ULSTER COUNTY RESOURCE RECOVERY AGENCY

RESOLUTION NO. 2629

RE: Authorizing Agency to Accept SCS Engineers' Proposal and Authorizing Agreement for Engineering Services

WHEREAS, the Ulster County Resource Recovery Agency (the "Agency") is engaged in Solid Waste Management and Recycling in Ulster County; and

WHEREAS, the Agency seeks to reduce costs and greenhouse gas (GHG) emissions associated with the disposal of leachate generated by the Town of Ulster and New Paltz Landfills while still maintaining regulatory compliance pursuant to New York State and federal laws and regulations; and

WHEREAS, the Agency issued an RFP for Engineering Services for Leachate Management Town of Ulster and New Paltz Landfills; and

WHEREAS, SCS Engineers of New York, PC ("SCS") provided the Agency with is Proposal to Provide Engineering Services for Leachate Management Town of Ulster and New Paltz Landfills ("SCS' Proposal"); and

WHEREAS, SCS is a recognized leader in the field of landfill leachate and industrial liquids management services and the Agency has determined that SCS' Proposal will provide the Agency with the engineering services necessary to meet its goals for the project, at the most favorable terms (when compared with proposals provided to the Agency in response to the RFP); and

WHEREAS, it is in the best interests of the Agency to accept SCS' Proposal and to enter into an agreement between SCS and the Agency for professional services, in the same form and substance as the agreement provided in Appendix D of the SCS Proposal; and

NOW THEREFORE, BE IT

RESOLVED, that Ulster County Resource Recovery Agency does hereby authorize and approve SCS Engineers of New York, PC's Proposal to Provide Engineering Services for Leachate Management Town of Ulster and New Paltz Landfills, attached hereto as Exhibit "A" and made a part of this Resolution; and be it,

FURTHER RESOLVED, that the Executive Director of the Agency is hereby authorized and empowered to execute an Agreement between SCR Engineers of New York, P.C. and the Agency for Professional Services in the same form and substance as the agreement provided in Exhibit A (as Appendix D of the SCS Proposal) on behalf of the Agency; and be it,

FURTHER RESOLVED, that the Executive Director and Agency staff are hereby authorized to take all steps necessary to carry out the Agency's duties and obligations, as set forth in such agreement upon execution of the same; and be it,

FURTHER RESOLVED, that this Resolution shall take effect immediately.

Moved by: Seconded by: _____

Vote: Ayes _____ Nays _____ Absent _____

Date: October 24, 2024
Financial Impact: Attached

EXHIBIT "A"

July 24, 2024
File No. 020338224

Mr. Marc Rider
Executive Director
Ulster County Resource Recovery Agency
PO Box 6219
999 Flatbush Road
Kingston, New York 12402

Subject: Proposal for Engineering Services for Leachate Management
Town of Ulster and New Paltz Landfills

Dear Mr. Rider:

The Ulster County Resource Recovery Agency (Agency) seeks to reduce costs and greenhouse gas (GHG) emissions associated with the disposal of leachate generated by the Town of Ulster and New Paltz Landfills while still maintaining regulatory compliance. Landfill leachate management is one of the most technically challenging tasks for solid waste managers, even at closed landfill sites. The selection of a leachate treatment/disposal method(s) to implement has long-term effects on costs, operations, maintenance, and regulatory compliance. With so many different technical options available for leachate treatment/disposal and with such a wide range of possible costs, it is important to have considered as many of the site-specific issues, as possible.

You have shared that your goals for this project are to:

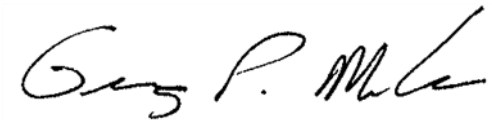
1. Evaluate the effectiveness and reliability of the existing leachate disposal system.
2. Identify leachate management methods that are the most appropriate for your facility(s).
3. Obtain information to make decisions regarding your leachate management options.

SCS Engineers of New York, PC (SCS) proposes an evaluation of the Agency's overall leachate management and will provide you with an unbiased, site-specific assessment of treatment/disposal options to aid in your decision making. We are ready to work with you as a partner to find cost-effective, regulatory-compliant options that support your goals.

We appreciate the opportunity to provide you with this proposal. Please contact Christine Stokes at (845) 918-5219 with any questions regarding your project.

Sincerely,

Christine H. Stokes
Project Manager
SCS Engineers of New York, PC



Gregory P. McCarron, PE
Project Director/Vice President
SCS Engineers of New York, PC

cc: Samuel Cooke, SCS Engineers
Kerim Temel, SCS Engineers
Lisa Wilkinson, SCS Engineers
Tim Smith, SCS Engineers

Encl. Proposal

Proposal to Provide Engineering Services for Leachate Management Project No. 2024-04 Town of Ulster and New Paltz Landfills

Ulster County Resource Recovery Agency
PO Box 6219
999 Flatbush Road
Kingston, NY 12402

SCS ENGINEERS

020338224 | July 24, 2024

4 Executive Boulevard, Suite 303
Suffern, New York 10901
845-357-1510

Table of Contents

Section Page

1 Project Background 1
Town of Ulster Landfill 1
Town of New Paltz Landfill 2
2 Scope of Services 4
Task 1 - Kick-off Meeting and Site Visit 4
Task 2 - Greenhouse Gas Emissions 4
Task 3 - Testing and Analysis of Data 5
Task 4 - Alternative Methods 5
Task 5 - Summary Report and Recommendations 6
3 Schedule & Budget 7
4 SCS Personnel 8
5 SCS Experience and Qualifications 10
References 10
Fresh Kills Landfill (New York) 10
Keegan Landfill (New Jersey) 11
Other Project Experience 11
Douglas County, Roseburg Landfill (Oregon) – Leachate Treatment Options Analysis and Leachate Treatment Plant Design/Construction 12
Hillsborough County Southeast Landfill (Florida) – Leachate Treatment Evaluation and Design 12
Confidential Publicly Owned Landfill Client (Wisconsin) – Leachate Treatment Options Analysis 12
Frederick County Landfill (Virginia) – Leachate Source Reduction, Storage Pond Construction, and On-Site Treatment Options Analysis 13
Sarasota County Landfill (Florida) – Leachate On-Site Treatment Options Analysis 13
Escambia County Waste Services - Perdido Landfill (Florida) – Leachate Treatment and Disposal Evaluation 13
Confidential Privately-Owned Landfill Client (Virginia) – Leachate On-Site Treatment Options Analysis 14
Confidential Privately Owned Landfill (Colorado) – Leachate Management Alternatives Study 14
New Hanover County Landfill (North Carolina) - Design On-Site Leachate Treatment System 14
BKK Landfill (California) – Leachate Treatment OM&M 15

Appendices

Appendix A Proposal Form and Non-Collusion Proposal Certification
Appendix B Proposed Schedule
Appendix C Fee Schedule
Appendix D Agreement for Professional Services
Appendix E Project Team Resumes
Appendix F Project Profiles

1 PROJECT BACKGROUND

This proposal has been prepared in response to the Ulster County Resource Recovery Agency (UCRRA, the Agency) Request for Proposals to offer alternatives to storing and transporting leachate for off-site disposal. Our proposal includes the requirement in Exhibit A of the RFP. Exhibit B appears to be related to compliance with permit requirements (if applicable). The proposal form and Non-Collusion Proposal Certification are included in **Appendix A.**

The Agency is at a crucial point in time regarding the management of landfill leachate at the Town of Ulster and New Paltz Landfills. The leachate generation rate increases in some years which results in increased costs for hauling and disposal. Ulster County wants to decrease their overall leachate post-closure care costs, which are primarily driven by the leachate disposal costs.

The following information is summarized or quoted directly from the UCRRA information provided in RFP Addenda No 1 and 2 (most of the technical information provided in the RFP Addenda was for the New Paltz Landfill). Leachate disposal cost for both of the landfills is $0.07/gallon with transport cost ~$0.15/gallon.

The past and current leachate concentrations are similar for the Town of Ulster and New Paltz Landfills. The following is a summary of the analytical results sent in the RFP Addenda:

- Ammonia (NH3): 1.9 to 28 milligrams per liter (mg/L) (more recent results were in the lower concentration range)
- Total Kjeldahl Nitrogen (TKN): 11 mg/L (New Paltz LF Grab), 2.6 mg/L (Ulster LF Grab) in 2020
- Biological Oxygen Demand (BOD): 2.6 to 13 mg/L (more recent results were in the lower concentration range)
- Total Suspended Solids (TSS): 2.7 to 8.0 mg/L (more recent results were in the lower concentration range) New Paltz LF Grab: 21 mg/L in 2020
- Total Dissolved Solids (TDS): 290 to 340 mg/L
- Chloride: 5.7 to 6.3 mg/L
- Metals: Either Non-Detect (ND) or low micrograms per liter (ug/L) constituents except for iron (1.12 mg/L) and thallium (2.6 ug/L)
- pH: 7.3 (a pH of 17.2 was presented in one Town of Ulster Landfill sample lab report, which is unlikely to be correct)
- Volatile Organic Compounds (VOCs): ND
- Polycyclic Aromatic Hydrocarbons (PAHs): ND except Bis (2-ethylhexyl) phthalate at 0.011 mg/L in 11/2017 (at Town of Ulster Landfill)
- Organochlorine pesticides and polychlorinated biphenyls (PCBs): ND
- Other constituents: Additional constituents were analyzed – see RFP Addenda for results

TOWN OF ULSTER LANDFILL

The Agency provided information on the Ulster Landfill in the Addendum 1 Questions/Answers; Addendum 2 Final Closure Plan drawing dated June 1993 prepared by Clough, Harbour & Associates; and, a "2023 Annual Post-Closure Monitoring Results" report for the Town of Ulster Landfill prepared by Sterling with the following summarized from the report:

- The volume of leachate holding tanks at the Town of Ulster Landfill is four tanks with 21,000 gallons capacity each.

- Leachate flow rate information was provided, with the following being a summary:
  - January – May 2024 flow total: 1,296,778 gallons
  - 2023 flow total: 2,094,832 gallons
  - 2002 to 2022 flow totals ranged from a low of 731,500 gallons in 2002 to a high of 3,050,000 gallons in 2005, with the average annual flow of 1,486,800 gallons.

- Leachate quality has been analyzed for several decades with some of that data presented in the RFP addenda, which has been summarized above for both landfills.

Groundwater quality is measured at the landfill by analyzing samples from four groundwater monitoring wells and off-site migration is tracked by analyzing samples from four residential wells and one commercial well. Groundwater at the landfill consistently has groundwater quality exceedances for chloride, total dissolved solids (TDS), iron, manganese and sodium. The off-site wells have historically had groundwater quality exceedances for sodium.

TOWN OF NEW PALTZ LANDFILL

The Town of New Paltz Landfill is a 19-acre unlined landfill that served the area of New Paltz, NY from 1959 until its closure in 1996. The following are important points from the information provided by the Agency:

- Portions of the waste mass were reported to be located on the surface of bedrock as well as thin layers of overburden soils.

- The landfill was closed in accordance with 6 NYCRR Part 360 with a geomembrane capping system, landfill gas venting, stormwater management and a leachate collection system (LCS).

- The LCS surrounds the entire landfill and consists of two gravity collection piping systems and is reported to intersect the water table (depending on prevailing groundwater elevations) thus functioning as a French drain. Each of the collection piping systems is composed of a 6-inch diameter perforated drainpipe set in a gravel packed trench that was excavated at or about the edge of the waste, which is inboard of the edge of the geomembrane capping system. In some areas, the routing of the leachate collection piping is located further inboard of the landfill perimeter, especially on the downgradient (east) side of the landfill which places the perforated collection pipe more closely into the waste.

- The LCS has a number of lateral drains constructed perpendicular to the perimeter collection piping which extend into the waste mass and up the side-slope to serve as a “leachate collection trench on side-slope”. The lateral drains were intended to serve as relief drains used to address the occurrence of leachate seeps when leachate would daylight to the surface of the side-slope prior to capping.

- The quantity of leachate collected by the LCS ranges from ~1.3 million to 2.2 million gallons per year.

- The leachate sample laboratory data indicates that the leachate is low strength; however, the flow rate is considered to be higher than normal for a capped facility. It was reported that portions of the LCS may be collecting clean groundwater that becomes commingled

with the landfill leachate in the LCS. During 2011, a study was proposed by Cornerstone Engineering & Land Surveying (Cornerstone) to identify what portions of the existing gravity collection system may be collecting uncontaminated groundwater. The workplan for this study reported that groundwater flows from the southwest to the northeast and there were eight monitoring wells installed at the site.

- In 2012, a report was generated by Cornerstone for the landfill leachate/ groundwater study which reported that the liquids sampled from the leachate lateral cleanouts was very similar in concentration to the liquids in the leachate sump and the groundwater in the down gradient monitoring wells.

  SCS Observation: With the exception of the ammonia concentration, which was two to three orders of magnitude higher in the leachate when compared with the downgradient groundwater results) the leachate and groundwater appeared to have some similar constituent concentrations. The overall conclusion within the report was that the landfill cap was performing as designed, there was no detectable leachate mound within the landfill and liquids in the perimeter collection system and the leachate sump are derived from groundwater moving through the waste and represent a dilute leachate.

- The 2012 Cornerstone report recommended the following:
  - Advance test pits to evaluate if the liquid is flowing within the bedding material underlying the landfill leachate collection pipes. If liquid was encountered samples for analysis were to be collected.
  - Consider reducing the volume of bedrock groundwater upwelling into the waste by pumping a sufficient volume of groundwater from the bedrock to lower the potentiometric head in the bedrock underlying the landfill waste mass.
  - As an alternative to groundwater pumping, consider treating the leachate to the extent sufficient to allow discharge to the surrounding ground surface. It was suggested that treatment of the low strength, dilute leachate may be cost effective and "packaged treatment process and/or a constructed wetland treatment system".

- A subsequent "2023 Annual Post-Closure Monitoring Results" report was prepared by Sterling Environmental Engineering (Sterling) with the following summarized from the report:
  - The landfill cover is being maintained with no evidence of erosion, settlement, excessive surface water ponding or leachate discharge.
  - Groundwater flow direction continues to be toward the northeast with the groundwater sample results indicating that concentrations of indicator constituents are consistent with historical data trends.

The following were noted during the pre-bid site visit:

- A "wet" area was noted by the Agency at the northwestern portion of the Ulster Landfill which may be a possible area for on-site retention.

- A former hunting cabin pond is present just off (within the landfill parcel) the New Paltz Landfill which overtops and discharges to the landfill perimeter road. The Agency noted that during the past 18 months there has been an additional 1.5 million gallons of leachate generated at this Landfill in connection with this pond.

2 SCOPE OF SERVICES

TASK 1 - KICK-OFF MEETING AND SITE VISIT

We will attend a kick-off meeting and conduct site visits to each landfill. This task is expected to be divided into two components: a collaborative face-to-face discussion with UCRRA staff to go over project coordination and information, and in-depth site visits by SCS staff members to observe the two existing leachate systems and the site issues that impact leachate generation at both closed landfills. We will request the following information, prior to the kick-off meeting:

1. Existing permit(s), including discharge limits.
2. Correspondence regarding leachate quality/regulatory issues.
3. Town of Ulster Landfill leachate collection system layout (in CAD format).
4. Minimum of 5 years historical daily, monthly and annual flow rates of the Town of Ulster Landfill's and Town of New Paltz Landfill's leachate.
5. Operational history (i.e., construction, filling, capping) of each cell at both landfills.
6. Minimum of 3 years historical quarterly analytical results/characteristics of both landfill's leachate including organic strength (i.e., BOD and COD), nitrogen compounds (i.e., ammonia, TKN, nitrite, nitrate), other micro nutrients, total suspended solids (TSS), total dissolved solids, metals, pH, alkalinity, etc. and sampling methods (i.e., "grab" or "composite" methods).
7. For both, the existing landfill's leachate pump station and leachate force main:
    a. Design information, including overall force main layout, clean-outs and piping plan and profile drawings.
    b. Operation history of pump station and force main, including any pipe pluggage and cleaning incidents, flow capacity restrictions or other operation issues.
    c. Implementation of any capacity, management, operation and maintenance activities.
8. Minimum types and percentages of wastes that have been received at the landfills (we can also use historical data).
9. Current leachate management costs (i.e., break out of the cents/gallon associated with the disposal of leachate at the POTW).
10. Size of the leachate storage tank(s) and working volumes of any lagoons that would be available for storage of leachate.
11. Prior Hydrologic Evaluation of Landfill Performance (HELP) modeling

Our evaluation and review will be based on the information provided by the Agency. Data and information that are critical to making a decision may not be available or known. If such information is identified during our evaluation, we will communicate with your staff so that appropriate actions can be taken to address any gap in the information that is key to making accurate and cost-effective leachate management decisions.

TASK 2 - GREENHOUSE GAS EMISSIONS

We will conduct a greenhouse gas (GHG) emissions evaluation, comparing current leachate management practices (hauling offsite) versus on-site treatment. By analyzing the carbon footprints of both methods, this task aims to identify the most sustainable approach and to minimize the environmental impact of leachate management practices. The results of this evaluation will be included in the summary report.

TASK 3 - TESTING AND ANALYSIS OF DATA

UCRRA has provided historical data which appears sufficient to perform the initial feasibility evaluation. Therefore, additional testing or sample collection is not required. If the selected leachate management approach requires additional characterization, leachate will be collected for analysis in a future phase (not part of this proposal's scope or costs).

As part of this task, we will review and evaluate the historical data and establish a design basis for the alternatives evaluation. We will review historical leachate flow rate data as well as raw leachate constituent concentrations of samples collected from each landfill.

TASK 4 - ALTERNATIVE METHODS

We will evaluate alternative leachate management practices. This evaluation will consider and cover the following:

- Existing storage capacity
- Regulatory requirements
- Onsite treatment alternatives, including:
  - Constructed wetlands
  - Evaporation systems
  - Filtration systems
  - Advanced oxidation systems
- Offsite disposal via direct discharge to the sanitary sewer
- Rough order of magnitude cost estimates (for up to 3 options)
- GHG emissions estimates for the identified options (up to 3 options)

The alternatives evaluation will consider the following criteria:

- Ability to treat leachate constituents and meet regulatory standards for the target constituents' removal.
- Rough order of magnitude capital and long-term operation and maintenance (O&M) costs.
- Available space for treatment systems.
- Consistent performance of the treatment systems.
- Robustness of the treatment systems for this leachate application.
- Operational flexibility (e.g., modularity, ability to modify the process, turndown).
- Known technology that is reasonably easy to operate with reasonable system maintenance.
- Implementation and constructability within the footprint identified.
- Residuals disposal options.
- Flexibility for future leachate pretreatment system upgrades.

Deliverables:

1) PowerPoint presentation summarizing the leachate pretreatment alternatives results.
2) Process Flow Diagrams (PFD) of the main treatment system components.

Assumptions:

1) Alternative technologies are expected to be limited given the leachate characteristics and treatment goals.
2) Association for the Advancement of Cost Engineering (AACE) Class 5 (order of magnitude) cost estimate for up to 3 alternatives. At this stage of the project cost estimating, the emphasis will be on getting comparative cost estimates for the treatment alternatives so they can be compared.

TASK 5 - SUMMARY REPORT AND RECOMMENDATIONS

We will consolidate the results of Tasks 1-4 into a report. This report will include a summary of the background and historical data review; GHG emission calculations/comparisons; a description of the alternative leachate treatment systems; the budgetary cost estimates; and, our recommendations focusing on cost savings and GHG reduction. We will provide a draft report to UCRRA for review and comment before finalizing the report.

3 SCHEDULE & BUDGET

Upon notice to proceed from the Agency, we will schedule the initial site visit to review the existing facility operation and meet with the Agency's project team. At the initial meeting, we will discuss expectations regarding the project scope as well as our working relationship. We will schedule future meetings and deliverable dates during the initial site visit and agree on the preferred method of communication for team members.

A proposed schedule is presented in **Appendix B**. In summary, we expect to begin the evaluation in mid-August and submit a draft summary report by October with a final summary report at the end of October.

Relative to schedule, we have assumed the following:

- Landfill background information will be provided shortly after the notice to proceed is given.
- Agency review time of 5 days for the draft report.
- After the initial site visit, meetings to discuss interim deliverables will be held via teleconference and/or MS Teams.

The estimated Time and Materials (T&M) project costs to conduct the above scope of work are as follows:

Proposed Budget

Task	Description	Budget
1	Kick-off Meeting and Site Visit	$6,000
2	Greenhouse Gas Emissions	$3,000
3	Testing and Analysis of Data	$8,000
4	Alternative Methods	$25,000
5	Summary Report and Recommendations	$10,000
	Total	**$52,000**

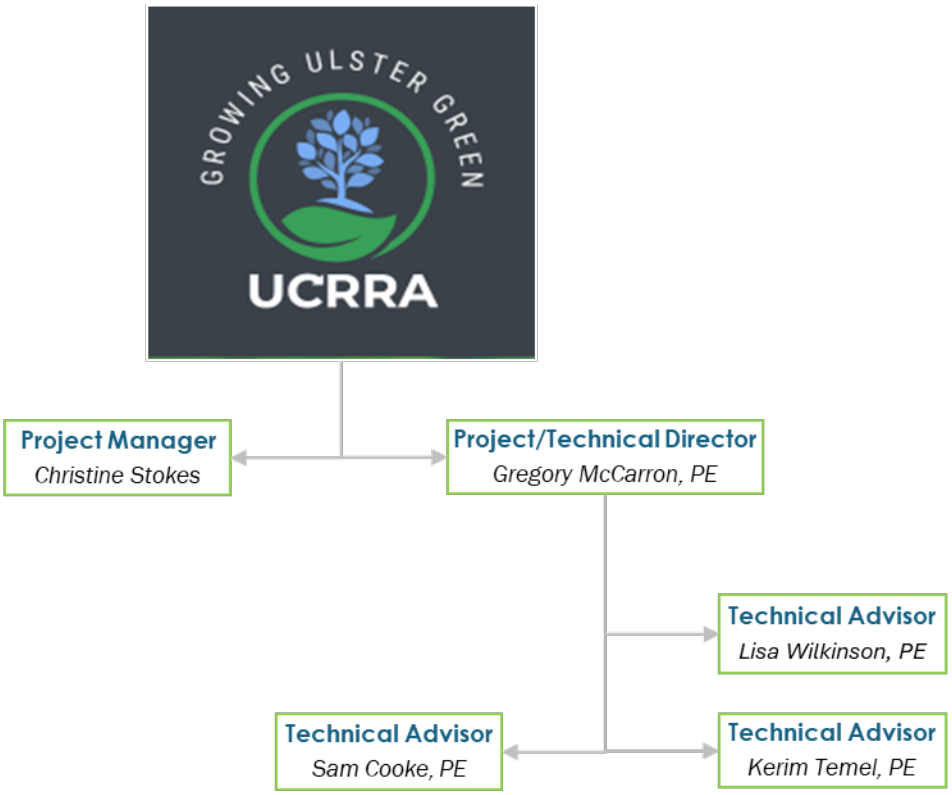
Our fee schedule is included in **Appendix C** and our Agreement for Professional Services is included in **Appendix D.** Expenses are not anticipated with the exception of travel for the one meeting and use of our company truck at $80 for the day. To provide your authorization to proceed with completion of the scope of work items, please sign and return the contract form at your convenience.

4 SCS PERSONNEL

SCS engages our national leachate treatment and management experts to direct and oversee the leachate evaluations while utilizing our local personnel and resources to more efficiently complete the site visits and project research. We do not propose to use subcontractors at this time.

The team SCS has assembled for this project, includes leachate management professionals as described below. Greg McCarron will provide technical direction for the overall engagement with additional technical and quality control support from Sam Cooke, Kerim Temel and Lisa Wilkinson. Christine Stokes will provide overall project and client management. Our Team has the capability to provide services in a timely and efficient manner. Christine Stokes is based within the hour of the landfills, and will be available for meetings and site visits as needed.

Greg McCarron and Lisa Wilkinson are licensed Professional Engineers in the State of New York. Resumes for each of these professionals are included in **Appendix E**. The following is an organizational chart including the proposed staff for the project:



Contact Information:

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GREG McCARRON, PE will serve as the project director. He is the landfill technical leader for SCS' Rockland County, New York office. Greg and his team work on landfill leachate management projects including studies for leachate minimization, pretreatment and treatment at sites in the mid-Atlantic region. Greg has over 35 years of experience in environmental engineering, including landfill cover and closure design, feasibility studies, regulatory assessments, economic analysis and construction oversight.

CHRISTINE STOKES is a Project Manager in SCS' New York office, with over 25 years of environmental consulting experience, including due diligence, site investigation and remediation, and regulatory compliance and permitting. Christine assists both Greg and Lisa on landfill projects throughout New York and the Northeast.

LISA WILKINSON, PE is a Project Director in SCS' New York office, and has over 26 years of experience in regulatory compliance, permitting, environmental consulting, landfill engineering design, landfill gas, civil engineering, financial feasibility evaluations, stormwater design, and construction quality assurance at landfills and solid waste facilities.

SAM COOKE, PE, CEM has over 40 years of professional and project management experience in engineering, with 26 years of environmental engineering consulting with SCS. He is a Vice President and is on the SCS Liquids Management Services Leadership Team. His primary area of technical expertise includes water and wastewater treatment with a specialization in landfill leachate and other industrial wastewater pre-treatment. He is experienced with various wastewater unit processes, permitting, design, feasibility monitoring, operation and maintenance, sampling, and compliance monitoring. Mr. Cooke has managed over 1,000 leachate/wastewater and other environmental engineering projects in 31 states.

KERIM TEMEL, PE is a Project Director with over 14 years of experience in municipal and industrial wastewater, leachate treatment, groundwater remediation, and O&M. He is responsible for overseeing SCS's Mid-Atlantic liquids management practice, which includes liquids management consulting, design, permitting, treatment method development, pilot testing, O&M, and construction oversight. Mr. Temel works closely with SCS's national liquids management staff and also coordinates with local teams on treatment system design work. He has participated in or directed treating complex wastewater such as those from landfill leachate (including removal of PFAS), pharmaceuticals, and chemicals industries.

5 SCS EXPERIENCE AND QUALIFICATIONS

SCS is one of the oldest and largest privately-held environmental services firms in the United States and is a recognized leader in the field of landfill leachate and industrial liquids management services. Founded in 1970, SCS is an employee-owned environmental consulting firm that has grown to a staff of over 1,300 engineers, geologists, scientists, constructors, and technicians with over 70 offices located throughout the United States. We specialize in providing consulting engineering services to private industry and government clients and have completed many complex and innovative liquids management and solid waste projects. We are a corporation independently-owned by its employees, all of whom are committed to providing safe, objective, responsive, and superior services to clients.

SCS is managed by senior technical professionals including engineers, scientists, constructors, and facility operators. Our staff have hands-on experience in the required disciplines and provide cost-effective, comprehensive engineering and construction services. Project teams are assigned on a project-by-project basis to ensure the specific needs of the client are appropriately met. SCS professionals provide clients with demonstrated expertise in all facets of leachate management, permitting, design, construction, operation, and maintenance.

REFERENCES

Fresh Kills Landfill (New York)

Contact: Phillip J. Gleason, P.E. Assistant Commissioner
Waste Management Engineering
New York City Department of Sanitation (DSNY)
44 Beaver Street, 9th floor
New York, NY 10004
(212) 437-4420
pgleason@dsny.nyc.gov

DSNY retained SCS Engineers to provide comprehensive engineering and design services for the closure of Section 1/9 and related activities at Fresh Kills Landfill, Staten Island, New York, including construction services during the final cover construction. The scope of services included the following:

- Project management and administration in connection with the engineering and design services including preparation of work plans and progress reports, and attendance at meetings.
- Preparation of a Final Cover Design Report, including report, calculations, drawings, specifications, and QA/QC plan.
- Identified and prepared permit applications to obtain regulatory approvals to support closure construction. Work included modifications to the Stormwater Pollution Discharge Elimination Systems (SPDES) permit, the Title V permit, and the Part 360 permit. State Tidal Wetlands permit and Army Corps Jurisdictional Determination were also obtained.
- Preparation of preliminary and final construction documents, including drawings, specifications, and QA/QC plan.

- Assistance with construction bidding, including pre-bid conference and preparation of an addendum.
- Provision of engineering services during construction.
- All necessary services for preparation of post closure care inspection plans.
- Update of Fresh Kills Closure Plans, based on As-built and End Use Plans, and other related services.
- All necessary services for the review of End Use Plans at various sections of the closed portions of the Fresh Kills Landfill.

Keegan Landfill (New Jersey)

Contact: Monica R. Mianecki, P.E., P.P., CFM, CME
Director of Solid Waste, Parks & Stormwater Management
New Jersey Sports & Exposition Authority
One DeKorte Park Plaza
P.O. Box 640
Lyndhurst, NJ 07071
(201) 460-2813 (office)
(551) 361-6532 (cell)
mmianecki@njsea.com

The New Jersey Sports and Exposition Authority retained SCS to provide engineering, regulatory, operations and monitoring support services for the Keegan Landfill. SCS services included final capping system design and design, construction and operation of the landfill gas collection and control system. A Hydrologic Evaluation of Landfill Performance (HELP) Model was performed to evaluate the differences in infiltration volumes for different final cover materials. SCS prepared and presented the stormwater design methods and criteria, stormwater peak flows, and basin routing and conveyance design. SCS prepared a QA/QC Plan for the installation, inspection and testing of each component of the final cover.

OTHER PROJECT EXPERIENCE

We have the required experience and qualifications to provide what you need for this project. In addition to being consistently named in the Engineering News Record as either No. 1 or 2 Solid Waste Design Firm from 2003 through 2023, SCS ranks among the top 10 sewer/wastewater firms in the nation. SCS has over five decades of solid waste, landfill design, and leachate management experience throughout the U.S.

We have numerous leachate treatment projects that are currently underway. These projects have progressed from the evaluation and options analysis stage to detailed design, preparation of construction bid documents, and construction and operation. Examples of the types of landfill leachate treatment and disposal evaluation projects that we have conducted within the last couple of years are summarized below. Full project profiles for 6 representative projects are included in **Appendix F**.

Douglas County, Roseburg Landfill (Oregon) – Leachate Treatment Options Analysis and Leachate Treatment Plant Design/Construction

SCS assisted Douglas County with identifying the most economically feasible landfill leachate treatment option for reducing leachate constituents such as ammonia, BOD, and TSS for both parts of this open/operating and closed landfill facility. The combined leachate flow rate from both parts of this landfill generates over 9 million gallons per year of leachate. The scope of work included a review of existing leachate analytical data and an evaluation of leachate discharge permit issues compared with the need for pre-treatment. SCS prepared budgetary costs for leachate treatment options such as evaporation, membrane bioreactor, reverse osmosis (RO), and shorter-term physical-chemical treatment methods, such as breakpoint chlorination and ammonia stripping. Following the treatment options analysis, SCS was engaged to design and coordinate public bidding for the leachate treatment facility. The plant is currently being scheduled for construction with SCS providing construction support services.

Hillsborough County Southeast Landfill (Florida) – Leachate Treatment Evaluation and Design

SCS worked with the Hillsborough County landfill to evaluate and implement cost effective solutions to manage their 50 million gallons per year of leachate. The scope of work included review of existing leachate analytical data and flow rate while evaluating a proposed leachate evaporator and coordinating for other possible leachate treatment methods. Based on the evaluation results, SCS prepared a preliminary design for a membrane bioreactor and reverse osmosis (RO) polish system as well as provided a summary list of design-build considerations to guide the leachate treatment plant design-build process.

Confidential Publicly Owned Landfill Client (Wisconsin) – Leachate Treatment Options Analysis

SCS was chosen to evaluate the most economically feasible landfill leachate treatment options for reducing ammonia, BOD, metals, and TSS at this open 60,000-ton-per-year landfill facility, which generates over 11 million gallons per year of leachate. The scope of work included a review of existing leachate analytical data and an evaluation of leachate discharge permit issues compared with the need for pre-treatment. SCS prepared budgetary costs for leachate treatment options such as evaporation, membrane bioreactor, RO, and shorter-term physical-chemical treatment methods, such as breakpoint chlorination and ammonia stripping.

Frederick County Landfill (Virginia) – Leachate Source Reduction, Storage Pond Construction, and On-Site Treatment Options Analysis

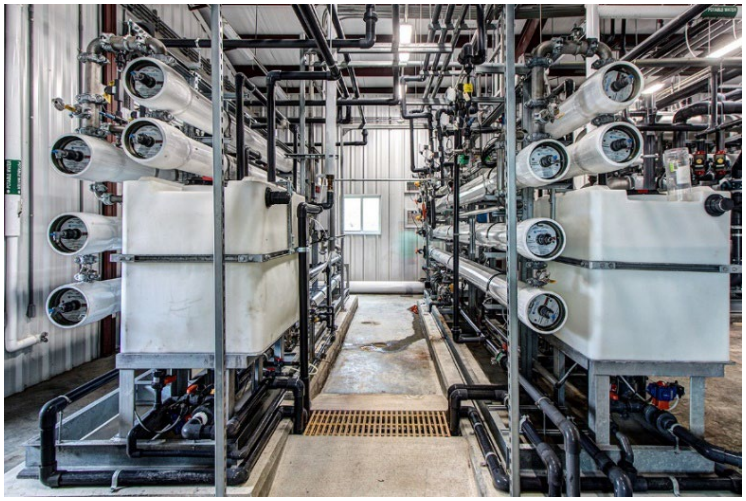
SCS utilized design-build delivery methods to address an emergency leachate management issue caused by a series of extreme precipitation events. SCS was contracted to design and immediately construct a 4-million-gallon lagoon to hold the accumulated leachate generated by these unusual weather events. In addition to the holding lagoon, SCS implemented multiple leachate generation reduction techniques as well as evaluating treatment options for reducing total nitrogen and PFAS. This project is ongoing and involves additional tasks, such as a review of existing leachate management strategies, permitting requirements, technology limitations, and capital and operating costs.

Sarasota County Landfill (Florida) – Leachate On-Site Treatment Options Analysis

SCS evaluated leachate storage, treatment, and disposal options for the County. The WWTP receiving the Landfill's leachate had concerns over rising total nitrogen and ammonia concentrations. SCS evaluated the cost and applicability of aeration, membrane bioreactor, sequencing batch reactor, and thermal evaporation. Storage options and deep well injection feasibility were also evaluated. The County was able to decide which option best suited their financial and environmental situation.

Escambia County Waste Services - Perdido Landfill (Florida) – Leachate Treatment and Disposal Evaluation

Escambia County discharges its leachate to the Emerald Coast Utilities Authority (ECUA) wastewater treatment plant for treatment and disposal. The landfill's leachate strength has been increasing and the total nitrogen concentration ultimately exceeded the ECUA treatment plant's pre-treatment requirements. In addition to the total nitrogen exceedance, the color of the leachate was also becoming a concern for ECUA's ultraviolet disinfection system. SCS prepared leachate generation projections and evaluated a variety of options for leachate disposal outside of the ECUA along with pre-treatment technologies to continue discharging to the ECUA.



Leachate management alternatives included:

- Constructed subsurface wetlands
- SBR treatment system
- MBR treatment system
- Enhanced MBR with activated carbon polishing
- RO
- Thermal evaporation
- Deep well injection

SCS prepared conceptual treatment system designs, developed CAPEX and OPEX estimates for each alternative, and evaluated associated regulatory, operational, and implementation pros and cons. A scoring matrix was developed based on the projected effluent quality, costs, technology track record/history, permitting concerns, ease of maintenance, and system footprint to compare the alternatives. Escambia County is currently reviewing SCS's recommendations for further implementation.

Confidential Privately-Owned Landfill Client (Virginia) – Leachate On-Site Treatment Options Analysis

SCS conducted a preliminary evaluation of landfill leachate treatment options for reducing PCBs in addition to a possible future reduction of 1,4 dioxane and zinc at this open construction and demolition (C&D) debris landfill that generates an estimated average of 30,000 gpd of leachate. The evaluation of leachate treatment methods included a review of membrane applications (i.e., nano-filtration and RO, with the membrane concentrate being recirculated back to the landfill) and granular activated carbon (GAC) as a PCB removal polishing step.

Confidential Privately Owned Landfill (Colorado) – Leachate Management Alternatives Study

This landfill primarily accepts energy and production wastes generated during oil and gas well installation. The leachate generated from this waste includes crude oil as well as other chemicals utilized in the well drilling and completion process. The landfill historically has been able to manage leachate by utilizing it for dust control over lined portions of the landfill. As the landfill has grown, the volume of leachate to be managed has been outpacing the development of additional areas for land applying the leachate. SCS evaluated a variety of alternatives including off-site disposal facilities, on-site pre-treatment, and evaporation. A combination of pre-treatment to separate hydrocarbons from the water followed by an evaporation pond for the residual water was determined to be the best alternative and is now in the design phase for implementation.

New Hanover County Landfill (North Carolina) - Design On-Site Leachate Treatment System

The County needed to upgrade its 50,000 gpd treatment system to meet stricter regulatory standards for surface water discharges, particularly standards relating to metals (arsenic) and ammonia. SCS conducted a leachate study to pinpoint the characteristics that could affect the new treatment process and selected a new treatment process to meet client and regulatory requirements. The recommended process included a membrane bioreactor (MBR) with ultrafiltration (UF) followed by RO membranes and bioreactor tanks for the denitrification process.

SCS collaborated closely with Dynatech Systems to deliver the final process design and control. In addition, as a follow-up project, SCS is testing the feasibility of injection of RO concentrate into a closed section of the landfill using vertical wells.

BKK Landfill (California) – Leachate Treatment OM&M

SCS is an integral partner for managing landfill leachate treatment at this closed municipal solid waste and hazardous waste landfill. In addition to managing the operation, maintenance and monitoring (OM&M) of the landfill gas and leachate collection systems, SCS performs OM&M of the landfill leachate treatment plant. Through SCS's dedicated on-site operators, SCS has successfully operated the treatment plant for many years and continues to provide these services for this highly regulated landfill.

Appendix A

Proposal Form and Non-Collusion Proposal Certification

PROPOSAL FORM AND NON-COLLUSION PROPOSAL CERTIFICATION

The following PROPOSAL INFORMATION and PROPOSAL FORM is included verbatim from the Ulster County RFP:

PROPOSER INFORMATION

Firm Name: Stearns, Conrad and Schmidt Consulting Engineers, Inc. (dba SCS Engineers of New York, PC)
Street Address: 4 Executive Boulevard, Suite 303
City, State, Zip: Suffern, New York 10901
Phone: (845) 918-5219
Fax: (703) 471-6676
Email: cstokes@scsengineers.com

C. PROPOSAL AND PROPOSAL FORM

C.1 Proposal

To: Ulster County Resource Recovery Agency
Reference: Engineering Services for Leachate Management
Project No. 2024-04
The Proposer, having examined the proposal documents, does hereby propose to furnish and complete the services described in the proposal documents, including Addenda issued thereto, in accordance with the prices hereinafter set forth. The Proposer, by virtue of this proposal, acknowledges receipt of all Addenda.

C.2 Acknowledgment of Addenda

Proposers must acknowledge receipt of addendum(s) as follows:
The following addendum(s) have been received:
Addendum No._____1_____CHS
Addendum No._____2_____CHS
Addendum No._____3_____CHS

The Proposer certifies that the addendum(s) above have been received and that changes covered by the addendum(s) have been taken into account in this proposal.

C.3 Proposal Acceptance

The Proposer hereby agrees to hold its proposal without change for a period not to exceed sixty (60) days.

C.4 Non-Discrimination and Affirmative Action

During the performance of this Agreement, the Proposer agrees to comply with Section 2050-v of the Public Authorities Law.**C.5 (reserved)**

C.6 Qualifications and Experience

The Proposer certifies that their qualifications and experience meet the minimum requirements set forth in Section B.4 of the Proposal Documents and provides herewith documentation or supplemental statements supporting such certification.

C.7 Schedule

Proposer understands that requested engineering services shall commence within a reasonable time frame following formal approval of the award by the Agency's Board of Directors.

C.8 Clarifications

If the Proposal, including any supporting data submitted therewith, contains any deviations from, exceptions to, or stated interpretations of the proposal documents, all of same shall be specifically identified on a single separate attachment to the proposal. Unless so identified, no such deviations, exceptions or interpretations shall be deemed incorporated in or a part of such proposal and shall not be binding on the Agency in the event of the Award of the Proposal to the successful Proposer. It is understood that in the event that any such deviations, exceptions or interpretations are, in the Agency's opinion, materially non-responsive to the requirements of the Request for Proposals, the entire proposal will be rejected.

Non-Collusion

Attached please find an executed "Non-Collusive Proposer Certification" form.

Non-Collusive Proposal Certification

Every proposal hereafter made to the Agency or an official thereof, where a competitive proposal is required by statute, rule or regulation, for Work or services performed or to be performed or goods sold or to be sold, shall contain the following statement subscribed by the Proposer and affirmed by such Proposer as true under the penalties of perjury:

1. (a) By submission of this proposal, each Proposer and each person signing on behalf of any Proposer certifies, and in the case of a joint proposal each party thereto certifies as to its own organization, under penalty of perjury, that to the best of his knowledge and belief:

   (1) The prices in this proposal have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other Proposer or with any competitor;

   (2) Unless otherwise required by law, the prices which have been quoted in this proposal have not been knowingly disclosed by the Proposer and will not knowingly be disclosed by the Proposer prior to opening, directly or indirectly, to any other Proposer or to any competitor; and

   (3) No attempt has been made or will be made by the Proposer to induce any other person, partnership or corporation to submit or not to submit a proposal for the purpose of restricting competition.

   (b) A proposal shall not be considered for award nor shall any award be made where (a) (1), (2) and (3) above have not been complied with; provided however, that if in any case the Proposer cannot make the foregoing certification, the Proposer shall so state and shall furnish with the Proposal a signed statement which sets forth in detail and the reasons therefore. Where (a) (1), (2) and (3) above have not been complied with, the proposal shall not be considered for award nor shall any award be made unless the head of the purchasing unit of the county, public department or agency to which the proposal is made, or his designee determines that such disclosure was not made for the purpose of restricting competition. The fact that a Proposer (a) has published price lists, rates, or tariffs covering items being procured, (b) has informed prospective customers of proposed or pending

publication of new or revised price lists for such items, or (c) has sold the same items to other customers at the same prices being proposed, does not constitute, without more, a disclosure within the meaning of subparagraph l. (a)

2. Any proposal hereafter made to the Agency by a corporate Proposer for work or services performed or to be performed or goods sold or to be sold, where competitive proposals are required by statute, rule or regulation, and where such proposal contains the certification referred to in subdivision 1 of this section, shall be deemed to have been authorized by the board of directors of the Proposer and such authorization shall be deemed to include the signing and submission of the proposal and the inclusion therein of the certificate as to non-collusion as the act and deed of the corporation.

Respectfully submitted,

July 24, 2024

Signature of Proposer — Date

Stearns, Conrad & Schmidt Consulting Engineers, Inc. (dba SCS Engineers of New York, PC)

Vice President of SCS Engineers of New York, PC
Project Director/Vice President

ATTEST:

July 24, 2024

Witness — Date

Business Address:

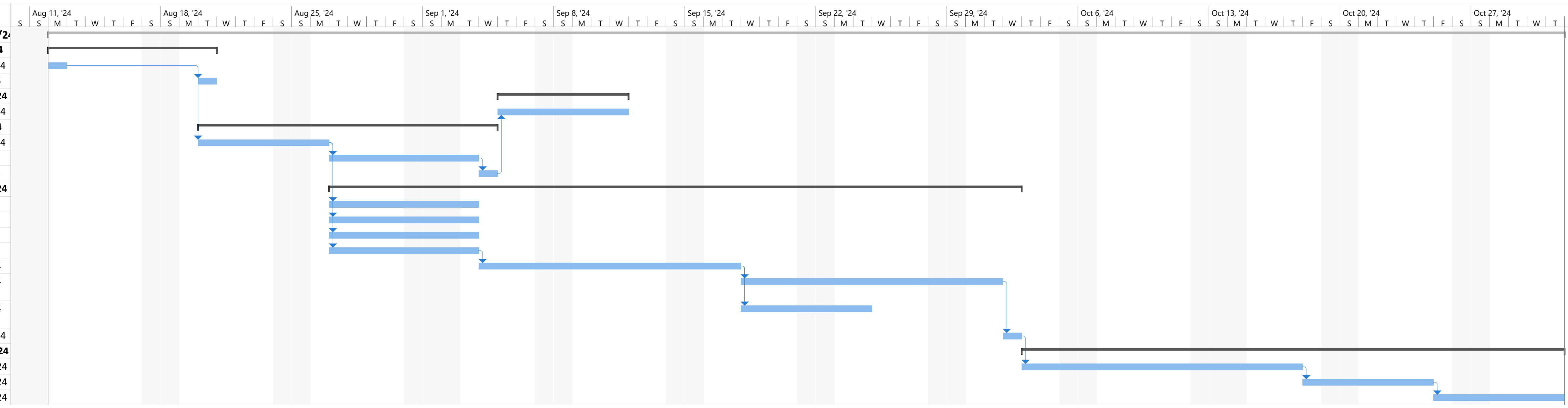
4 Executive Boulevard, Suite 303
Suffern, New York 10901

Appendix B

Proposed Schedule

Leachate Evaluation at Town of Ulster and New Paltz Landfills Project Schedule

ID	WBS	Task Name	Duration	Start	Finish
0	**0**	**Notice to Proceed/Contract Award**	**57 days**	**Mon 8/12/24**	**Thu 10/31/24**
1	**1**	**Task 1 - Kick-off Meeting and Site Visit**	**7 days**	**Mon 8/12/24**	**Tue 8/20/24**
2	1.1	Kick-off Meeting	1 day	Mon 8/12/24	Mon 8/12/24
3	1.2	Site Visit	1 day	Tue 8/20/24	Tue 8/20/24
4	**2**	**Task 2 - Greenhouse Gas Emissions**	**5 days**	**Thu 9/5/24**	**Wed 9/11/24**
5	2.1	Calculate GHG emissions for the current operations	5 days	Thu 9/5/24	Wed 9/11/24
6	**3**	**Task 3 - Testing and Analysis of Data**	**11 days**	**Tue 8/20/24**	**Wed 9/4/24**
7	3.1	Data Transfer	5 days	Tue 8/20/24	Mon 8/26/24
8	3.2	Existing Data Evaluation	5 days	Tue 8/27/24	Tue 9/3/24
9	3.3	Design Basis	1 day	Wed 9/4/24	Wed 9/4/24
10	**4**	**Task 4 - Alternative Methods**	**26 days**	**Tue 8/27/24**	**Wed 10/2/24**
11	4.1	Review current collection system	5 days	Tue 8/27/24	Tue 9/3/24
12	4.2	Condition of the landfill cap	5 days	Tue 8/27/24	Tue 9/3/24
13	4.3	Storage capacity	5 days	Tue 8/27/24	Tue 9/3/24
14	4.4	Regulatory discharge requirements	5 days	Tue 8/27/24	Tue 9/3/24
15	4.5	Leachate management alternatives	10 days	Wed 9/4/24	Tue 9/17/24
16	4.6	Rough order of magnitude cost estimates (up to 3 options)	10 days	Wed 9/18/24	Tue 10/1/24
17	4.7	GHG emissions estimates for the identified options up to 3)	5 days	Wed 9/18/24	Tue 9/24/24
18	4.8	Presentation to UCRRA	1 day	Wed 10/2/24	Wed 10/2/24
19	**5**	**Task 5 - Summary Report and Recommendations**	**20 days**	**Thu 10/3/24**	**Thu 10/31/24**
20	5.1	Draft summary report	10 days	Thu 10/3/24	Thu 10/17/24
21	5.2	UCRRA review	5 days	Fri 10/18/24	Thu 10/24/24
22	5.3	Final summary report	5 days	Fri 10/25/24	Thu 10/31/24



Project: Notice to Proceed/Con
Date: Wed 7/24/24

Task	Milestone	Project Summary	Inactive Milestone	Manual Task	Manual Summary Rollup	Start-only	External Tasks	Deadline	Manual Progress
Split	Summary	Inactive Task	Inactive Summary	Duration-only	Manual Summary	Finish-only	External Milestone	Progress	

Appendix C

Fee Schedule

STANDARD FEE SCHEDULE
(Effective through March 2025)

	Rate/Hour
Project Director II	$290
Project Director I	255
Project Manager	180
Senior Project Professional	160
Project Professional	145
Staff Professional	125
Designer	125
Associate Staff Professional	110
Drafter	100
Senior Field Technician	110
Technician	90
Office Administrator	140
Administrative Assistant	100
Secretary/Clerical	90

1. The hourly rates are effective through March 31, 2025. Work performed thereafter is subject to a new Fee Schedule.
2. The above rates include salary, overhead, administration, and profit. Costs for outside consultants, laboratory and subcontractors and for job related travel (current automobile[1] mileage rate is $0.67 per mile) and subsistence, computer and administration fee ($6.00 per billable hour for non-field work), equipment, supplies, etc., are billed at actual cost plus 15 percent.
3. Charges for equipment usage will be invoiced in accordance with SCS's Equipment Rates schedule, plus 15 percent.
4. Invoices will be prepared monthly for work in progress, unless otherwise agreed. Invoices are due and payable upon receipt. Invoices not paid within 30 days are subject to a service charge of 1.5 percent per month on the unpaid balance.
5. Payment of SCS invoices for services performed will not be contingent upon the client's receipt of payment from other parties, unless otherwise agreed to in writing. Client agrees to pay legal costs, including attorney's fees incurred by SCS in collecting any amounts past due and owing on client's account.
6. Rates for Senior Executives and Principals of the firm and special situations, such as litigation support and expert testimony, are negotiated on a project-specific basis.

[1]Current truck usage rate is $45 per half day, $80 per day plus $0.45 per mile

Appendix D

Agreement for Professional Services

SCSNY Project No. _____

AGREEMENT BETWEEN SCS ENGINEERS OF NEW YORK, P.C. AND CLIENT FOR PROFESSIONAL SERVICES

THIS AGREEMENT (hereafter "Agreement") is made by and between Ulster County Resource Recovery Agency (UCRRA, hereafter "Client"), and SCS ENGINEERS OF NEW YORK, P.C. (hereafter "SCSNY").

WHEREAS, Client intends to engage SCSNY to perform professional services for a project known as Engineering Services for Leachate Management (hereafter "Project").

NOW, THEREFORE, Client and SCSNY do hereby agree as follows:

ARTICLE 1--SCOPE OF SERVICES. SCSNY shall provide professional services (hereafter "Services") as set forth in Attachment A, in accordance with the terms and conditions of this Agreement. Unless expressly stated therein, the scope of work does not include testimony or responding to subpoenas. In the event SCSNY receives a subpoena or other legal order for the production of project records or testimony, the client agrees to pay for all time and expenses of SCSNY related thereto.

ARTICLE 2--RESPONSIBILITIES OF THE CLIENT. Client will:

2.1 Provide all criteria and full information as to its requirements for the Project.

2.2 Furnish SCSNY with data, reports, surveys, and other materials and information required for the Project, except such of the foregoing as are included in the Services to be provided by SCSNY.

2.3 Acquire all land and rights-of-way as required for the Project.

2.4 Provide access to the Project site and make all provisions for SCSNY to enter upon public and private lands as required for SCSNY to perform its Services under this Agreement.

2.5 Examine all studies, reports, sketches, construction costs, specifications, drawings, proposals and other documents presented by SCSNY to Client, and promptly render in writing Client's decisions pertaining thereto within a week, or, if a longer time is needed, within a period mutually agreed upon.

2.6 Give prompt written notice to SCSNY whenever Client observes or otherwise becomes aware of any defect in the Services rendered by SCSNY.

2.7 Furnish to SCSNY, prior to execution of this Agreement, a copy of any design, construction or other standards Client requires SCSNY to follow in performing Services under this Agreement.

2.8 Provide to SCSNY all budget requirements, if any, applicable to the Services and the Project.

ARTICLE 3--CHANGES IN THE SERVICES.

3.1 Changes may be made to the Services. Client may order additional Services upon the agreement of SCSNY. Client may delete previously ordered Services.

3.2 The provisions of this Agreement, with an equitable adjustment in SCSNY's compensation and schedule, shall apply to all changes in the services.

3.3 All changes to the Services shall be made pursuant to the Change Order form set out in Attachment B.

3.4 In the event Client directs SCSNY to perform changed Services without executing a Change Order in the form set out in Attachment B, SCSNY shall be compensated for the changed Services in accordance with SCSNY's then current standard rates as set out in Attachment C, unless otherwise agreed in writing by the Parties.

ARTICLE 4--PROJECT SCHEDULE.

4.1 The parties will mutually agree upon a schedule for performance of the Services ("Project Schedule").

4.2 SCSNY will begin performance of the Services upon Client's performance of all such Client responsibilities, as set out in Article 2, which are reasonably required in order for SCSNY to begin and perform the Services in accordance with the Project Schedule.

ARTICLE 5--COMPENSATION. For the Services as set forth in the Scope of Services, SCSNY shall be compensated as set forth below. Changes to the Services under Article 3 shall be compensated at SCSNY's then current standard rates as set out in Attachment C unless otherwise agreed in writing by the parties.

☒ 5.1 SCSNY will be compensated for time and expenses in accordance with SCSNY's standard rates in effect at the time of performance. Copies of SCSNY's current rates are attached in Attachment C. These rates are subject to adjustment on January 1 and June 30 of each year.

☐ 5.2 SCSNY will be compensated in the lump sum amount of $_____.

☐ 5.3 Other: SCSNY will be compensated as follows:

ARTICLE 6--PAYMENT. Payment for Services rendered by SCSNY shall be in accordance with the following:

6.1 Invoices will be submitted by SCSNY every month and will indicate:

(a) for time and expenses compensation, the time and expenses incurred during the period.

(b) for lump-sum compensation, the percentage of work completed during the period.

(c) for other compensation: _____.

6.2 Client will pay the sum of $_____ upon execution of this Agreement as a professional retainer. This sum shall be applied as a credit to Client on SCSNY's final monthly invoice for Services under this Agreement.

6.3 Payments for invoices issued by SCSNY are due and payable upon receipt.

6.4 Payments due SCSNY under this Agreement shall be subject to a service charge of one and one-half (1-1/2) percent per month for invoices not paid within thirty (30) days after the date of receipt of invoice.

6.5 If Client does not make timely payments, SCSNY may suspend performance of its Services on the basis of non-performance on the part of Client. When all amounts due are paid and adequate assurances of payment are given for all Services which have been rendered but not yet invoiced, as well as all future Services, SCSNY will continue its Services.

6.6 Client agrees to pay all costs and expenses of SCSNY, including reasonable attorney fees, arising out of or in connection with collecting amounts for which Client is responsible pursuant to this Agreement

ARTICLE 7--INSURANCE. SCSNY shall, during the performance of this Agreement, keep in force Workers' Compensation Insurance, including Employer's Liability Insurance for its employees, and Commercial General Liability Insurance with a combined minimum limit of $1,000,000 for bodily injury and property damage.

ARTICLE 8--LIMITATION OF LIABILITY.

8.1 This Article 8 states the agreement of the parties with respect to allocation of the risks inherent in the type of project undertaken herein. The parties agree that SCSNY's liability under this Agreement and for the Project shall be limited to the amount covered, if any, by SCSNY's liability insurance then in effect up to $1,000,000, or the amount of SCSNY's total fees hereunder (whichever is greater).

8.2 If Client desires that SCSNY assume more of the risk under this Agreement and for the Project than is specified in Article 8.1, and is willing to compensate SCSNY for the greater assumption of risk then in consideration of Client paying a _____ surcharge (in addition to the compensation specified in Article 5, SCSNY's total liability under this Agreement and for the Project shall be limited to: _____

ARTICLE 9--RELEASE AND INDEMNIFICATION.

9.1 It is understood and agreed that, in seeking the Services of SCSNY under this Agreement, the Client may be requesting SCSNY to undertake obligations for the Client's benefit involving the presence or potential presence, or release or potential release to the environment, of hazardous substances and other contaminants. Therefore, Client agrees that SCSNY will not be responsible for, and does hereby release, hold harmless, indemnify, and defend SCSNY from and against any and all claims, losses, damages, liability and costs, including but not limited to costs of defense, arising out of or in any way connected with the presence, discharge, release or escape of hazardous substances or contaminants of any kind, excepting only such liability as may arise out of the sole negligence of SCSNY.

9.2 Except as provided in Article 9.1 above, and to the extent provided in Article 8 above, SCSNY shall indemnify and hold harmless Client from and against any liabilities, claims and causes of action which Client may suffer as a result of negligent acts, errors, or omissions, or the willful and reckless disregard of obligations under this Agreement on the part of SCSNY or SCSNY's agents, employees or subcontractors in the performance of this Agreement, excepting such liability as may arise out of Client's negligence.

ARTICLE 10--GENERAL PROVISIONS.

10.1 SCSNY will perform its Services hereunder, as specified in Attachment A, in a timely manner. SCSNY is not responsible for delays occasioned by factors beyond its control, nor by factors which could not reasonably have been foreseen at the time this Agreement was executed.

10.2 SCSNY shall be entitled to rely on information provided by Client. SCSNY shall be entitled to an equitable adjustment in the price and schedule if conditions differ materially from information provided by the Client, or differ materially from what reasonably could have been anticipated given the nature of the Services.

10.3 SCSNY shall perform its Services in accordance with the professional standards applicable to the Services provided (i.e., engineering, planning, consulting or others), at the time such Services are rendered. SCSNY makes no other warranty, either expressed or implied, as part of this Agreement.

10.4 SCSNY shall not disclose, or permit disclosure of any information designated by Client as confidential, except to its employees and other consultants who need such information in order to properly execute the Services of this Agreement. This provision shall not apply to information which: (1) has been published and is in the public domain, (2) has been provided to SCSNY by third parties who have the legal right to possess and disclose the information, (3) was in the possession of SCSNY prior to the disclosure of such information to SCSNY by Client, (4) is required by law or any governmental agency to be disclosed, or (5) would require disclosure to comply with the ethical obligations of SCSNY to protect the public.

10.5 Statements made by SCSNY concerning probable construction costs and detailed cost projections represent SCSNY's judgment with respect thereto. It is recognized, however, that SCSNY has no control over actual site conditions, the cost of labor, materials, or equipment, a contractor's methods of determining bid prices, or over competitive bidding or market conditions. Accordingly, SCSNY cannot and does not represent or guarantee that bids or ultimate Project costs will not vary from any statement of probable construction cost or other cost projection prepared by SCSNY.

10.6 All drawings, specifications, reports, notes and data developed pursuant to this Agreement are instruments of service, and as such the original documents are and remain the property of SCSNY.

10.7 If construction at the site is to be performed by a person other than SCSNY, Client agrees to require such person to assume sole and complete responsibility for job site conditions during the course of construction, including safety of all persons and property. SCSNY shall have no responsibility for site health and safety for anyone other than its own employees and its subcontractors, unless SCSNY expressly has agreed to provide such services. Client agrees SCSNY shall not be responsible for and does hereby release, hold harmless, indemnify and defend SCSNY from and against all claims, losses, damages, liability and costs, including costs of defense thereof, arising out of or in any way connected with performance of construction work by persons other than SCSNY and its subcontractors.

10.8 To the extent specifically provided in the Services, SCSNY will be available for advice and consultation, and will monitor on a limited basis construction work performed by persons other than SCSNY. SCSNY accepts no responsibility and makes no warranty whatsoever that construction work performed by other persons meets the design specifications (this being the sole responsibility of Client) unless the Services provides specifically for SCSNY to assume such responsibility. In no event shall SCSNY be responsible for the means, method or manner of performance of any persons other than SCSNY or its Subcontractors.

10.9 At no time shall title to hazardous substances, solid wastes, petroleum contaminated soils or other regulated substances pass to SCSNY, nor shall any provision of this Agreement be interpreted to permit or obligate SCSNY to assume the status of a "generator," "owner," "operator," "transporter," "arranger," or "treatment, storage or disposal facility" under state or federal law.

ARTICLE 11--TERMINATION OF AGREEMENT. This Agreement may be terminated by either party upon thirty (30) days written notice to the other party without cause; by mutual written agreement of the parties; or by either party with five (5) days written notice to the other in the event of continuing substantial failure to perform in accordance with the terms hereof by the other party through no fault of the terminating party. If this Agreement is terminated, SCSNY shall be paid for all Services performed by SCSNY to the effective date of termination. The indemnities of Article 9 and Article 10 shall survive any termination of this Agreement.

ARTICLE 12--DELEGATION OF DUTIES; ASSIGNMENT; SUCCESSORS. Neither party shall delegate its duties under this Agreement without the written consent of the other party. Each party binds itself to the successors, administrators and assigns of the other party in respect of all covenants of this Agreement.

ARTICLE 13--EXTENT OF AGREEMENT. This Agreement represents the entire and integrated agreement between Client and SCSNY and supersedes all prior negotiations, representations, or agreements, either written or oral, for Project. In the event any provision of this Agreement is determined to be invalid, the remaining provisions of this Agreement shall continue in full force and effect.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed by their duly authorized representatives as of last date written below.

UCRRA:	SCS ENGINEERS OF NEW YORK, P.C.
SIGN:_____	SIGN: _____
PRINT NAME: _____	PRINT NAME: _____
TITLE: _____	TITLE: _____
DATE: _____	DATE:_____

Appendix E

Project Team Resumes

GREGORY P. MCCARRON, P.E.

Education

B.S. - Environmental Engineering, Rensselaer Polytechnic Institute, 1986

Professional Licenses

Professional Engineer - New York, Rhode Island, Maine, Massachusetts, New Hampshire, and Virginia

Professional Affiliations

Solid Waste Association of North America
New York State Association for Solid Waste Management

Professional Experience

Mr. McCarron has over 35 years of progressively-responsible experience in solid waste management, including landfill engineering and design. His experience includes planning, design, permitting, regulatory support, construction oversight, operations, project management, system start-up, economic analysis, and technology assessment.

Examples of his project experience include:

City of New York, Closure Design for Section 1/9, Fresh Kills Landfill. Design of final cover, landfill gas, and stormwater management systems, and preparation of construction documents. For project from 2013-present, Project Manager responsible for the design of the closure systems for Section 1/9 of the Fresh Kills Landfill (312 acres). Tasks included site investigations, wetlands studies, stormwater, wetlands, and solid waste permitting, design of final cover, landfill gas, and stormwater management systems, and preparation of construction documents for the closure. For prior project, tasks included design and engineering of Section 2/8 final closure; design and engineering of Section 3/4 final closure; permitting of storm water management system; and, design and engineering of Phase I storm water management system.

Development Authority of the North Country, Watertown, NY. Project manager for landfill closure planning, including sequential fill planning, roads and drainage planning, LFG master plan, air permitting, stability evaluations, and miscellaneous consulting work.

Sullivan County, Monticello, NY. Project engineer for the design of a double-lined sanitary landfill for Sullivan County, New York. Estimated leachate generation with EPA's HELP computer model to size leachate collection and treatment systems. Assisted in the preparation of the permit application including the engineering report and operations and maintenance report.

Waste Connections, Inc., Colonie Landfill, NY. Project director for landfill gas management services, including LFG system expansion design to control odors.

Broome County Landfill, NY. Design and CQA services for expansions of LFG collection system.

Casella Waste Systems, Inc., Hakes C&D Landfill, New York. Design and preparation of construction documents for LFG collection system expansions, preparation of LFG master plans, and H_2S treatment system.

Pine Avenue C&D Landfill, Niagara Falls, NY. LFG system design, odor control, construction quality assurance services and LFG operations and maintenance consulting for LFG gas collection, control and sulfur removal system. Work includes design of annual LFG collection system expansions and preparation of 5-year LFG system planning documents.

Brookhaven C&D Landfill, NY. LFG system design, including collection system expansion and enclosed flare procurement and construction. Operations support to maintain and enhance odor control.

Blydenburgh C&D Landfill, Islip, NY. Prepared bid documents for replacement of the LFG systems, including collection and flare systems. Conducted a field evaluation of the existing LFG collection and flare systems.

Confidential Clients, multiple C&D Landfills, Ohio. Design and preparation of construction documents for LFG collection system expansions, preparation of LFG master plans, and H_2S treatment system.

New Jersey Sports and Exposition Authority, New Jersey, Keegan C&D Landfill. Project Director for ambient air monitoring and odor support including ambient air monitoring study, surface emissions monitoring, gas collection and control system design, preparation of permit applications and construction quality assurance support.

Sussex County Municipal Utilities Authority, NJ. Provision of solid waste reporting services and other support to the Sussex County Municipal Utilities Authority (SCMUA), as related to the SCMUA Landfill. Services included: semi-annual groundwater and stormwater detection reporting, annual stormwater pollution prevention plan updates, quarterly enclosed flare inspections, annual surface emission monitoring, and other SCMUA-requested support.

Town of Charlestown, RI. Implementation of the Town's post-closure landfill environmental monitoring program at the former municipal landfill on Sand Hill Road during the three-year period from 2014 through 2016. Tasks included semi-annual groundwater and landfill gas monitoring at selected monitoring points at the Facility, data management, and associated reporting.

Hartford Landfill, Hartford, CT. Project manager for CRRA Hartford Landfill for a vertical expansion of the Phase 1 double lined ash area. Key work items included evaluation of liner base; vertical expansion liner design; contractor laydown area and access road; stability evaluation.

Smithtown, NY. Project director for research and evaluation of the impacts of organic waste processing facilities (OWPFs), and identification of the Best Management Practices (BMPs) for operating and regulating indoor OWPFs. Among other resources, SCS used the database of the U.S. Composting Council (USCC) to identify composting facilities throughout the country. The Town planned to draft ordinance amendment(s) that would permit and regulate such facilities in the Town.

CHRISTINE H. STOKES, LSRP

Education

BS – Chemical Engineering, Polytechnic University (NYU Tandon School of Engineering), 1997

Professional Licenses

Licensed Site Remediation Professional – New Jersey

Specialty Certifications

New York State Division of Water – Erosion and Sediment Control (ESC) Trained
New York City Office of Environmental Remediation (OER) Turbo Trained

Professional Affiliations

Brownfield Coalition of the Northeast (BCONE)
Licensed Site Remediation Professionals Association (LSRPA)
Society of American Military Engineers (SAME)

Professional Experience

Ms. Stokes has over 25 years of progressively responsible experience in environmental consulting, including due diligence, site investigation and remediation, environmental compliance, permitting and risk assessment. Ms. Stokes is a New Jersey Department of Environmental Protection (NJDEP) Licensed Site Remediation Professional (LSRP).

Ms. Stokes has provided consulting services for sites ranging from residential through small to large scale industrial facilities including automotive and transportation facilities, petroleum storage and distribution, dairy and grain industries, metalworking facilities, manufacturing facilities, utilities including municipal water providers, transfer stations, landfills, landfill gas to energy plants and waste-to-energy facilities.

Due Diligence

Extensive experience in conducting and managing single property to large portfolios of Phase I and Phase II ESAs and other environmental assessments of residential, commercial and industrial properties nationwide for real estate companies, lending institutions, investment firms, insurance companies, developers and governmental agencies. Ms. Stokes meets the definition of an Environmental Professional (EP) under the EPA All Appropriate Inquiries regulations (40 CFR 312) and a Qualified Environmental Professional (QEP) under the New York State Department of Environmental Conservation (NYSDEC).

Brownfield and Voluntary Remediation

Planning and executing several soil and groundwater investigations, and vapor intrusion assessments at commercial (including dry cleaners) and industrial sites with chlorinated volatile organic compound (CVOC) and/or petroleum hydrocarbon impacts. Additionally, planned, permitted, and conducted remedial actions, including underground storage tank (UST) closures and media treatment utilizing in-situ chemical oxidation and bioremediation in addition to more conventional methods such as pump and treat (P&T), soil vapor extraction (SVE), and soil excavation.

Permitted and oversaw installation of several sub-slab depressurization (SSD) systems to mitigate indoor air impacts related to chlorinated solvents. Performed investigations and remedial evaluations related to emerging contaminants including 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS).

Prepared treatment system documents related State Pollution Discharge Elimination System (SPDES) and/or Permit-by-Rule (PBR) requests for discharges to groundwater, surface water, and publicly-owned treatment works (POTW). Additionally, prepared Operation and Maintenance (O&M) plans for operating remediation systems.

Prepared phase reporting related to site investigations and remediation; and, necessary documentation to establish institutional controls consisting of Environmental Easements/Deed Notices/Declaration of Environmental Restrictions (EE/DER) and Classification Exception Areas (CEA)/Well Restriction Areas (WRA). Specifically, in New Jersey, issued Response Action Outcome (RAO) as appropriate.

Human Health and Environmental Risk Assessment

Performed limited human health risk assessments for contaminated sites undergoing redevelopment. Included evaluation of effects from exposure to VOCs, poly-cyclic aromatic hydrocarbons (PAHs), and heavy metals present in soil, groundwater, surface water, and/or the aquatic environment.

Environmental Database Management

Managed and reported from investigation databases using Environmental Quality Information System (EQuIS). Similarly, managed and reported from energy consumption databases for offices and manufacturing operations. Databases used to determine greenhouse gas (GHG) emissions for comparison with company-wide, state and national goals to reduce emissions.

Federal and State Environmental Review

Experience on projects involving federal and or state level review by local entities including New York's State Environmental Quality Review Act (SEQRA).

Permitting, Planning and Reporting

Permitted and reported on SPDES activities including Discharge Monitoring Reports (DMR); and preparing/updating Discharge Pollution Control and Countermeasures (DPCC) plans, Spill Prevention Control and Countermeasures (SPCC) plans, and Stormwater Pollution Prevention Plans (SWPPPs). Permitting of minor and major (Title V) facilities and preparation of annual air emission statements.

Insurance Support Services

Providing technical guidance to insurers with SCS' National Service Leader for a wide-range of environmental claims at locations throughout the United States. Insurance Support Services is a new SCS service area.

Lisa K. Wilkinson, P.E.

Education

Masters of Engineering, Environmental Engineering - State University of New York at Buffalo, 1995

B.S. - Civil Engineering - State University of New York at Buffalo, 1993

Professional Licenses

Registered Professional Engineer – New York, Vermont and Pennsylvania

Professional Affiliations

Solid Waste Association of North America
American Society of Civil Engineers
Chi Epsilon - National Civil Engineering Honor Society

Professional Experience

Ms. Wilkinson, a project manager in SCS' New York office, has over 25 years of experience in regulatory compliance, permitting, environmental consulting, landfill engineering design, landfill gas, civil engineering, financial feasibility evaluations, storm water design and construction quality assurance at landfills and solid waste facilities. Project experience includes:

New Jersey Sports and Exposition Authority, New Jersey, Keegan Landfill. Project Director for preparation of Closure and Post Closure Care Plan for the Keegan Landfill, including final cover system, stormwater management system, landfill gas management, soil erosion and sediment control system design.

City of New York, Closure Design for Section 1/9, Fresh Kills Landfill. Project Manager for the design of the closure systems, including site investigations, wetlands studies, wetlands and solid waste permitting, design of final cover, landfill gas, and stormwater management systems, and preparation of construction documents.

Fresh Kills Landfill, Section 2/8 and 3/4, New York City. Provided coordination of QA/QC testing and review of test results for geotechnical and geosynthetic construction materials covered under the QA/QC Plan for closure of two landfill areas the Fresh Kills Landfill of approximately 100 acres each. Additional responsibilities included: performing field inspection of HDPE geomembrane liner installation and landfill gas extraction system construction, assistance in monitoring the contractor's adherence to contract plans and specifications, and assisting in compiling test results and preparation of the certification construction report.

Youngs Avenue Landfill, Riverhead, New York. Project Manager for the planning, design and construction quality assurance of the 30 acre closure system of a partially reclaimed landfill. Work included analysis of alternatives including excavation of significant areas of waste to recontour the partially reclaimed areas of the landfill. Specific tasks include design and preparation of design drawings, engineering report, post closure monitoring and maintenance operations manual, construction drawings and specifications, interface with regulatory authority, preparation of cost estimates and alternatives analysis, and construction quality assurance activities for preparation of the certification report.

Irelandville Road Landfill, Schuyler County, New York. Project Manager for a feasibility study of reclamation of 18-acre closed, unlined Landfill to reduce collection and disposal costs of leachate influenced by high groundwater levels. Specific tasks included preparation of a workplan to complete a waste characterization study, field oversight during digging of the test pits and screening of excavated waste, preparation of the financial analysis for the feasibility study and review of historical leachate and groundwater monitoring quality data.

Sullivan County Phase I Landfill, Monticello, New York. Senior Project Engineer for the design of the Phase I Closure. Specific tasks include design and preparation of closure drawings and engineering report, preparation of construction bid drawings and specifications, project management, oversight of construction quality assurance activities and preparation of the certification report.

Chester County Solid Waste Authority, Lanchester Landfill, Pennsylvania. Project Manager for the Phase II closure design of the Area C Landfill. Specific tasks include design and preparation of closure drawings, preparation of construction bid drawings and specifications, project management, oversight of construction quality assurance office administration activities.

Pennsauken Sanitary Landfill, Pennsauken, New Jersey. Project Manager for the preparation of bidding documents for a groundwater remediation system. Specific tasks include preparation of construction drawings and specifications and construction cost estimate for a forty-three well air sparging system at the landfill perimeter.

Townley Hill Road Dump Site, Catlin, New York. Project Manager for construction oversight for remediation and closure of site. Managed daily oversight of a 10-week closure project including site remediation, testing, geotextile and soil placement.

Connecticut Resources Recovery Authority, Hartford Landfill, Connecticut. Senior Project Engineer for the design of a 2.5-acre landfill liner for a vertical "piggyback" expansion of the existing Phase 1 double lined ash area. Specific tasks include design and preparation of construction documents for the liner system, project management, and preparation of the certification report. Performed an evaluation of the existing clay cap materials on the northern side slope and a soil gas survey of the existing closed interim ash fill area prior to design.

Development Authority of North Country, New York. Staff Engineer for planning, design and engineering of Landfill Master Plan and Final Closure project. Assisted with LFG collection system design, stormwater collection system design and evaluation of final cover alternatives.

Casella Waste Systems, Inc., Hakes C&D Landfill, New York. Project manager for general LFG and air emissions consulting services. Specific tasks include design and preparation of construction documents for LFG collection system expansions, preparation of LFG master plans, preparation of air permit application and landfill expansion permitting assistance, H_2S surface emissions monitoring, and air compliance services.

Pine Avenue Landfill, Niagara Falls, NY. Project manager for landfill gas (LFG) system design, regulatory support, odor control from H_2S emissions, construction quality assurance services and LFG operations and maintenance consulting for LFG gas collection, control and sulfur removal system.

Waste Connections, Inc., Colonie Landfill, NY. Project manager for the numerous LFG related projects at the Town Landfill. Specific tasks include Title V permitting, Title V compliance submittals, emission statements, Federal GHG emissions reports, analysis of the LFG collection and control system operational history, design and preparation of LFG system expansions.

SAM COOKE, P.E., CEM, MBA

Education

M.B.A., Quantitative Methods concentration, Loyola University of Chicago, Illinois, 1986

B.S., Chemical Engineering, Washington University, St. Louis, Missouri, 1981

Professional Licenses

Professional Engineer in Wisconsin, Illinois, Indiana, and Colorado
Certified Energy Manager (Association of Energy Engineers - AEE)

Professional Affiliations

Solid Waste Association of North America (SWANA)
Association of Energy Engineers (AEE)

Professional Experience

Mr. Cooke has over 35 years of professional and project management experience in engineering, with 23 years of environmental engineering consulting with SCS. He is a Vice President and the SCS National Leader in Liquids Management Services. His primary area of technical expertise includes water and wastewater treatment with a specialization in industrial wastewater pre-treatment. He is experienced with various wastewater unit processes, permitting, design, feasibility monitoring, operation and maintenance, sampling, and compliance monitoring; and has served as an expert witness for multiple wastewater issues. Mr. Cooke has managed over 1,000 wastewater and other environmental engineering projects in 31 states with many industrial/ manufacturing, government agencies, and corporate clients.

Water and Wastewater Treatment

Performed wastewater treatment system evaluations to assess the best treatment options based on feasibility, efficiency, and cost for multiple industrial wastewater pre-treatment facilities.

Acted as consultant on the use, operation, and inspection of the following wastewater treatment and other equipment: membrane bioreactors, sequencing batch reactors, aerators, clarifiers; settling basins; sludge ponds; scalping tanks; sludge filtration; oil/water separators; deep well injection of wastewater; biological degradation (aerobic and anaerobic); dissolved air flotation of solids; induced air flotation of solids; chemical/fuel tanks and containment, induced draft cooling towers, boilers, chemical injectors, etc.

Evaluated landfill leachate treatment for the removal of ammonia, total Kjeldahl nitrogen, total nitrogen, biochemical oxygen demand (BOD), total suspended solids (TSS), sulfur-based compounds, and total dissolved solids (TDS) by biological, physical/chemical treatment methods.

Consulted on the use, operation, and inspection of the following influent water treatment equipment: hot process softeners (lime and soda ash), anthracite filters, sodium zeolite softeners, deaerators, demineralizers, dealkylizers, clarifiers, and chemical injectors. Consulted on operation and maintenance for specialized industrial water and wastewater applications.

Lead engineer for industrial wastewater pre-treatment system feasibility and design projects, including treatment for nitrogen compounds, fats, oils and grease, total suspended solids, heavy metals (mercury), sanitary waste, sludge dewatering, pH neutralization, volatile organic compounds, total suspended solids, polynuclear aromatic hydrocarbons, etc. Served as a consulting engineer for the feasibility and conceptual design of influent water treatment (demineralizer system) and wastewater discharge for major utility projects.

Provided expert testimony regarding water and wastewater treatment for litigation support, utility projects, and municipal public hearings. Obtained state, city public works, and wastewater treatment facility approval for pre-treatment system designs. Carried out multiple discharges of special wastewater to publicly owned treatment works (POTWs).

Process and Design Engineering

Prepared detailed design plans and specifications for soil and groundwater remediation systems and underground storage tank (UST)/above-ground storage tank (AST) system installations. Plans generally included a process flow diagram, piping and instrumentation diagram, equipment layout diagram, site layout, and other mechanical and electrical detail sheets. Permits for construction/installation were obtained and engineering specifications were prepared.

Completed design plans and specifications for 39 UST replacement sites for the Air National Guard. Performed numerous bid reviews of vendor quotations for remediation system equipment and subsurface investigation services.

Directed feasibility reviews for remedial options for multiple projects and implemented the chosen technology. Options include bioremediation, soil vacuum extraction, groundwater pump and treatment with air stripping (both with and without granular activated carbon), free product recovery with oil/water separation, fluidized bed bioremediation, and soil incineration (both stationary and mobile units).

Energy and Sustainable Engineering Services

Performed sustainability diagnostic evaluations of >100 manufacturing facilities to determine their energy and environmental sustainability baseline. The evaluation included energy, water, toxic materials, lean manufacturing, transportation, waste, and other triple bottom-line sustainability aspects. Also performed >100 follow-up energy and environmental savings evaluations, audits, and assessments, as detailed below.

Completed >100 different energy assessments and energy engineering conceptual design projects including evaluation of boilers, chillers, HVAC equipment, air compressors, lighting, building envelope, wastewater treatment, water use, and process equipment (ovens, washers, paint spray booths, conveyors, fabrication, furnaces, air pollution control equipment, molding machines, etc.). The project focus was primarily on maximizing energy savings and reducing energy costs while

increasing productivity, human comfort, indoor air quality, and energy efficiency. Manufacturing facilities included ferrous and non-ferrous foundries, food manufacturers (including various baking, cheese, pizza, fermented beverages, coffee, seasoning, dairy products and sausage companies), metal fabricators, wood-based manufacturers, plastic injection molders/extruders, fiberglass molders, chemical packagers, electric coil manufacturers, metal stampers, metal die casters, metal extruders, industrial printers, industrial laundries, HVAC equipment manufacturers, metal finishers, printed circuit board manufacturers, etc.

Managed energy/environmental projects involving Lean and Clean industrial assessments, greenhouse gas emission inventories, beneficial reuse of industrial waste, and waste heat recovery projects for multiple mid-size and large manufacturing facilities. Work included analysis of plant data, development of recommendations, and prioritizing projects for maximum return on investment.

Conducted inventory of energy usage and greenhouse gas (GHG) emissions for all commercial, industrial, agricultural, and residential users for a mid-sized mid-western city. Prepared GHG inventory documentation report and completed recommendations for these energy efficiency and sustainability action areas: land use, transportation, renewable energy, buildings, purchasing, electrical efficiency, fleet fuel efficiency, water/wastewater, recycling/reuse, urban forests, and community education. Prepared detailed reports and delivered multiple presentations for City leaders, staff, and the community.

Publications and Presentations

"Landfill Leachate: Prevent Generation and Control Disposal," SWANA NW Region Symposium, April 2018.

"Agricultural Chemicals – Regulatory Update," Wisconsin Agri-Business Association Magazine Article, December 2017.

"Retro-commissioning – Make Good Buildings Even Better," Public Works Magazine Article, Nov/Dec 2015.

"Retro-commissioning – Make Good Buildings Even Better," presentation to the Growing Sustainable Communities Conference, Sept. 2013.

"Manufacturing Energy Efficiency," presented to the Manufacturing Advantage Conference, 2012.

"Sustainable Manufacturing Overview," presented to the Non-Ferrous Foundry Society's Annual Meeting, 2011.

"Profitable Sustainability Initiative for Manufacturers," presented to the Manufacturing Matters! Wisconsin Conference, 2011.

"Greenhouse Gas Emissions and Recommendations Report," presented at a number of government and community group meetings, 2009 and 2010.

"Beneficial Reuse of Construction Waste in 'Green Building' Projects," presented to WDNR, 2008.

"Petroleum and Hazardous Materials Spill Response," presented at the Southern Wisconsin Claim Adjusters Meeting, Madison, Wisconsin, 1998 and 2001.

"Airport Fuel Spills Prevention, Preparation and Cleanup," presented at the Wisconsin Aviation Conference, Wausau, Wisconsin, 1994.

"Soil and Groundwater Recovery and Treatment Systems," presented to a major utility meeting, Washington, DC, 1993.

"Soil Vapor Extraction," presented to a major utility meeting, Michigan, 1990.

"Ammonia Stripping Towers Optimization," presented at Western States Blast Furnace and Coke Plant Association Annual Meeting, 1983 (Won award for best presentation at conference).

KERIM TEMEL, PE

Education

ME - Environmental Engineering, City College of New York, 2011
BE - Mechanical Engineering, Gazi University, 2005

Professional Licenses

Professional Engineer –New Jersey (#24GE05615500)

Specialty Certifications

OSHA Health and Safety at Hazardous Waste Operations (HAZWOPER)
OSHA Hazardous Materials, Supervisor Training, 8-Hour
OSHA Construction Training, 10 Hours

Professional Affiliations

Water Environment Federation (WEF)
Virginia Water Environment Association (VWEA)

Professional Experience

Karim Temel is a Project Director with over 14 years of experience in municipal and industrial wastewater, leachate treatment, groundwater remediation, and Operations and Maintenance (O&M). He had significant experience treating complex wastewater such as those from landfill leachate (including removal of Perfluoroalkyl Substances [PFAS]), pharmaceuticals, and chemicals industries. His areas of experience include alternatives evaluations, planning and design, troubleshooting, characterization, treatability testing, confirmation testing, system evaluations, startup and training, and process design. Additionally, he has managed numerous biological and physical/chemical wastewater treatability and process design projects for pharmaceuticals and landfills.

Landfill Leachate Treatment

Sarasota County, FL, Leachate Treatment Alternatives Evaluation and Leachate Storage Tank Aeration System Design. Subject Matter Expert. Led project to evaluate leachate treatment alternatives for total nitrogen removal and design of a new aeration system for an existing leachate storage tank. Services included waste load development, alternatives evaluations, CAPEX cost estimate, report preparation, and detailed design of an aeration system.

Vermont, PFAS Removal Leachate Alternatives Evaluation Casella Waste Systems. Process Engineer. Evaluated, at a conceptual level, two on-site and two off-site treatment and pretreatment technologies for removal of per- and polyfluoroalkyl substances (PFAS) compounds at New England Waste Services of Vermont's (NEWSVT) landfill in Coventry, Vermont. In addition to an evaluation of benefits and limitations

associated with particular disposal and technology alternatives, the results of a preliminary economic analysis of the on-site and off-site treatment and disposal options are included. The various technologies discussed were evaluated and selected based on commercial availability, proven treatment of leachate, and effectiveness at PFAS removal for application in each of the associated disposal options as part of conceptual integrated treatment systems.

Confidential Client. PFAS Removal Leachate Alternatives Evaluation. Lead Process Engineer. Developed the design basis of a new leachate treatment plant (LTP), evaluated applicable technologies for PFAS removal, prepared applicable processes and process flow diagrams, performed financial analysis, and prepared technical memorandum.

Confidential Client. PFAS Removal Leachate Alternatives Evaluation and Bench Pilot Testing. Lead Process Engineer. Provided engineering services for the design, construction, startup, operation, and data management of a pilot system to treat landfill leachate for the removal of Perfluoroalkyl substances (PFAS) compounds. The pilot system included biological treatment, ultra-filtration, nano-filtration, activated carbon, and reverse osmosis. The results from the pilot study were used to develop CAPEX, OPEX, and Life Cycle costs for the following four alternatives: 1) MBR + NF, 2) MBR + GAC, 3) MBR + NF + GAC, and 4) RO. The final deliverables for each alternative were PFDs, Plot plan, Major Equipment Lists, and Life Cycle Cost Analysis.

Henrico, VA, Old Dominion Landfill, Republic Services. Leachate Treatment Plant Design. Lead Process Engineer/Deputy DM. Led the design of a new leachate physical-chemical pre-treatment plant for metals removal and sludge dewatering with a capacity of 200,000 gpd. Work includes alternatives analysis, treatability testing, process design, detailed design, and financial analysis.

Waverly, VA, Atlantic Landfill Waste Management. Leachate Treatment Plant Start-up and Commissioning. Lead Process Engineer. Collaborated with the operations team to commission the Design-Build LTP. The LTP includes chemical metals precipitation/separation process, MBR, RO, Resin ammonia polishing system, RO concentrate reduction system, and dewatering system. The LTP was successfully commissioned and met the design and permit requirements.

Waverly, VA, Atlantic Landfill, Waste Management. Landfill Operation and Pre-Treatment Evaluation. Process Engineer. Operated a 75,000-gallon-per-day landfill seep pre-treatment plant and evaluated the seep pre-treatment alternatives by incorporating a Dissolved Air Flotation (DAF) unit as a solids/liquid separation. Conducted DAF and Gas Energy Mixing (GEM) pilot unit testing, including a chemical addition system, to determine the performance of the DAF and GEM on removing precipitated metals from landfill seep at the facility.

Johnston, RI, Confidential Client. Arsenic Removal Conceptual Design. The Project Engineer evaluated the best available technologies for arsenic removal for the treatment of process wastewater generated at the gas conditioning plant. The conceptual design package included a process major equipment list, an operational cost estimate, and an AACE Class 5 cost estimate.

Emelle, AL, Waste Management. Leachate Treatment Plant Hazard and Operability (HAZOP) and Detailed Design Review. Process Engineer worked with the design team to perform HAZOP and a detailed design review for the leachate treatment plant. The outcome from the HAZOP review was implemented in the detailed design.

Henrico, VA, Old Dominion Landfill, Republic Services. Leachate Treatment Plant Alternatives Evaluation. The Lead Process Engineer developed the design basis and evaluated the alternative technologies for the LTP. Performed biological leachate treatment modeling to identify the biological tank size. Prepared Class 5 cost estimate for the proposed LTP.

Henrico, VA, Old Dominion Landfill, Republic Services. Permitting Support. Lead Process Engineer/Project Manager provided technical support throughout the permit renewal appeal and permit limits negotiation phase.

Apopka, FL, Vista Landfill, Waste Management. Membrane Bioreactor Modeling and Cost Estimate. Lead Process Engineer developed MBR biological model for the removal of Total Nitrogen, sized equipment, and developed capital and operational cost estimates.

San Diego County, CA, Otay Landfill, Republic Services. High Strength Leachate Treatability Testing. Project Manager/Process Engineer developed the anaerobic bench testing procedure for high-strength landfill leachate, coordinated with the testing lab, analyzed the data received from the testing lab, and summarized the findings.

Buford, GA, Richland Creek Landfill, Republic Services. Leachate Treatment Plant Upgrade Evaluation and Design. Lead Process Engineer developed the design basis of the LTP upgrades and evaluated the alternative technologies for the LTP upgrade. Assisted in the preparation of the permit application as well as the sewer capacity certification request form. Performed design calculations and prepared process and instrumentation diagrams for the LTP upgrades.

Morgantown, PA, Conestoga Landfill, Republic Services. Leachate Treatment Plant O&M Manual Revision. The process Engineer updated the pre-established O&M manual for the leachate treatment plant.

Waverly, VA, Atlantic Landfill, Waste Management. Leachate Treatment Plant O&M Manual Preparation. Process Engineer prepared the O&M Manual for the leachate treatment plant.

Lowellville, OH, Carbon Limestone Landfill, Republic Services. Leachate Treatment Plant Detailed Design Support. The Lead Process Engineer reviewed the design concept and P&IDs and prepared a process control description. Provided technical feedback to the process mechanical team. Reviewed contract specifications.

Canton, MI, Sauk Trail Hills Landfill, Republic Service. Leachate Treatment for Chemical Oxidation Demand (COD) Removal. Process Engineer evaluated simple aeration in a biologically active aerated tank configuration and chemical oxidation with hydrogen peroxide to remove COD to comply with local pre-treatment limits. Testing demonstrated that a 25% reduction in COD in winter conditions could be achieved with the installation of a Venturi-type aerator. Using existing tank nozzles, the system could be economically installed in the existing leachate storage tank.

Waterloo, NY, Seneca Meadows Landfill, Seneca Meadows, Inc. Leachate Treatment Plant Evaluation. The Lead Process Engineer evaluated the existing technology and recommended near-term modifications that could be implemented quickly and economically to improve treatment performance and operations.

Waverly, VA, Atlantic Landfill, Waste Management, Leachate Treatment Plant Evaluation. The Lead Process Engineer performed the site-wide mass balance calculation for the LTP with a daily treatment capacity of 455,000 gallons. Prepared Process Performance Acceptance Testing summary tables and an LTP Start-up and Commissioning Plan, including identifying required temporary equipment during the early start-up phase (Biomass seeding, growth, and acclimation).

Confidential Client. Leachate Treatment Plant Evaluation. Process Engineer served as part of a multi-disciplinary design team responsible for the design of the preparation of the leachate characteristics (Basis of Design) and part of the conceptual Leachate Treatment Design team. Prepared process flow diagrams for alternative treatment systems and participated in the preparation of leachate treatment alternatives evaluation technical memorandum.

Wellsboro, PA, Phoenix Resources Landfill, Waste Management. Leachate Treatment Evaluation. The Process Engineer evaluated the best available technologies for managing and treating leachate from the landfill to achieve and maintain compliance with the State of Pennsylvania's leachate storage regulations. The evaluation focused on hydraulic evaluation, technologies available for the treatment of the leachate, the treatment performance (i.e., removals), O&M, and associated impacts if the technologies were employed.

Kane, PA, McKean Landfill, Casella. Leachate Treatment Reverse Osmosis System Evaluation. Process Engineer evaluated RO system O&M procedures and overall performance. Identified key modifications/replacements that would likely improve the longevity of the RO system and its ability to meet compliance consistently and reliably. Conducted bench-scale tests that included evaluating the performance of RO modules (ammonia-N rejection rates), testing breakpoint chlorination for ammonia-N polishing, and conducting air stripping tests for ammonia-N polishing.

Pharmaceutical Water and Wastewater

Bridgewater, NJ, American Cyanamid. Groundwater Treatment Facility Design and Continued Support. Project Engineer performed a groundwater treatment facility design, including preliminary design calculations, equipment selection, preliminary cost estimation, air emission estimation, and process and instrumentation drawings. The treatment facility includes advanced oxidation, physical/chemical metals treatment, a membrane bioreactor, and an adsorption system. The Commissioning Manager prepared a Start-up and Commissioning Plan for the Groundwater Treatment Facility, including identifying required temporary equipment during the start-up phase. The Project Engineer prepared the O&M Plan for the Groundwater Treatment Facility. Process Engineer/Project Manager providing continued engineering and consulting support to evaluate the site-wide treatment processes at the Groundwater Treatment Facilities for potential PFAS and 1,4-dioxane removal. The treatment processes evaluated include MBR, Granular Activated Carbon, and ion exchange resins. The scope of work involves biological 1,4 dioxane removal, well-head electrochemical oxidation and plasma treatment, segregated stream Fenton's treatment bench testing, and evaluations.

Elkton, VA, Merck, Industrial Wastewater Treatment Upgrades. Process Engineer served as part of a multi-disciplinary design team. Scope of work included upgrading the existing wastewater plant and developing an Authorization for Expenditure scoping package, which included an approximately 10 percent total installed cost estimate. Process scope included upgrading Equalization Tanks, Biological Aeration system, new clarifiers, new solids drying and handling, utilities, non-contact cooling water systems, automation, instrumentation, and a new pump station for the head of the plant. The project's estimated cost was over $83 million. Performed process calculations, developed Piping and Instrumentation Drawings (P&IDs) & datasheets, and assisted 3D model & equipment/line/valve list development.

Millsboro, DE, Merck, High Ammonia Loading Reduction Alternatives Evaluation Lead Process Engineer The work included characterization of source wastewater, alternatives evaluation including source segregation, biological ammonia removal, evaporation, and advanced oxidation. FEL-1 was conducted for the selection option of source segregation, equalization, and pH neutralization system.

Bridgewater, NJ, American Cyanamid. 1,4-Dioxane Treatment Alternatives. The Lead Process Engineer/Project Manager performed a technology evaluation for the removal of 1,4-Dioxane at the extraction well head, segregated groundwater for highly contaminated groundwater extraction wells, and combined groundwater. Technologies evaluated were biological removal with co-substrate, plasma oxidation, electrochemical oxidation, Fenton's oxidation, Ultraviolet/Peroxide oxidation, Ozone Oxidation, and RO. biological removal with co-substrate, plasma oxidation, electrochemical oxidation, and Fenton's oxidation bench-scale treatability testing were conducted for proof-of-concept treatment. End-of-pipe (groundwater treatment effluent) treatment alternatives are currently underway

Confidential Client, Pennsville, NJ. Pharmaceutical Manufacturing Wastewater Treatment Plant Operation Optimization Analysis. The Lead Process Engineer performed a WWTP Operation Optimization analysis for a pharmaceutical wastewater stream. This evaluation included process alternatives, equipment upgrades, automation, as well as WWTP effluent discharge options. The evaluation included an American Association of Cost Engineers (AACE) Class 5 cost estimate, operational cost estimate, and payback period estimation.

Amgen, Thousand Oaks, CA, Groundwater Treatment Facility Evaluation. The Process Engineer evaluated treatment options and performed AACE Class 5 cost estimation for a conceptual groundwater treatment facility.

Amgen, Multiple Sites, Water Reuse Facility Alternatives Evaluation, and Engineer of Record Design. The Lead Process Engineer evaluated treatment options to meet Amgen's water reduction. Analyses were performed at Thousand Oaks, CA, West Greenwich, RI, and Cambridge, MA sites. Some of the analyses are sitewide mass balance, water recycle model generation, and technology evaluation including membrane capacitive deionization, reverse osmosis, softening, reverse osmosis, evaporation/condensation, crystallization, and dewatering. Various treatment trains were considered, and Class 5 cost estimates were established. The selected option was then carried on engineer of record phase of the project and Class 4 cost estimates were established.

Mine, Energy, and Manufacturing Water and Wastewater

Confidential Client, Boise, ID. Slurry Sludge Management Alternatives Evaluation. The Lead Process Engineer performed an alternative evaluation of a slurry management system for an acid mine water treatment process. The scope of work involves the preparation of a design basis, alternatives evaluation, technology evaluation, financial analysis, and summary technical memorandum.

Grand Rapids, MI, Covanta Energy Inc. Contact Water Treatment Study. The Project Engineer evaluated the contact water pre-treatment systems for mercury removal and the stormwater rerouting system. Reviewed available fine solids control technologies, conducted alternatives evaluation, and the conceptual design of a recommended option. Developed budgetary level cost estimate.

Confidential Client, International (Canada). Selenium Treatment Technical Evaluation. The Project Engineer performed a mass balance evaluation for 13 different selenium treatment alternatives. The selected conceptual design package was prepared, and this package included a process major equipment list and an AACE Class 5 cost estimate.

Lake Orion, MI, General Motors, Wastewater Treatment Plant Upgrades Detail Design Led the design of wastewater treatment upgrades. Work includes alternatives analysis, process design, equipment selection, and detailed design.

Watervliet, NY, Watervliet Arsenal Hexavalent chromium [Cr (VI)] WWTP Pilot Plant Design and Commissioning Lead Process and Design Engineer for a batch Cr (VI) metals removal system design. Assisted start-up and commissioning team

Refinery and Data Center Water and Wastewater

Confidential Refinery Client, Delaware City, DE. Wastewater Treatment Plant Process Evaluation. The Project Engineer performed routine process performance calculations for the overall WWTP.

Confidential Refinery Client, Confidential Location in Australia, WWTP FEL 2 Stage Gate Design Subject Matter Expert served as a subject matter expert. Reviewed proof of concept biochemical methane potential, bench scale anaerobic digestion treatability testing plan and results, design calculations, flow and material

balance, PFD, and P&IDs. The treatment process includes an anaerobic digester, a biological ammonia removal system, an activated sludge process, ultrafiltration, reverse osmosis, and a dewatering system.

Confidential Technology Client, Confidential Location, Data Center Water Reuse Detail Design Design Manager: led the design of a new TDS removal system (Membrane Capacitive Deionization (CapDI©) with a capacity of 45,000 gpd. Work includes process design, design, detailed design and bid package preparation, and financial analysis.

Pulp and Paper Water and Wastewater

Baltimore, OH, Greif (formerly Caraustar), Wastewater Treatment Plant Evaluation and Whole Effluent Toxicity Review. Process Engineer assisted a recycled paperboard mill that experienced transient non-compliance issues with their whole effluent toxicity (WET) National Pollutant Discharge Elimination System permit limits. Investigate the toxicity sources, identify potential remedies for toxicity reduction, and implement a solution to obtain regulatory compliance. The scope of work included performing an evaluation of the operating performance of the industrial water treatment plant (IWTP), reviewing processes and chemicals used within the mill and IWTP, conducting detailed reviews of WET lab reports, conducting jar and bench scale testing, and performing an alternatives evaluation including AACE Class 5 cost estimates to select a preferred alternative.

Cedar Springs, GA and Monticello, MS, Georgia-Pacific, Wastewater Treatment Plant Evaluation. The Lead Process Engineer evaluated the WWTP to develop a strategy to reduce risks for non-compliance, reduce O&M costs, manage solids more efficiently, reuse solids where possible, and achieve low concentrations for the parameters of concern at GP Cedar Springs Mill and Monticello Mill. Some of the analyses performed; were primary clarifier evaluation, reduction of the WWTP footprint, aeration stabilization basin (ASB) evaluation, dewatering system evaluation, hydraulic capacity evaluation and lift station pump upgrades, foam control, instrumentation, and automation.

Monroeville, AL, Georgia-Pacific, Wastewater Treatment Plant Evaluation Lead Process Engineer evaluated WWTP to meet Europe ecolabel certification, specifically Nordic Swan at Alabama River Cellulose Mill. The evaluation involved at-source and end-of-pipe treatment alternatives to achieve the Nordic Swan guidelines for phosphorus, chemical oxygen demand, and energy intensity.

Syracuse, NY, WestRock, High-Rate Anaerobic Designer and WWTP Upgrade Lead Process/Process Mechanical Engineer for a design-build High-Rate anaerobic digester upgrade project at WestRock-Solvay Mill. The design included new high-rate anaerobic digester, flash aeration tank upgrades for calcium removal, dissolved air floatation (DAF) to Suspended Air® Flotation (SAF®), and end-of-pipe screening (ongoing work 2024)

Municipal Wastewater Treatment

Wards Island, NY, Disinfection Alternatives Evaluation Wards Island Wastewater Treatment Plant. Project Engineer conducted a disinfection study to evaluate the performance of the different disinfectants, namely, chlorine, chloramine, and peracetic acid. The evaluation included chemical dosage, residual concentrations, contact time, and fecal/chloroform kill efficiency.

Newark, NJ, Passaic Valley Sewerage Commission. Secondary Clarifier Modeling. The Project Engineer modeled secondary clarifiers by using Ansys/Fluent. Conducted bench and field experiments to determine the model input parameters. The model was calibrated by conducting field dye testing, stress testing, and wet weather testing.

Coney Island, NY, Coney Island Wastewater Treatment Plant. Wastewater Characterization. The Project Engineer conducted wastewater characterization for a biological nutrient removal upgrade project.

Wards Island, NY, Wards Island Wastewater Treatment Plant. Struvite Prevention Alternatives Analysis. The Project Engineer analyzed operating data and performed a literature study (research papers and case studies). Conducted bench scale studies to evaluate struvite control alternatives; namely, the addition of Ferric Chloride and aeration of the digested sludge.

Wards Island, NY, Wards Island Wastewater Treatment Plant, SHARON Process Evaluation and Model. Project Engineer evaluated and modeled a full-scale single reactor system for high-activity ammonium removal over nitrite (SHARON®) in New York City. The evaluation consisted of sampling and analyzing the samples for COD, Ammonia, Nitrate, Nitrite, and Suspended Solids. From the years of collected data, the process was modeled and calibrated the model by using BioWin.

Wards Island, NY, Wards Island Wastewater Treatment Plant, Evaluation of Anaerobically Digested Sludge Gas Production. The Project Engineer conducted bench-scale studies to evaluate digested sludge gas production, production rate, and solids destruction. Operated Anaerobic Ammonia Oxidation (ANAMMOX) Moving Bed Biofilm reactor (MBBR)

Brooklyn, NY, 26 Ward Wastewater Treatment Plant. Project Engineer operated a 2000-gallon MBBR pilot plant facility retrofit in order to evaluate the performance of ANAMMOX, a recently discovered biological nitrogen removal technology, for a project funded by New York State Energy Research and Development Authority and New York City Department of Environmental Protection.

Publications and Presentations

A. A. Alleyne, S. Xanthos, K. Ramalingam, K. Temel, H. Li, and H. S. Tang, Numerical investigation on flow generated by INVENT mixer in full-scale wastewater stirred tank. Engineering Applications of Computational Fluid Mechanics, 2014, 8(2014), 503-517

“Struvite Control: An Alternative Approach,” for the New Jersey Water Environment Association Annual Conference, 2014, at Bally’s, Atlantic City, New Jersey (presenter) (lead author)

“Alternative to Traditional Struvite Control Practices” for the NYWEA 86th Annual Meeting 2014 at Marriott Marquis Times Square, New York, NY. (presenter)

“Struvite Control Prior to Dewatering at Waste Water Treatment Plants: An Alternative Approach” for the WEFTEC 86th Annual Meeting 2013 at McCormick Place South, Chicago, IL. (presenter) (lead author)

“Process Performance Evaluation of a Full-Scale Single Reactor System for High Activity Ammonium Removal Over Nitrite (SHARON®) Demonstration Facility at Wards Island WWTP in New York City” for the NYWEA 84th Annual Meeting 2012 at Marriott Marquis Times Square, New York, NY. (presenter)

“Process Performance Evaluation of a Full-Scale Single Reactor System for High Activity Ammonium Removal Over Nitrite (Startup and Commissioning of an Advanced Leachate Treatment Plant” for the NJWEA Annual Technology Transfer Seminar 2019, Atlantic City, NJ. (presenter)

Appendix F

Project Profiles

LANDFILL CLOSURE PERMITTING AND DESIGN, NEW YORK CITY

Fresh Kills Landfill, Staten Island, New York

Background

The New York City Department of Sanitation (DSNY) required engineering and design services for the closure of Section 1/9 and related activities at Fresh Kills Landfill, Staten Island, New York. Landfill closure construction was previously completed on the lower side slopes of Section 1/9.

The landfill closure covers approximately 312 acres. Services needed included the investigation for functionality and the upgrading of Basin 0. Work requirements also included applying and obtaining all required regulatory permits necessary for construction of approximately 6 drainage outlets into Arthur Kill and Great Fresh Kills located on the west of the Main Mound. The construction of stormwater drainage outlets into the Arthur Kill and Great Fresh Kills may trigger requirement of wetland permits, wetland mitigations, modifications to the existing SPDES permit, and other related permits.

Challenge

There were a number of key issues and factors that had to be addressed to provide the required services and successfully advance the project through construction, including the following:

- Final grading plan, including acceptable soil types for sub-base grading and coordination with the end use plan.
- Interface of final cover types, especially stormwater management at these interfaces.
- Stormwater management, including possible elimination of some downchutes and further design of Basin 0.
- Wetlands impacts and permitting.
- Landfill gas management, including the extent of the needed expansion of the LFG collection system.

The SCS Team also needed to coordinate work with various divisions within DSNY and other DSNY consultants so as to provide the proper organization of all items necessary to complete the engineering and design services of the closure of Section 1/9.

Outcomes and Benefits

We designed revisions to the conceptual documents, with the following results:

- Basin 0 was re-designed to accept more stormwater.

- Two downchutes were eliminated, which resulted in cost savings and avoidance of possible erosion at the base of the downchute.

- Due to concerns with wetlands impacts and permitting, we re-configured xix stormwater outlets for Swales AK1 through AK6. Based on the termination of the outlets relative to the Spring high water line, some permitting effort was avoided (e.g., Army Corps, Protection of Waters), which saved time and cost.

- The prior closure plan required about 370 vertical extraction wells; about 20 condensate tanks; and, a gas venting layer, with vents, located at one per acre. We were able to eliminate over 150 new wells and use some of the existing wells. We eliminated all condensate tanks. Finally, we proved that one vent for every three acres was sufficient.

Contract Information

Primary Client Contact:	Project Terms:	SCS Team:
Santi Chang, PE Project Manager DSNY 44 Beaver Street New York, New York 10004 212-437-4419 schang@dsny.ny.gov	August 2013 – Present Budget: $7 million	Gregory P. McCarron, PE Lisa Wilkinson, PE Marcus Scrimgeour, PE

PROJECT PROFILE: LANDFILL GAS AND LANDFILL SERVICES, KEEGAN LANDFILL, NEW JERSEY SPORTS AND EXPOSITION AUTHORITY

Keegan Landfill, Kearny, New Jersey

Background

The Keegan Landfill is approximately 95 acres and is a single-mound, unlined landfill surrounded by a bentonite-slurry cutoff wall including leachate collection. The landfill was approved to operate in 2009 as a Class II landfill that primarily accepts construction and demolition waste.

Challenge

An Administrative Consent Order (ACO) was issued by the New Jersey Department of Environmental Protection (NJDEP) in March 2019 in response to odor complaints made against the Landfill. The ACO required the installation and operation of eight fixed monitoring stations to continuously measure hydrogen sulfide (H_2S) concentrations in the ambient air. SCS worked with NJSEA to develop and execute an ambient air monitoring program and perform surface emissions monitoring to investigate the source of the odors. Based on the results of the investigation and SCS's recommendations, NJSEA committed to installation of a landfill gas collection and control system (GCCS).

The Landfill was also required to cease waste disposal in June 2019 and install final cover to formally close the Landfill. The Landfill had not reached final design grades. The top plateau grades required modification to achieve the minimum slope required by the NJDEP regulations and to maintain stormwater runoff.

Outcomes and Benefits

An interim GCCS was designed, permitted, installed and was operational by September 2019 under the combined efforts of SCS's engineering, construction and operations groups. The landfill gas collection system was expanded in December 2019, a second flare was operational by February 2020 and a sulfur removal system was operational by March 2020. An enclosed flare was installed and operation authorization was granted by NJDEP in September 2020 to replace operation of the two temporary flares.

The final closure and post-closure care plan have been submitted to NJDEP for review.

The GCCS has successfully managed odors and emissions from the landfill. As of February 2020, there have been no exceedances of the 30 parts per billion (ppb) H_2S concentration, averaged over a 30-minute period at any of the eight perimeter monitoring stations. There have been no verified odor complaints documented by the NJDEP.

LANDFILL LEACHATE TREATMENT ASSESSMENT AND DESIGN

Roseburg Landfill in Oregon

Background

Landfill leachate from a landfill expansion is disposed at a local Publicly Owned Treatment Works (POTW). With the operation of the expansion area, leachate constituent concentrations increased significantly causing POTW concerns. In addition, treatment for per & polyfluoroalkyl substance (PFAS) reduction could be required in the future.

The landfill expansion generated leachate that required pre-treatment to meet the discharge permit requirements.

Challenge

The ammonia and other leachate constituent concentrations in the landfill leachate were increasing significantly from the landfill expansion area. The POTW was pressuring our client to investigate pre-treatment options and our client did not want to raise their leachate disposal costs significantly. SCS was tasked with finding a solution to reduce the leachate constituent concentrations, including possible future PFAS constituents, with economic concerns in mind. Additionally, the evaluation needed to be performed at a fast-pace to satisfy the POTW and regulators growing concerns.

SCS met with our client to assess the political, technical and logistical leachate issues, evaluated the leachate flow data, reviewed the grab and 24-hour composite leachate sample analytical data, and prepared documentation to coordinate with owner, POTW and regulatory staff. SCS considered various options for leachate constituent reduction and prepared budgetary cost estimates based on leachate treatment equipment suppliers information and presented all data in a report.

Following the options analysis, SCS was retained to prepare the request for bid (RFB) documentation for public bidding. SCS coordinated for geotechnical evaluation and prepared civil site work, erosion control, process flow diagram and piping & instrumentation diagrams in addition to technical specifications for the RFB. SCS evaluated the bids during the RFB process on behalf of the owner.

Outcomes and Benefits

SCS worked closely with our client to address the technical landfill leachate constituent reduction needs through a thorough leachate treatment assessment. The assessment concluded that a membrane bioreactor, followed by a reverse osmosis polish, were the most economical solutions that would also address future PFAS reduction as well as NPDES permit discharge concerns. The overall objective was to keep our client in compliance and discharging to the POTW, as economically viable as possible. Technical, economic and political challenges were also important to address.

Primary Client Contact:	Project Terms:	SCS Team:
Nick Frisinger Douglas County – Solid Waste Mngr 1036 SE Douglas Ave, Room 308 Roseburg, OR 97470 541-440-6093 (Office) nafrisin@co.douglas.or.us	2018 to Present Budget: ~$7.5 million (engineering and construction)	Shane Latimer, Project Manager, Siamak Modarresi, Mark Huber and Sam Cooke, Technical Leads Other SCS Engineers Staff

SCS ENGINEERS

60,000 GALLON PER DAY LEACHATE TREATMENT FACILITY DESIGN SOUTHEAST COUNTY LANDFILL

Hillsborough County, Florida

Background

Hillsborough County needed a long-term plan for managing leachate at the Southeast County Landfill. The County wanted to carefully evaluate its options, so it retained SCS Engineers (SCS) to conduct a feasibility study.

SCS's analysis included biological, physical, and physicochemical treatment processes and off-site disposal at a publicly-owned and operated wastewater treatment facility. Considering the County's desire to manage leachate on site, SCS recommended an on-site treatment system, with effluent disposal through a spray irrigation system over completed sections of the landfill.

Challenges, Outcomes, and Benefits

The primary constituent of concern was ammonia. SCS selected an activated carbon treatment process, which included nitrification and denitrification unit processes. The design is based on leachate generation estimates using the USEPA's Hydrologic Landfill Performance Model (HELP) and leachate characterization studies. The system includes a 570,000-gallon leachate storage tank, a full secondary containment system for treatment and storage vessels, an effluent storage pond, and a 21-acre leachate spray field.

SCS successfully addressed regulatory concerns throughout the project. FDEP instituted stringent spray irrigation limitations on the system based on rainfall patterns. SCS adapted the leachate management plan for the site to accommodate the limitations. SCS has also provided ongoing operational support for the treatment plant, including:

- Oversight of the rehabilitation of five leachate storage tanks
- Rehabilitating a 550,000-gallon leachate storage tank
- Re-programming the storage tank's active cathodic protection system

Since completion and startup, the system has effectively treated the target contaminants.

SCS ENGINEERS

LANDFILL LEACHATE TREATMENT, STORAGE & DISPOSAL EVALUATION

Frederick County, VA

Background

Frederick County (County) manages on average over 1 million gallons of leachate per month. The facility consists of three landfill units: an old closed unlined municipal waste (MSW) landfill, an open MSW landfill, and an open construction and demolition debris landfill. Leachate from all three units are comingled and pretreated onsite, prior to being pumped to the local wastewater treatment plant.

Challenge

Due to record rain events, its leachate infrastructure has been inundated, requiring an emergency response.

Outcomes and Benefits

As an emergency response, SCS was hired for our design/build capabilities. We have performed the following design/build tasks:

1. Design/build of a 4-million gallon lagoon to immediately control and contain the leachate.
2. Begin evaluation of treatment options for:
    a. Total nitrogen as one of the key leachate constituents of concern
    b. Emerging contaminants of concerns, such as PFAS
    c. Effect of leachate constituents on UV transmittance used at WWTP.
    d. Pretreatment including, but not limited to, thermal evaporators, membrane technologies, sequencing batch reactors, and packaged plants.
3. Evaluation to minimize leachate generation in the first place.

This project is ongoing and involves additional tasks such as review of existing leachate management strategies, permitting requirements, technology limitations, and capital and operating costs.

LANDFILL LEACHATE TREATMENT STORAGE & DISPOSAL EVALUATION

Sarasota County U.S.

Background

Sarasota County (County) requested an evaluation on leachate storage, treatment, and disposal options. This required an engineering evaluation of capital and operational costs, advantages and disadvantages, permitting issues, and general timelines for each option with the purpose of improving leachate quality and assessing viable storage and/or disposal options.

Challenge

The landfill sends leachate to a wastewater treatment plant (WWTP) for treatment and disposal. Recently, the total nitrogen and ammonia nitrogen concentrations in the raw leachate began increasing and the County became concerned that these parameters and the leachate's dark color could potentially impact their continued ability to dispose of the leachate to the WWTP.

SCS evaluated four treatment options to address this concern: Aeration, membrane bioreactor, sequencing batch reactor, and a thermal evaporator. SCS reviewed the leachate composition data and leachate generation rates, obtained budgetary cost estimates for each treatment option, evaluated the feasibility of each option and the compatibility with this site, and included the findings in a written report.

In addition to leachate treatment options, the County also requested an evaluation on leachate storage options. Leachate storage at the site is limited to one storage tank, and the County wanted additional storage to store overflow leachate or provide backup storage should the primary tank require maintenance. SCS evaluated the advantages and disadvantages and obtained cost estimates for a number of leachate storage options including a concrete tank, steel tank, and HDPE-lined leachate pond, and included the findings in the written report.

Finally, SCS evaluated the option of constructing a deep injection well at the site to prove an alternate option for leachate disposal. SCS reviewed the local and regional geology and hydrogeology to evaluate the compatibility of the site with the construction of a deep injection well, obtained budgetary cost estimates for the installation and operation of a deep injection well, and included the findings in the written report.

Outcomes and Benefits

Based on the evaluations presented in the report, SCS presented a number of viable options for leachate storage, treatment, and disposal. Ultimately, the final choice depended on the needs and the financial resources of the County, however SCS was able to provide to the County with the necessary information for each recommended option for the County to make a final selection.