

- C1 Draft Literature Review on Nitrogen Reduction in Soil Report

Task Description: The provider will review available literature to assess the current status of knowledge related to nitrogen fate and transport in saturated and unsaturated soils. Literature from other fields (e.g. agriculture, agronomy, hydrogeology, soil science, environmental science, ecology, biosystems engineering) will be reviewed for its application to OSTDS in Florida. Particular focus will be placed on studies that have measured and documented denitrification rates in soil and groundwater. This review will expand on the literature review on denitrification in soil performed for the department's Wekiva study and a complementary literature review, recently completed by the Colorado School of Mines. Results of the literature reviewed in this task will be added to the searchable literature reference database established in Task A.

Deliverables from Contract: Draft [literature review](#) and updated reference database.

Status: Task Complete

- C.2 Final Literature Review on Nitrogen Reduction in Soil Report

Task Description: The department will gather comments on the draft final report from RRAC and any other interested parties and transmit such comments to the provider within one month of receiving the draft. The provider will address these comments in preparing final deliverables within one month of receiving comments.

Deliverables from Contract: [Final report](#) and updated reference database.

Status: Task Complete

- C.3 Draft QAPP Evaluation of N Reduction by Soils & Shallow GW

Task Description: The provider will develop a QAPP to document Task C objectives and the monitoring framework for field sites. Information gained during the literature review conducted as part of Task D will be incorporated, as appropriate, into the monitoring framework to ensure data required for model inputs will be collected. The monitoring framework will encompass the "Observational Approach" to allow information obtained in the field and during other tasks (e.g., Task D2, D7, D10, etc.) to be utilized to direct subsequent monitoring. The QAPP will describe the number and type of homeowner systems to be monitored, sample frequency and duration, analytical parameters and methods, data handling and management, and document control.

It is anticipated that each site will be monitored to delineate the OSTDS effluent quality, hydraulic and nitrogen loading rates to the soil, and potential groundwater impacts. Flow meters will be installed as needed to determine actual soil loading rates. Shallow piezometers will be installed within the soil treatment unit and downgradient of the system to evaluate nitrogen fate and transport. Tracer tests using a conservative tracer will be conducted to determine connectivity of the OSTDS-vadose zone-groundwater system as well as evaluate subsurface travel times. Water quality analyses will be conducted on all field samples and will include temperature, total nitrogen, ammonium nitrogen, nitrate-nitrogen, and chloride. Less frequent analyses will be conducted on samples as necessary and will include pH, alkalinity, cBOD5, total phosphorus, anions, cations, fecal coliform, and E. coli. Should a total nitrogen plume be identified from an OSTDS, additional piezometers may be installed to enable further hydrogeologic characterization affecting fate and transport (i.e., groundwater velocity, hydraulic gradient) and assessment of nitrogen concentrations over time. This field monitoring framework will enable evaluation of the current nitrogen reduction in soil and groundwater and provide input to parameter selection for Task D. Results will also enable validation and verification of simple models developed and refined as described in Task D.

It is anticipated that at least two subsurface monitoring sites will be established at each of three dispersed locations in Florida to provide geographical variety. Example candidate locations are the Wakulla area (north Florida), the Wekiva area (central Florida), and a south Florida site to be determined. It is anticipated that four

monitoring events will be conducted at each site. Sites will be selected and monitored to encompass a range of conditions affecting nitrogen mass loading to the environment and the resulting groundwater concentrations.

Site selection will be leveraged, to the extent possible, with Task B to enable complete evaluation of the onsite system from STE through nitrogen treatment units and including soils. The key conditions of importance will be the hydraulic loading rate of effluent to the soil, and the effluent quality discharged to the soil.

It is anticipated that a soil treatment and groundwater monitoring test center will also be established in this task to provide performance evaluations of multiple wastewater treatment systems; systems that will provide a broad range of nitrogen removal capabilities. The subsequent application of treated effluent to soil treatment and dispersal units will result in separate, non-comingled plumes which can be used for monitoring of nitrogen fate and transport in the subsurface. Subsurface monitoring will be used to develop data sets for nitrogen fate and transport for parallel systems receiving widely varying nitrogen concentrations. Subsurface sites at the test center will be monitored for a variety of parameters at different frequencies, including pH, alkalinity, DO, ORP, TKN, NH₃, NO_x, C-BOD₅, TP, PO₄, fecal coliform, and total enterococci. Duration and frequency of monitoring at each of the sites will be specified in the QAPP.

Deliverables from Contract: [Draft QAPP](#) for field sites and test center.

Status: Task Complete

- C.4 Recommendation for Process Forward (per meeting)

Task Description: Based on the details agreed upon in the draft QAPP, the provider will develop a revised cost estimate and a recommendation whether or not to proceed with the remainder of Task C as outlined below, or recommend an amendment to this contract. Both the provider and FDOH shall reach a written agreement prior to moving forward with Task C.

Deliverables from Contract: [Meeting summary and recommended scope and budget revisions](#) **Status:**

Task Complete.

- C.5 Final QAPP Evaluation of N Reduction by Soils & Shallow GW

Task Description: The department will gather comments on the draft final report from RRAC and FDOH internal review and transmit such comments to the provider within one month of receiving the draft. The provider will address these comments in preparing final deliverables within one month of receiving comments. If the provider subsequently recommends modifying or adding procedures to address conditions encountered in the field, the QAPP may be revised or appended upon mutual agreement between provider and the department.

Deliverables from Contract: [Final QAPP](#) acceptable to FDOH.

Status: Task Complete.

- C.6 S&GW Test Facility Design 50%

Task Description: The Gulf Coast Research & Education Center of the University of Florida has been evaluated by the provider for establishing a controlled test site for side-by-side evaluation of multiple soil treatment unit regimes and the resulting nitrogen groundwater fate and transport. This task will be leveraged with tasks B and D.

Since both the Task A and Task C test facilities will be located at the GCREC, the provider will design the test facility for Task C in concert with the Task A test facility. The Task C test facility 50% design submittal will include preliminary layout sketches and design concepts and criteria. Provisions for supporting installation, operation, and monitoring of treatment systems and groundwater plumes, including controllable dosing flowrates, effluent quality, soil hydraulic loading rates, and staging for field efforts. The monitoring framework will support evaluation of time and spatial variations of soil treatment and groundwater plume configurations (e.g. groundwater flow velocity, concentrations, etc.). Provisions will be made for supporting the installation and operation of in-tank treatment systems or unsaturated groundwater monitoring systems, including supply of power, treatment system sub-components, a common wastewater source at controllable flowrates, provision for effluent routing to soil treatment units, sampling collection and monitoring appurtenances, and staging of field analytical work and sampling will be included.

The 50% design documents will be submitted to FDOH for review and comment. Comments will be provided by the department within two weeks of receipt.

Deliverables from Contract: [50% design documents.](#)

Status: Task Complete

- C.7 S&GW Test Facility Design 100%

Task Description: The provider and the department will agree on the test facility design and experimental concepts based on review of the 50% design submittal. The provider will prepare the test facility 100% design submittal based on these concepts. The 100% design submittal will include all design details and technical specifications necessary to estimate construction cost. These documents will be submitted to FDOH for review and comment. Comments will be provided by the department within two weeks of receipt.

Deliverables from Contract: [100% design documents.](#)

Status: Task Complete

- C.8 S&GW Test Facility Design Final

Task Description: In preparing the test facility final design submittal, the provider will include final revisions based on the review of the 100% design submittal. This will result in a set of signed and sealed construction plans suitable for facility construction.

Deliverables from Contract: [Signed and sealed construction plans.](#)

Status: Task Complete

- C.9 S&GW Construction Support & Administration (2 deliverables, 50% at start, 50% at completion)

Task Description: The provider will work with a construction contractor for facility construction using a designbuild methodology within the amount budgeted for construction in this attachment or its amendments. Construction will be completed in two phases, with Phase 1 relating mostly to PNRSII pilot test facilities while Phase 2 will primarily involve construction of facilities related to Task C soil treatment and groundwater monitoring studies. This subtask will cover the Phase 2 construction. There will be some overlap between PNRSII and Task C facilities, for example, power supply for the test facility will be constructed in Phase 1 (Task A) but will also serve the Task C facilities. The in-situ biofilter systems for PNRSII will be constructed in Phase II along with the mini-mounds for Task C.

Provider will be onsite during construction to review materials and equipment being used to determine if work is conducted in accordance with the construction plans and will assist with installation of monitoring equipment. Construction will be reviewed for completeness by the provider and for conformance with the design intent. The provider will propose a contract amendment to increase funds or test facility design changes to decrease costs as necessary and feasible to maintain budget. Provider will respond to Contractor requests for information and prepare any necessary addenda. Construction will be reviewed for completeness by the provider and conformance with contract documents.

Deliverables from Contract: [Compensation for this subtask](#) will be in two phases: 50% upon start of facility construction and the remaining 50% at construction completion.

Status: Task Complete

- C.10 S&GW Test Facility Construction 50% (2 deliverables, start and 50% complete)

Task Description: The provider will monitor facility construction as needed to monitor progress and conformance with design documents. For budgeting purposes, the provider and the department have assumed a construction cost value in this scope and budget. At the time the contractor is onsite and construction is started, invoices for materials and mobilization will be submitted to the Department by the Provider for payment. When the provider determines that approximately 50% of the facility construction is complete, a construction progress report will be provided for documentation and this subtask will be deemed complete, and the remaining amount in the Section C. cost schedule for this subtask will be paid to provider.

Deliverables from Contract: [Documentation of contractor and equipment onsite and Construction Progress Report](#) (at 50% complete).

Status: Task Complete

- C.11 S&GW Test Facility Construction 100% (cost reimbursable)

Task Description: Provider will monitor facility construction as needed to monitor progress and conformance with design documents. This task will include the construction cost of the facility based on the construction estimate and any approved additional costs. For budgeting purpose the provider and the department have assumed a construction cost value in this scope and budget. This subtask will be based on this amount as a cost reimbursable item not to exceed the estimated total construction cost value, and will be documented by contractor invoices, material and equipment bills, and other provider incurred expenses. The amount paid will be the total documented Task C construction cost less the amount paid to provider in subtask C-10 above.

Deliverables from Contract: [Construction progress report.](#)

Status: Task Complete

- C.12 S&GW Test Facility Construction Substantial Completion

Task Description: Provider will conduct a site inspection to determine if the project is substantially complete. The inspection will result in the preparation of a punch list to be delivered to the contractor in writing for final completion.

Deliverables from Contract: [Construction punch list.](#) **Status:**

Task Complete

- C.13 S&GW Test Facility Accept Construction

Task Description: The provider will conduct one final inspection for the project to determine if the work has been completed in accordance with the contract documents and the punch list. Subsequent to this final inspection, the provider will make final payment to the subcontractor. Written notice shall be provided to FDOH that the work is complete. As-built drawings will then be developed by the provider for the facility.

Deliverables from Contract: [As-built drawings of the test facility.](#)

Status: Task Complete

- C.14 Soils & Hydrogeologic and Monitoring Plan for S&GW Test Facility

Task Description: The soil and groundwater characteristics of the test facility site will be determined by the provider as described in the QAPP. Characterization will include soils analyses, aquifer testing, piezometer installation and tracer testing with a conservative tracer to establish groundwater flow parameters. Based on the results of this characterization, a monitoring plan will be established for the six mini-mound systems at the soil and groundwater test facility. The location, number and frequency of sampling will be as generally defined in the QAPP, but refined based on results of this task. Additionally, field assessment for Task D model parameter estimation, model verification and validation will also be included as available from results of this task.

Deliverables from Contract: [Soil and groundwater characterization memo](#) and revised QAPP element for test facility.

Status: Task Complete

- C.15 Tracer Testing at GCREC (per tracer test)

Task Description: Groundwater tracer tests will be conducted at the research sites based on the protocols outlined in the QAPP. First, an ambient groundwater tracer test will be conducted at or immediately adjacent to the site of the Soil and Groundwater Test Facility to determine existing groundwater flow characteristics using a conservative tracer substance. Second, a groundwater tracer test will be initiated at the GCREC Mound system to delineate groundwater flow characteristics downgradient of the mound. Third, a groundwater tracer test will be conducted at one of the mini-mounds at the Soil and Groundwater Test Facility after start-up to characterize groundwater flow and contaminant transport from these systems. Deliverables for this task will be a tracer test memo describing each test and the results, and payment will be per test memo. The Department may authorize the Provider in writing to perform additional tracer tests as part of this project.

Deliverables from Contract:

[Tracer Test Memo 1](#)

[Tracer Test Memo 2](#)

[Tracer Test Memo 3](#)

Status: Task Complete

- C.16 S&GW Sample Event Reports (per sample event)

Task Description: The monitoring and data collection framework for the soil and groundwater test facility will be described in the revised QAPP including number of sampling points for each plume, sampling frequency and duration, and analytical parameters. Monitoring reports, based on the QAPP framework, will be provided that describe site conditions and interim sample results (i.e., compiled data from field and analytical laboratory analyses). A brief description of the monitoring progress will be provided.

Deliverables from Contract:

[Sampling event report 1](#)
[Sampling event report 2](#)
[Sampling event report 3](#)
[Sampling event report 4](#)
[Sampling event report 5](#)
[Sampling event report 6](#)

Status: Task Complete

- C.17 S&GW Data Summary Report (per sample event)

Task Description: The provider will provide data reports that verify completion of analyses by an analytical laboratory and that include compiled data from field and analytical laboratory analyses in electronic and paper form. This task is contingent on the previous task.

Deliverables from Contract:

[Data Summary Report for sampling event 1](#)
[Data Summary Report for sampling event 2](#)
[Data Summary Report for sampling event 3](#)
[Data Summary Report for sampling event 4](#)
[Data Summary Report for sampling event 5](#)
[Data Summary Report for sampling event 6](#)

Status: Task Complete

- C.18 Test Facility Closeout Report

Task Description: At the conclusion of controlled test site monitoring, the provider will determine if the test facility infrastructure will be transferred to the property owner or the site restored to prior condition. If the property owner wishes to keep the facility, the provider will submit an acceptance document to the department that documents transfer of ownership and complete responsibility of test site infrastructure to the owner. A report will be provided to document close-out of the site.

Deliverables from Contract: [Test Facility Closeout Report.](#)

Status: Task Complete

- C.19 Field Site Selection (per property owner agreement)

Task Description: Candidate field sites will be identified by the provider for subsurface monitoring activities. FDOH permit information will be gathered by the provider as available on candidate sites, and a system inspection and evaluation conducted on selected sites. Monitoring at the sites will be used to assess the current level of nitrogen reduction obtained by Florida soils, to assess groundwater impacts due to conventional systems, and to provide data for parameter estimation, and verification and validation of models developed in Task D. Sites will be monitored by the provider to encompass a range of conditions affecting nitrogen mass loading to the environment and the resulting groundwater concentrations. Specifically, key conditions of importance will be the hydraulic loading regime, the rate of effluent discharged to the soil, and the effluent quality (e.g. BOD, nitrogen) discharged to the soil. Factors considered during site selection include property owner amenability, site access, occupancy, system age, type of system and daily wastewater flow. While numerous subtleties exist between individual OSTDS, monitoring a range of these key conditions and factors will enable comparison of sites. Based on the previous subtasks and the process forward meeting, the first site to be monitored will be the existing mound system at the GCREC, for which the property owner agreement has already been established in subtask A12. This will allow establishment of materials and

methods for subsequent field site monitoring, and provides a large, unobstructed area to study a nitrogen plume in more detail than could be accomplished at a private home site.

Agreements will be established with property owners by the provider for establishing monitoring systems. It is anticipated that up to seven (7) field sites will be identified for potential inclusion in the study. Availability of funding and site characteristics will be used to establish which of these will be included for monitoring.

Deliverables from Contract:

[Property Owner agreement site 1](#), [Property Owner agreement site 2](#), [Property Owner agreement site 3](#), [Property Owner agreement site 4](#), [Property Owner agreement site 5](#), [Property Owner agreement site 6](#), [Property Owner agreement site 7](#)

Status: Task Complete

- C.20 Instrumentation of GREC Mound System

Task Description: The QAPP documents the objectives, monitoring framework, sample frequency and duration and analytical methods to be used at the GREC existing mound system site. Additional soil and groundwater testing will be conducted, if necessary, based on the results in Task C 14. Instrumentation of the site, in accordance with the QAPP, will include providing all materials and assembly needed to establish the monitoring framework at the site, and will be performed by the provider. A monitoring installation report will be provided by the provider for the GREC site describing the monitoring system and any additional characterization.

Deliverables from Contract: GREC Mound Characterization and Monitoring Installation [progress report 1](#), [progress report 2](#), [monitoring grid](#)

Status: Task Complete

- C.21 GREC Mound Sample Event Report (per sampling event)

Task Description: The monitoring framework established at the GREC will be described in the QAPP including number of sampling points, sampling frequency and duration, and analytical parameters. Monitoring reports, based on the QAPP framework, will be provided that describe site conditions and interim sample results (i.e., compiled data from field and analytical laboratory analyses).

Deliverables from Contract: [GREC Mound sampling event report 1](#), [GREC Mound sampling event report 2](#), [GREC Mound sampling event report 3](#), [GREC Mound sampling event report 4](#).

Status: Task Complete

- C.22 GREC Mound Data Summary Report (per sampling event)

Task Description: The provider will provide data reports that verify completion of analyses by an analytical laboratory and that include compiled data from field and analytical laboratory analyses in electronic and paper form. This task is contingent on the previous task.

Deliverables from Contract: [Data Summary Reports sampling event 1](#), [Data Summary Reports sampling event 2](#), [Data Summary Reports sampling event 3](#), [Data Summary Reports sampling event 4](#)

Status: Task Complete

- C.23 Instrumentation of Remaining Field Sites Report (per site)

Task Description: The QAPP will document the objectives, monitoring framework, sample frequency and duration and analytical methods to be used at the remaining field sites, presumably individual private home sites. Instrumentation of the sites, in accordance with the QAPP, will include providing all materials and assembly needed to establish the monitoring framework at each home site, and will be performed by the provider. A monitoring installation report will be provided by the provider for each of up to four (4) individual home sites describing the monitoring system.

Deliverables from Contract: [Monitoring Installation report 1](#), [Monitoring Installation report 2](#), [Monitoring Installation report 3](#), [Monitoring Installation report 4](#)

Status: Task Complete

- C.24 Field Sites Sample Event Reports (per sample event, per site)

Task Description: The monitoring framework will be described in the QAPP including number of sampling points at each site, sampling frequency and duration, and analytical parameters. Monitoring reports, based on the QAPP framework, will be provided that describe site conditions and interim sample results (i.e., compiled data from field and analytical laboratory analyses).

Deliverables from Contract: Sampling event report (per sampling event, per site). System 1 Sample event [1](#); System 2 Sample events [1](#), [2](#), [3](#), [4](#); System 3 Sample events [1](#), [2](#), [3](#), [4](#); System 4 Sample events [1](#), [2](#), [3](#), [4](#).

Status: Task Complete

- C.25 Field Sites Data Summary Report (per sample event, per site)

Task Description: The provider will provide data reports that verify completion of analyses by an analytical laboratory and that include compiled data from field and analytical laboratory analyses in electronic and paper form. This task is contingent on the previous task.

Deliverables from Contract: Data Summary Reports (per sampling event, per site). System 1 Sample event [1](#); System 2 Sample events [1](#), [2](#), [3](#), [4](#); System 3 Sample events [1](#), [2](#), [3](#), [4](#); System 4 Sample events [1](#), [2](#), [3](#), [4](#).

Status: Task Complete

- C.26 Draft Site Summary and Close-out Memo (per site)

Task Description: The provider will prepare data tables summarizing the observations for each site, including site conditions, onsite system characteristics and soil and ground water concentrations and conditions found.

At the conclusion of home site monitoring, the provider will submit homeowner acceptance documents to the department that either transfer ownership and responsibility of monitoring points to the homeowner (e.g., piezometers) or all monitoring points will be removed by the provider and the site shall be returned to its original configuration.

A report will be provided to the department to document close-out of each home site. The draft close-out memos will be submitted to FDOH for review and comment.

Deliverables from Contract: Draft Site Close-out memo. [Site 1](#), [Site 2](#), [Site 3](#), [Site 4](#), [GCREC Site](#).

Status: Task Complete

- C.27 Final Site Close-Out Memo (per site)

Task Description: Comments will be provided by the department within two weeks of receipt and the provider will prepare a final close-out memo.

Deliverables from Contract: Final site close-out memo acceptable to FDOH. [Site 1](#), [Site 2](#), [Site 3](#), [Site 4](#).

Status: Task Complete

- C.28 Draft Task C Final Report

Task Description: The final report will summarize results of Task C activities on nitrogen reduction in Florida soil and shallow groundwater. The report will include task objectives, methods, results, discussion, conclusions and recommendations.

Deliverables from Contract: A draft report will be provided for comment prior to submittal of the final report.

Status: Task Eliminated.

- C.29 Task C Final Report

Task Description: The department will gather comments on the draft final report from RRAC and FDOH review and transmit such comments to the provider within one month of receiving the draft. The provider will address these comments in preparing final deliverables within one month of receiving comments.

Deliverables from Contract: Final Report.

Status: Task Eliminated

- C.30 Change-order Allowance

Task Description: From time to time the Department may find it necessary to make minor changes or adjustments to activities under this task based on results that indicate a potential improvement to the project by making a change. Examples of such changes include additional or revised sample locations and parameters, minor modifications to test systems or field activities based on problems encountered, or conditions that develop requiring expedient actions to correct a potentially serious problem. Up to \$ 40,000 will be allocated from the contract budget for such minor changes to research activities under this task. Upon determination by the Department that changes should be made, all or a portion of these funds may be authorized by written notification from the Department to the Provider directing specific changes to research activities be made, and the amount budgeted for the changes specified.

Deliverables from Contract: Deliverables outlined in authorization letter.

[Additional Monitoring Wells for S&GW Test Area 3 Tracer Test Progress Report 1](#), [Additional Monitoring Wells for S&GW Test Area 3 Tracer Test Progress Report 2](#), [Abandonment of Monitoring Wells at S&GW Site 3 and Site 4](#), [Abandonment of S&GW Test Facility](#).

Status: Task Complete