgh) in Newburgh, NY (approximately 30 miles away). Samples will be transported on ice to maintain a temperature of 4°C.

A minimum of 10% of the total sample load will be collected in duplicate for quality control purposes. Stone Environmental will retain originals of all laboratory reports and chain-of-custody documents.

#### **8.4 Effluent Quality Monitoring**

Septic tank effluent and treated wastewater from the demonstration systems will be sampled at the time of demonstration system startup and then quarterly for one full year (5 times total). A local subcontractor or system operator will be selected and trained by the Stone Team to collect the samples from two points in the wastewater treatment train. Stone will create a form to use to document the sampling process.

One sample will be collected in the first tank of the demonstration system, at the beginning of the treatment process. At this point, the water is considered septic tank effluent. It has passed through either a large septic tank serving a single facility, or multiple septic tanks which each serve an individual residence or building. The septic tank effluent sample is a composite of the wastewater streams from all the buildings served by the system.

The second sample will be collected at the final point of the advanced treatment process, just before the water is distributed to the drainfield. The exact sampling location will be determined by the design of the selected technology.

Both samples will be “grab” samples, but they are intended to approximate average wastewater effluent strength and system performance. Wastewater samples will be analyzed for:

- Total Phosphorus
- Total Dissolved Phosphorus
- Soluble Reactive Phosphorus
- 5-day Biochemical Oxygen Demand
- Total Suspended Solids
- Chloride

Other analyses may be required by state or local regulatory agencies for the specific treatment technologies in the demonstration systems. These analyses will be performed according to the sampling schedule specified in the regulation.

Samples will be taken under chain-of-custody to EnviroTest Laboratories, Inc. (formerly STL Newburgh) in Newburgh, NY (approximately 30 miles away). Samples will be transported on ice to maintain a temperature of 4°C.

A minimum of 10% of the total sample load will be collected in duplicate for quality control purposes. Stone Environmental will retain originals of all laboratory reports and chain-of-custody documents.

### **8.5 Energy Consumption Monitoring**

Electricity consumed by the systems will be monitored approximately monthly using electricity meters and pump elapsed-time meters. Meter readings will be recorded a minimum of once per month. Readings may be taken by the Stone Team, the treatment system operator, homeowners, or an employee of the Village of Greenwood Lake or the Town of Warwick, as appropriate. Energy consumption will also be estimated for other system processes including maintenance and pumpouts.

### **TASK 9. COMPARISON OF ENERGY AND ECONOMIC BENEFITS**

The Stone Team will prepare an analysis of the energy and economic benefits of decentralized wastewater treatment systems compared with conventional, centralized wastewater treatment systems. The team will compare published electricity consumption data for different decentralized wastewater treatment options with electricity consumption typical of centralized wastewater treatment on a per capita or unit flow basis. A recent analysis conducted by NYSERDA will be the primary source of average electricity consumption data for centralized wastewater treatment. Literature describing the life-cycle costs (including avoided capital costs) of decentralized wastewater treatment options as compared with centralized systems will also be reviewed. Tables showing energy consumption and life-cycle cost will be prepared with discussion for inclusion in the final project report.

Insight gained from the monitoring of energy consumption at the demonstration sites will be presented.

### **TASK 10. RECORDS MANAGEMENT SYSTEM**

Information management systems are used in a growing number of communities to facilitate long-term maintenance and management of existing and new decentralized wastewater treatment systems. The Village of Greenwood Lake maintains a database of septic system inspection and pumpout data. Residents are required to pump out their septic tanks every three years. An inspection must be performed certifying that the system is in working order. The database includes the dates and certifications and prompts Village staff when required maintenance is overdue. Village staff are familiar with the database. Because the records management system appears to be adequately serving

the needs of the community, no records management assistance to the Village is budgeted in this workplan.

The Town of Warwick has no electronic records management system to facilitate septic system maintenance. Stone will assist the Town of Warwick in identifying suitable septic system records management software. Software available at no cost from a public entity will be selected if it meets the Town's requirements. Stone will advise the Town of Warwick concerning how to set up the records management system and how to maximize the benefits of such a system in improving wastewater management in the community. This task does not include file review or data entry, tasks generally required when a septic information management system is being developed.

## **TASK 11. EDUCATION AND OUTREACH**

### **11.1 Public Involvement Including Local Outreach and Education**

A program will be implemented to educate and involve local officials, citizens, engineers, contractors, business owners, and other stakeholders and decision-makers in decentralized wastewater treatment planning and management. The following are essential elements of this program:

#### **11.1.1 Newsletter**

The Project Team will develop a short newsletter to be distributed periodically of a two year period. The first issue of the newsletter will introduce the project. Additional issues will provide updates as the project proceeds as well as educational information useful for residents, small businesses, and other local audiences about the importance of water conservation, septic system maintenance, avoiding or limiting use of materials containing phosphorus (fertilizer, dishwashing detergent, et cetera.), and other best practices relevant to these audiences.

The introductory issue of the newsletter will be distributed in spring of 2008. Subsequent issues are planned to be distributed at appropriate project milestones during 2008 and 2009. OCWA or an OCWA consultant will lead writing, using Stone Environmental reports and other data sources. OCWA staff will coordinate distribution plans with Village of Greenwood Lake and Town of Warwick officials and staff and other partners. Orange County will provide in-kind graphic layout and printing services if needed. The Stone Team will review and comment on drafts. Distribution may include insertion into MS4 public education mailings or other municipal mailings; posting on Village and Town websites; and placing in municipal buildings.

#### **11.1.2 Presentations to Homeowner Associations and Local Boards**

A presentation will be prepared to introduce the project and provide basic background information on phosphorus management goals for lakes and the importance of effective management of onsite wastewater systems. This will be a PowerPoint presentation, approximately 20-30 minutes long. The target audiences will be the active homeowners associations in specific neighborhoods around

Greenwood Lake, including Indian Park, Wahtawah Park, Windermere Park, Greenwood Park, Forest Park, Forest Knolls, and Furnace Brook, as well as neighborhoods without associations. A shorter version of the same presentation will be offered at a meeting of the Village Board; the Village Board meetings are televised, enabling the Project Team to reach a significant number of residents. The opportunity to provide a similar presentation to a Town of Warwick Board will be explored. Presentations will be delivered in the May-September 2008 timeframe. OCWA or an OCWA consultant will prepare and deliver PowerPoint presentations, with technical assistance and comment from the Stone Team.

### **11.1.3 Press Releases**

Educational press releases will be written at key project milestones and targeted at the Greenwood Lake News and other weekly papers that serve the Warwick area (Advertiser and Dispatch.). Topics for press releases will include lake management, onsite system management, water conservation, et cetera. The press releases will be designed as short articles (approximately 500 words) that can potentially be published in their entirety by these papers. The overall schedule will be to submit press releases on an as needed basis, such as when additional input is needed and/or when project milestones have been met. These press releases will be accompanied by occasional phone contact or meetings with key press contacts, including the Editor of the Greenwood Lake News, with assistance from the Mayor of the Village of Greenwood Lake, to encourage constructive, educational, and positive coverage. OCWA staff will write and distribute press releases.

### **11.1.4 Public Advisory Committee Meetings**

The project team will meet with a Public Advisory Committee after certain milestones are reached, when additional input is needed. A tentative schedule of meetings is as follows: 1) After the OCWA workplan is completed but before it is finalized, to invite comments from the committee; 2) After the needs assessment is complete and preliminary findings of the treatment technologies evaluation are available, to discuss the applicability of certain treatment approaches and provide an update on the site selection process; 3) After site selection, system design, and permitting tasks are complete and the construction bid process is underway; 4) After construction and several months of operation and monitoring are completed. Additional updates will be provided to the committee as needed using email or conference calls, if necessary. OCWA staff will coordinate the Advisory Committee meetings, with participants to include at least one member of the Stone Team.

### **11.1.5 Case Study**

A four-page brochure (e.g., 11 x 17" folded in half) will be developed to provide an overview of the project findings and outcomes. This brochure will describe the process of assessing wastewater management needs, selecting demonstration sites and wastewater treatment technologies, and monitoring system performance. The brochure will have a professional layout that will appeal to a

broad range of interests. OCWA or an OCWA consultant will lead information compilation, research, and writing, and coordinate distribution plans with Village of Greenwood Lake and Town of Warwick officials and staff and other partners. Orange County will provide in-kind graphic layout and printing services. The Stone Team will review and comment on drafts. Distribution may include insertion into municipal mailings (e.g., with education materials distributed as part of stormwater management programs); posting on Village and Town websites; and placing in municipal buildings. The brochure will also be distributed at regional and national conferences.

## **11.2 Training Programs**

The Stone Team will hold two workshops on decentralized wastewater treatment, one on regulation and management and a second on treatment technologies. These workshops will be designed to support effective and informed decision making by local officials and their engineering and planning consultants, and to encourage the development of increased knowledge and skills among businesses and municipal staff involved in installing, operating, and maintaining decentralized wastewater systems. The target audiences for the workshops include engineers, planners, local and state officials, onsite system installers and maintenance firms, and water and sewer operators. A tour of the demonstration sites will be included in both workshops.

OCWA or an OCWA consultant will lead planning of the workshops, in close consultation with the Stone Team and the advisory committee, and with input from stakeholders in the target audience groups. Workshop presenters will include members of the Stone Team and speakers drawn from government, academia, non-profit organizations, and the private sector, and will potentially include representatives of NY State (DEC, Department of State, Comptroller's office, NYS EFC, etc.); US EPA; Cornell Cooperative Extension and Cornell University; consulting engineers; and technology vendors. OCWA staff will provide logistical support and publicity.

### **11.2.1 Management Workshop**

This workshop will cover management mechanisms and industry trends for decentralized system management. The content of this workshop will be refined with input from various stakeholders, and will tentatively include:

- EPA's five voluntary management models
- New York State's regulatory framework that enables establishment of wastewater districts for decentralized systems, and other regulatory involvement in district setup and financing (including the NYS Comptroller's role)
- Remote monitoring and control technologies
- Environmental and economic impacts
- Risks and benefits of decentralized wastewater management strategies

- Funding options for municipalities, property owners, and small businesses, including ideas and mechanisms that are currently available in New York State and others that are not (e.g., use of State Revolving Loan funds for private onsite upgrades, authorized in Connecticut and proposed in New York)
- Implications of the 2005 New York State law on water efficiency and reuse

### **11.2.2 Technology Workshop**

This workshop will cover technology trends in onsite and small community treatment and dispersal, including generic treatment systems and established proprietary systems (e.g. Advantex, BioClere), drip irrigation, small diameter collection systems, and others. Decentralized wastewater management technologies and management practices selected for the Greenwood Lake demonstration systems will be discussed, including an overview of the needs assessment study findings, and a description of the technology and site selection process.

### **11.2.3 New York State Onsite Training Network Workshop**

We will also explore the potential for the New York State Onsite Training Network (NYSOTN), the existing technical training program of NYS DEC, SUNY and other partners, to conduct a third workshop on onsite systems. The curriculum for this workshop will be drawn from NYSOTN's existing training programs on soils assessment, onsite design, installation, maintenance, and inspection, and will be tailored to be most relevant to the OCWA project and to local priorities in Greenwood Lake and Warwick. The primary responsibility for implementing this workshop will be NYSOTN's, with OCWA or an OCWA consultant leading workshop planning and OCWA staff providing logistical support and publicity. Payment of participant's fees (\$200-250/day) is not included in the project budget. To encourage attendance by residents of the Greenwood Lake watershed and Mountain Lodge Park, OCWA could consider sponsoring their fees, with NYSOTN charging other attendees.

## **11.3 Dissemination of Project Findings to Regional and National Audiences**

Working with the advisory committee, we will disseminate project findings to communities, state agencies, and other stakeholders through meetings, articles, conference presentations, and OCWA's website.

### **11.3.1 Agency Meetings**

Representatives from technical and educational advisory agencies and organizations will be convened for two meetings. The primary purpose of these meetings is to seek input on questions relevant to project implementation, and to maintain an ongoing dialogue among key people in both New York and New Jersey concerned with water quality in Greenwood Lake. Another benefit of these meetings will be communicating to state agencies some of the regulatory, financing, and other issues and

obstacles encountered during project implementation. These meetings will build on previous meetings that included many of the same organizations. This task will help to support the value of this project as a demonstration project for the region and NY State, and for other areas in EPA's Region 2, which includes New Jersey. One of these meetings may be held in Albany to facilitate participation by state officials. The other will be held in Orange County and include a tour of the demonstration systems. (Note that these meetings are separate from any meetings with regulatory officials that may be needed regarding the permitting process for demonstration systems.)

OCWA or an OCWA consultant will lead meeting planning, including outreach to key participants to coordinate meeting goals and agenda items. OCWA staff will coordinate meeting location and other logistics. The Stone Team will provide technical input into priority agenda items and meeting goals. One Stone Team representative will participate in each meeting, contingent on scheduling and budget.

### **11.3.2 Conference Presentations**

Project findings will be presented at a minimum of two conferences, including a national conference, such as the annual National Onsite Wastewater Recycling Association (NOWRA) conference, and a conference in Orange County TBD. A written article will also be prepared based on the material presented at each conference, aimed at publications that are not peer-reviewed journals.

Stone Environmental will prepare a presentation and an article for a national conference and publication, with input and comment from OCWA. OCWA or an OCWA consultant will prepare a presentation and an article for a regional conference in Orange County, with input and comment from the Stone Team.

### **11.3.3 Project Website**

The Orange County Water Authority will maintain a website charting the progress of this demonstration project. The Stone Team will work with OCWA to provide the content for this site. Information hosted on the website may include:

- Project newsletters
- Project reports
- PowerPoint presentations
- Photographs of demonstration system installation
- Demonstration system performance data
- Advertisements of public meetings
- Links to additional information resources

## **TASK 12. GREENWOOD LAKE WASTEWATER MANAGEMENT PLAN**

A conceptual wastewater management plan will be developed for the Village of Greenwood Lake and areas of the Town of Warwick within the Greenwood Lake watershed. This plan will be based on the findings of the needs assessment, wastewater treatment train evaluation, analysis of phosphorus removal approaches, and the energy and economic comparison, and input from local officials, regulators, and the public. The plan will describe:

- Areas most vulnerable to contamination by improperly treated wastewater
- Wastewater treatment technologies with broad applicability in the Greenwood Lake watershed
- Phosphorus removal measures from source reduction to the design of the dispersal system, and where in the watershed these measures are most needed
- Energy efficiency and electricity conservation goals
- Options for new treatment capacity to facilitate revitalization of Main Street in the Village of Greenwood Lake
- Financing mechanisms and potential sources of funding for wastewater improvements
- Recommendations for future research and demonstration projects

## **TASK 13. REPORTING**

### **13.1 Quarterly Progress Reports**

Stone Environmental will submit a progress report to OCWA on a quarterly basis. The progress reports will be 1-2 page summaries of the work performed in the last quarter and the work to be accomplished in the next quarter. The progress reports will be in a letter format and shall include the specific information requested in the Statement of Work contained in OCWA's agreement with NYSERDA.

### **13.2 Final Project Report**

After conclusion of the monitoring program, a final report will be drafted meeting both EPA and NYSERDA requirements. A draft report will be submitted to OCWA, EPA, and NYSERDA for review and comment. The final report shall include a summary of the project including methods and results of the needs assessment; review of phosphorus management alternatives in decentralized wastewater applications; demonstration system selection, installation, and monitoring; a comparison of the energy and economic benefits of decentralized wastewater management versus a conventional, centralized wastewater treatment system; and recommendations for future research and demonstration projects. The report will also describe steps required to implement the Greenwood Lake Wastewater Management Plan (Task 12). Eight printed copies of the final report are anticipated.

## TASKS LED OR ASSISTED BY OCWA AND MUNICIPAL PARTNERS

The following table summarizes the tasks in which OCWA, the Village of Greenwood Lake, and the Town of Warwick are expected to play significant roles. Where a lead role is specified, the Stone Team expects to provide support. This task list is not all-inclusive—collaboration is expected to be ongoing throughout the project; however these are the major roles envisioned for project partners.

Task	Task No.	Role
<b><u>Orange County Water Authority</u></b>		
Grant Administration	4.1/4.2	Lead
NEPA/SEQR Compliance	4.3	Lead
Legal Arrangements for Demonstration Site Testing	5.3	Lead
Legal/Financial Arrangements for Demonstration Sites	6.4	Lead
Final Selection of Demonstration Sites	6.5	Consultation
Local/County/State Permitting	6.9	Payment of permit fees
Bidding Process	7.1	Lead
Newsletter	11.1.1	Lead
Presentations to Homeowner Associations and Local Boards	11.1.2	Lead
Press Releases	11.1.3	Lead
Public Advisory Committee Meetings	11.1.4	Coordination/logistics
Case Study	1.1.5	Lead
Training Program (3 workshops)	11.2	Lead
Agency Meetings	11.3.1	Lead
Conference Presentations/Articles	11.3.2	Participant
Project Website	11.3.3	Lead
<b><u>Village of Greenwood Lake/Town of Warwick</u></b>		
Identification of Candidate Demonstration Sites	5.2	Participant
Characterization of Candidate Demonstration Sites	6.1	Public works assistance
Final Selection of Demonstration Sites	6.5	Participant
Septic Information Records Management System	10	Collaborator (Town only)
Presentations to Homeowner Associations and Local Boards	11.1.2	Facilitator
Press Releases	11.1.3	Reviewer
Public Advisory Committee Meetings	11.1.4	Participant (Village to host)

## PROJECT ENHANCEMENTS

There are many valuable tasks that could be accomplished in this project with additional funding or if construction costs are lower than estimated. If additional funding is secured or construction funds are reallocated, some of our preliminary ideas include:

1. Incorporate a conceptual design phase prior to final design, to allow for feedback on the wastewater treatment system designs. Budget constraints required stripping of the conceptual design phase from the workplan.
2. Develop a data layer showing the estimated phosphorus sorption potential of soils in the Greenwood Lake watershed, based on analysis of samples of the major soils in the watershed. Samples in each of the major soil series would be sampled to a depth of approximately six feet. These data would be extrapolated to the watershed based on USDA-NRCS soils mapping. This datalayer would demonstrate where the P sorption potential of soils is likely adequate for onsite wastewater dispersal and where advanced treatment to remove phosphorus is likely necessary. This would be a unique contribution to wastewater management nationally.
3. Digitize all OWTS permit data (including plans) in the study area. Develop a geographic data base using GIS to show system age, system type, and estimate design flows for all OWTS in study area. This should be designed so it can be updated by local officials to keep the information up to date.
4. Install clusters of onshore and offshore piezometers/monitoring wells in shoreline areas of Greenwood Lake where septic systems are and are not present to determine groundwater flux into the lake. Where groundwater flux is toward the lake, collect water quality samples for phosphorus constituents in both onshore and offshore sampling locations
5. Perform water quality monitoring in Greenwood Lake to develop a more accurate assessment of wastewater impacts to the Lake. Indicators of wastewater contamination that could be sampled include optical brighteners, caffeine, and indicators of human pathogens.
6. Conduct an aggressive source reduction campaign to reduce phosphorus loads entering the wastewater stream. Activities such as discontinuance of phosphorus containing dishwasher detergents and elimination of garbage macerators could be promoted through education and incentives.
7. Expand the Greenwood Lake Wastewater Management Plan to include greater specificity regarding wastewater flows and clustering options, including siting of dispersal areas for potential cluster systems.

## SCHEDULE

Phase	2007		2008												2009												
	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
1.1 Project Kick-off Meeting	X																										
1.2 Greenwood Lake Public Meeting	X																										
1.3 Refine Project Workplan and Budget		X	X	X																							
1.4 Prepare Statement of Goals/Project Description				X																							
2. Mountain Lodge Park Study		X	X	X	X	X	X	X																			
3. Mountain Lodge Park Recommendations								X	X																		
4.1 2008 Project Management/Grant Administration		X	X	X	X	X	X	X	X	X	X	X	X	X													
4.2 2009 Project Management/Grant Administration															X	X	X	X	X	X	X	X	X	X	X	X	X
4.3 NEPA/SEQR Compliance																											
5.1 Greenwood Lake Wastewater Needs Assessment		X	X	X	X	X	X	X																			
5.2 Identification of Candidate Demonstration Sites							X	X	X																		
5.3 Legal Arrangements for Demonstration Site Testing								X	X	X																	
5.4 Consultation with Regulators					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5.5 QAPP and QAPP Amendments							X	X	X																		
6.1 Characterization of Candidate Demonstration Sites										X	X																
6.2 Evaluation of Phosphorus Removal Approaches				X	X	X	X	X	X																		
6.3 Selection of Decentralized Wastewater Treatment Options							X	X	X	X																	
6.4 Legal/Financial Arrangements for Demonstration Sites									X	X	X																
6.5 Final Selection of Demonstration Sites									X	X	X																
6.6 Topographic Survey										X																	
6.7 Wetlands Consulting										X																	
6.8 Design of Demonstration Systems								X	X	X	X																
6.9 Local/County/State Permitting									X	X	X	X															
7.1 Bidding Process													X														
7.2 Construction Management w/ As-built Drawings													X	X	X												
7.3 Operations and Maintenance Manuals													X	X	X	X											
7.4 Operations and Maintenance Procedures													X		X		X		X		X			X			
8.1 Water Use Monitoring													X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
8.2 Groundwater Quality Monitoring													X		X		X		X		X			X			
8.3 Soil Pore-Water Monitoring													X		X		X		X		X			X			
8.4 Effluent Quality Monitoring													X		X		X		X		X			X			
8.5 Energy Consumption Monitoring													X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
9. Comparison of Energy and Economic Benefits																			X	X							
10. Records Management System									X																		
11.1 Public Involvement Including Local Outreach and Education	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
11.2 Training Programs																	X						X				
11.3 Disemmination of Project Findings								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
12. GWL Conceptual Wastewater Management Plan																						X	X	X	X	X	
13.1 Quarterly Progress Reports					X			X		X		X		X		X		X		X		X					
13.2 Final Project Report																							X	X	X	X	