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ISSUES

- Significant new and ongoing regulatory issues
- Higher labor, energy, fuel, equipment, and insurance costs
- Uncertain and changing market for recyclables
- Political pressure to do more with less
- Perception that private sector can provide better service at reduced cost and with less governmental risk
- Increasingly-engaged public calling for more recycling and implementation of zerowaste goals

CHALLENGES

- Numerous competing priorities
- Effective change requires comprehensive evaluation of current organizational, financial, and operational activities
- Public and elected officials may lack knowledge of costs, risks, or sustainability of implementing new programs
- Well-intentioned new activities can have unintended consequences upon existing systems and finances

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Letter from the President

August 2021

August already. Where did the summer go? Time to think about school supplies, bus routes and lunch money. So what's next? County boards are coming back from vacation and busy August agendas are followed by budget hearings for budgets that were submitted last year. Besides all that I'm thinking about...WasteCon!!! Did you know that WasteCon is in Florida this year, in Orlando?



Have you already blocked out that first week of November? Have you thought about breaking out the sticks (golf clubs) for the outing on Monday? Well if you haven't already, now would be a perfect time to start planning for one of the biggest solid waste educational and networking events of the year. The local planning committee has been meeting regularly with SWANA conference planners and this year's event will definitely be a bigger onsite event than last year.

So what help do we need? There will be information coming soon looking for volunteers to help with onsite services and room proctors as well as other services needed to pull off this event. Besides that, we need you to attend. I can't think of a better way to prep for 2022 than to network with my peers and learn about what's happening across the county in solid waste and recycling.

Now if you want a more local experience, the Road-E-O is coming to Fort Myers from September 10 – 11. If you have not attended one of these events it is one to experience as some of Florida's best drivers and equipment operators dodge, duck, dive and dodge obstacles to test their maneuvering talents. This is a celebration of the folks that get the job done daily at the curbside, over the road, and at transfer stations and landfills. Winners of this event have the opportunity to travel to the national event at the 2022 National Road-E-O.

I hope the summer has treated you well. Maybe you've taken in some of the Summer Olympics in Tokyo or just taken some time to relax while school is out. I look forward to seeing everyone this fall at our SWANA events. For more information on the chapter Road-E-O, click [here](#). To learn more about WasteCon and to register, click [here](#).

Sincerely,

Keith Howard
SWANA FL President

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Landfill Partial Final Covers

Ali Khatami, Ph.D., P.E.

State of Florida Solid Waste Rules in Chapter 72-701 of the Florida Administrative Code require landfills to receive final cover within 180 days of reaching final grades. This requirement leads to closing landfill slopes in phases, normally referred to as partial closure. Generally, partial closures start from the bottom of the landfill slope up to a certain elevation, with geosynthetics in the final cover temporarily anchored along the partial closure's sides and upper boundaries (Photo 1). Engineers propose different designs for securing the lower boundary of partial closures at the bottom of the landfill slope. Some engineers propose an anchor trench outside the bottom lining system anchor trench to secure the final cover geosynthetics. Others specify welding the cover geomembrane to the bottom lining system geomembrane.

Final Cover Anchor Trench at Perimeter Berm

Experience with anchor trenches for the final cover geosynthetics at the bottom of the landfill slope where the perimeter berm is located has not been positive because of these issues:

- Landfill gas may escape through the opening between the bottom lining system anchor trench and the final cover anchor trench.
- Leachate seeps below the final cover geomembrane that reach the bottom of the landfill slope may penetrate the landfill perimeter berm through the opening between the two anchor trenches.
- High concentrations of landfill gas may be detected along the landfill perimeter berm at the location of the two anchor trenches during surface emissions monitoring.
- If high leachate levels are developing above the bottom



Photo 1: Partial closure of landfill slope



Photo 2: LTDS under construction below cover geomembrane

lining system, landfill leachate may escape through the opening between the two anchor trenches.

Welding of Final Cover Geomembrane to the Bottom Lining System Geomembrane

To eliminate these issues, engineers weld the final cover geomembrane to the bottom lining system geomembrane for cases where there is a bottom lining system below the waste. The welding completely seals the landfill interior space from the outside environment and keeps regulated materials, such as waste, leachate and gas, within the sealed system. Of course, the engineer should design proper means to address these elements behind the sealed system; designs may include:

- A leachate toe drain system below the final cover geomembrane at the bottom of the landfill slope to collect and convey leachate seep liquids to the leachate collection system at the bottom of the landfill.

- A suitable landfill gas collection system below the final cover geomembrane, at the lower boundary of the landfill slope, collects gases accumulating in the area. This is an important consideration because the closest gas collection well may be more than 250 ft. away, up on the slope.
- A rainwater toe drain system above the final cover geomembrane, at the bottom of the landfill slope, collects and drains the water in the final cover geocomposite.

Leachate Toe Drain System (LTDS)

Leachate toe drain system is a concept originally developed by SCS and incorporated into landfill final cover designs more than 20 years ago. Unfortunately, many solid waste engineers are unaware of the need for LTDS, so their designs lack this important feature. LTDS saves a tremendous amount of repair money in the long run by avoiding complications for landfill operators.

Engineers install an LTDS at the landfill perimeter berm below the final cover geomembrane to collect leachate seep liquids that flow down the slope, below the final cover geomembrane. LTDS allows collected liquids to flow to the leachate collection system at the bottom of the landfill (Photo 2).

Engineers also install vertical pipes on the LTDS pipe at certain intervals to remove excess gas pressure from underneath the final cover geomembrane in the lower part of the slope (photo 3).

Rainwater Toe Drain System (RTDS)

A rainwater toe drain system removes water that moves laterally within the final cover geocomposite toward the slope's bottom. The RTDS includes a perforated HDPE pipe encased in gravel and wrapped in geotextile. Along the landfill slope's bottom, the RTDS is positioned behind a HDPE flap welded to the final cover geomembrane. The RTDS is sloping with high and low points along the

alignment (Photo 4). Lateral drain pipes located at low points remove water from the RTDS to the perimeter ditch.

Other designs that involve extending the geocomposite to daylight at the slope surface cause problems such as:

- Excessive vegetation impacts the opening of the geocomposite at the outlet edge
- Soil erosion from higher-up clogs the opening of the geocomposite at the outlet edge
- Algae growth at the opening of the geocomposite at the outlet edge
- Gradual discharge of water from geocomposite softens the perimeter berm soils in the vicinity of the outlet edge
- Water percolates into the landfill



Photo 3: Vacuum pipe connected to LTDS

perimeter berm and causes stability issues

- A slippery surface develops along the outlet edge on top of the landfill perimeter berm, creating a health and safety issue for landfill personnel

Install the RTDS on terraces along the depression on the interior side of the terrace. Direct discharge from the final cover geocomposite can cause the



Photo 4: RTDS completed above Cover Geocomposite

same issues discussed previously on landfill terraces. There is proven track record of success that makes RTDS a superior design.

Ali Khatami, Ph.D., P.E. is Vice President of SCS Engineers. He has more than 30 years of experience in design, permitting, and construction of landfills. Dr. Khatami can be reached at akhatami@scsengineers.com or www.scsengineers.com.

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- City of St. Cloud
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- City of Tampa
- Miami-Dade County



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Know your Force Majeure Clause

Mark Hadlock, PE

Force majeure clauses have been included in most construction contracts for many years. Generally, their use is relatively limited, until recent industry-wide impacts have triggered *force majeure* claims.

Once used on rare occasions, as a result of the pandemic and other severe weather-related events, *force majeure* claims

unfortunately have become very common in the past six months. The clause's purpose is to allocate the risk of loss if contract performance by either party is hindered by unforeseen events. In essence, the parties agree that the *force majeure* clause will

excuse a default or failure to perform some portion of the contract without damages or penalty clauses being used to resolve the conflict.

Rising Claims

As a result of recent global and regional events, we have seen an unprecedented number of *force majeure* claims across a wide range of construction projects. Most of the claims are related to the extraordinary increase in material prices, including resin for geosynthetics and pipe, framing lumber and plywood, fuel, copper wiring, windows and doors,

and steel, with price increases ranging from 20% to 200% or more and lead times increasing to as much as six months or more. As a result, nearly all contractors working on solid waste-related projects that are geosynthetic focused, such as landfill expansions and closures, are submitting *force majeure* based claims for hundreds of thousands of dollars that the owner can



either pay to keep the project moving forward or elect to not pay and stop work on the project. Unfortunately, most solid waste projects are critical infrastructure that have been years in planning and cannot easily be postponed without a possible disruption of service to the public.

Know Your Contracts

To a large extent, *force majeure* clauses have been boilerplate—generalized wording that is not specific to the actual project. This approach was sufficient when *force majeure* was rarely invoked. Some owners'

contracts have *force majeure* clauses where the contractor is only entitled to additional time to complete the work while others have no *force majeure* clause at all. Contractors will be on high alert to review the details of *force majeure* clauses in future contracts and will be savvy to the intricacies of the clause. Owners need to take the same precautions and prepare in anticipation of potential claims by contractors.

With these recent claims for *force majeure* being as significant as they are, it would be prudent for owners to review their contract's general conditions with respect to *force majeure*, understanding

its limitations, considering project-specific changes to more equitably share risk, and better define how using the clause will impact the contract.

Mark Hadlock, PE, is a Senior Engineer for Jones Edmunds. He can be reached at mhadlock@jonesedmunds.com.



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Siloxanes from Household Products Can be a Bane or a Boon for Landfill Gas Producers

Ramon Rivera

Synthetic man-made compounds that are used to manufacture common household products such as motor oil and shampoo are ending up in landfills where they supercharge natural gas produced by those landfills, a new study has found. While this currently poses a problem, it could present an opportunity to make landfill gas more energy-rich in the future, according to the study authors.

The synthetic compounds, known as siloxanes, are very efficient heat conductors that interact well with water, and, consequently, are now increasingly added to a wide range of consumer products. As a result, the volume of siloxanes that end up in landfills is increasing too.

It has recently become apparent that siloxanes can damage equipment

used to generate power when fueled with biogas recovered from landfills. However, according to researchers from the University of Michigan (U-M), these siloxanes could potentially be harnessed and used to produce even more energy from biogas.

The study is the first of its kind to analyze the effect that siloxanes have on biogas. They discovered that siloxanes make biogas more reactive, resulting in faster ignition and the production of more energy when used as a fuel in engines. However, when present in biogas, siloxanes can also damage engines.

“Siloxanes are highly ignitable,” said Margaret Wooldridge, the Arthur F. Thurnau Professor of Mechanical Engineering and director of the Dow Sustainability Fellows Program at U-M. “They change the chemistry of biogas like crazy. The stuff is like

rocket fuel, literally—crazy-reactive.”

Siloxanes effectively alter the flame speed of biogas, which is an indicator of how rapidly biogas combusts and powers a reciprocating piston or gas turbine engine. Biogas consists primarily of methane, a highly flammable gas that is produced by both natural sources and the breakdown of organic waste in landfills—together with lesser amounts of carbon monoxide, hydrogen and other hydrocarbons. As methane gas is highly combustible, both biogas and natural gas provide a valuable source of fuel and clean energy.

However, as methane is a greenhouse gas that is 30 times more potent than carbon dioxide, it poses a considerable environmental problem due to its climate-warming capacity. According to the EPA, landfills are

the third-largest human-related source of methane (after the oil and gas industry and agricultural sources) and contribute more than 14% of anthropogenic methane emissions in the U.S. annually.

By capturing methane emissions from landfills, we kill two birds with one stone, so to speak. We prevent these emissions from contributing to climate warming while also harnessing a valuable source of fuel.

Measuring the ‘Ignitability’ of Biogas

For this study, the research team compared the ignitability of carbon monoxide and hydrogen gas mixtures that contained two siloxanes—hexamethyldisiloxane (HMDSO) and trimethylsilanol (TMSO)—with carbon monoxide and hydrogen mixtures that contained no siloxanes. The researchers timed how long it took for each of the mixtures to ignite. A fuel with a shorter ignition period, such as hydrogen, is considered to be more reactive or ignitable than a fuel that takes longer to ignite.

The ignition times of carbon monoxide and hydrogen gas mixtures containing TMSO were 37% faster than that of carbon monoxide and hydrogen gas mixtures containing no siloxanes, while carbon monoxide and hydrogen gas mixtures containing HMDSO were 50% faster than the comparative siloxane-free mixture.

The results of the study were recently published in the scientific journal *Combustion and Flame*. The research team hopes the study sheds some light on how siloxanes affect engine performance when they form a component of biogas used to power engines. “Trace concentrations of siloxanes have been a known problem

in biogas applications leading to the formation of abrasive silica deposits on engine components,” said Rachel Schwind, a PhD student and co-author of the study. “For this reason, most

prior research in this area has focused on how to remove them from the captured gas.”

Harnessing Siloxanes, Rather than Removing Them

While the problems siloxane poses are

acknowledged, we must also recognize their potential, says Wooldridge, pointing out that they could be key to bolstering energy production from biogas.

Being able to harness siloxanes as a source of energy rather than trying to remove them would solve a lot of current problems and could offer multiple benefits. Analyzing and having a clearer understanding of the combustion chemistry of siloxanes is a positive step in that direction.

“That would potentially negate the need for scrubbing or removal during biogas processing and reduce costs,” said Schwind. “If we can reduce those costs, it moves biogas closer to being a truly carbon-neutral fuel. And if we can make landfill gas a more economically attractive option, landfill operators will have more incentive to capture and utilize this harmful greenhouse gas.”

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Journal Reference

Rachel A. Schwind & Margaret S. Wooldridge. Effects of organic silicon compounds on syngas auto-ignition behavior. *Combustion and Flame*, Vol 212, 234-241 (2020). doi/10.1016/j.combustflame.2019.10.022.



Photo courtesy of David Dodge, Green Energy Futures



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Planning for Uncertainty in Solid Waste Agencies

Marc J. Rogoff and Bill Gaffigan

In the last issue of *Talking Trash*, we discussed various aspects of the planning process for solid waste agencies. This part discusses planning for fleet replacement, reserve policy, and pro forma modelling.

Financing Fleet Replacement

Briefly, here’s some of the most common approaches to finance capital fleet replacement.

Guaranteed Buy-Back Programs

Buy-back programs are an alternative to an outright cash purchase of fleet equipment. A buy-back program allows an agency the right to sell, lease, trade or otherwise dispose of the vehicle. However, in the bid for equipment, the bidder guarantees that they will repurchase the vehicle from the agency at the end of a specified hourly usage or annual term from the date of delivery. Typically, many agencies use these provisions to keep maintenance costs to a minimum and to enable them to procure new equipment at a frequent rate.

Sinking Fund

In order to fund fleet replacements, many solid waste agencies have used a sinking or revolving fund to spread the costs of funding new vehicles or equipment over a longer period of time. Essentially, this type of financing approach requires that an agency make periodic payments into a fleet replacement fund, thereby ensuring that there will adequate funds available for the replacement vehicle or unit when it comes due for replacement.

In essence, a basic advantage to this approach is that it enables the agency to predict its annual funding needs over a long planning horizon. Notwithstanding, a major disadvantage of the sinking fund method of funding



Figure 1: Pro Forma Rate Model example.

is that it is oftentimes prohibitively expensive for many agencies to establish if they already have a large backlog of fleet replacement needs. That is, a large amount of cash must be deposited initially to create the working capital necessary to start replacing vehicles or equipment. Further, there is always the temptation on the part of municipal officials to raid such funds during lean budget years, thereby undermining a well-designed fleet replacement program in a single year.

Debt Financing

In comparison to cash or sinking fund financing programs, debt financing typically allows solid waste agencies an option to spread out the costs of fleet replacement. Rather than trying

to accumulate cash reserves in a sinking fund, an agency can borrow funds from financial institutions, either as lines of credit or fixed-term bank loans or bonds. The agency repays the outstanding principal and interest on a periodic basis once the vehicles or equipment are placed in service.

Similar to the sinking fund method of financing fleet replacement, debt financing enables the agency to eliminate the peaks and valleys in replacement funding requirements. In some respects the predictable nature of the annual expenditures tend to make replacement funding less subject to controversial budget decisions. Historically however, many solid waste agencies have shied away from debt financing to fund their fleet replacements. Oftentimes, much of this is due to local or managerial preferences to avoid high interest charges for vehicles and equipment that have a short lifespan. In other cases, state or local laws prohibit the use of debt financing without voter approval.

Leasing

Leasing or lease-purchase options are other commonly used methods by solid waste agencies for financing fleet replacements. Usually, these financing programs are offered directly from the manufacturer or third-party distributor. In comparison to the other financing methods discussed in the previous sections, leasing enables the agency to pay a fee (installment purchases) for a vehicle or equipment and then essentially ‘walk away’ from it after a specified period.

New municipal lease programs now offered on the market allow agencies to have new trucks every two years

with full factory warranties on the vehicle chassis and body. A variant to leasing is a lease-purchase where an agency can own the equipment. Overall, there is no hard and fast rule in lease financing since the terms may differ from manufacturer to manufacturer. In most cases, their obligation terminates if the department fails to appropriate funds to make the renewal year’s lease payments. Because of this provision, neither the lease nor the lease payments are considered debt. Payments can be structured monthly, quarterly, semi-annually or annually based on the cash flow of the agency.

Reserve Policies

Key among the lessons learned by many solid waste agencies is the implementation of a reserve fund for operations, emergency events, weather events, etc. The reserve fund(s) provides a short- to medium-term financial backstop for unforeseen events in solid waste management operations that cannot be predicted, otherwise known as the “unknown unknowns”.

For short- and medium-term planning, we have oftentimes proposed that our clients establish a 90-day operating reserve for their solid waste operations, which would provide financial assurance for the following events:

- Unforeseen Acts-of-God such as hurricanes or pandemics that could result in a major, temporary increase in operating cost or loss of revenue.
- Tropical storm impacts that cause significant erosion or other damage that requires repair.
- Business interruption events due to Acts of God or ransomware attacks that result in temporary loss of billing systems or prevent the collection of fees.
- Downturns in the national, state

and local economies or associated fiscal emergencies.

Pro Forma Modeling

Our firm has prepared long-term business plans and solid waste plans in recent years. To ascertain the uncertainty over a 30-year planning period, we have developed Pro Forma Models (Model) specifically for these business cases to provide preliminary, planning-level cost estimates, which can be used to evaluate things like agency tipping fees, and customer rates and the impact of long-term financial liabilities.

Typically, these models are spreadsheet programs that project annual revenues and costs to operate, administer and maintain the solid waste system and provides a means for comparing alternative operational, institutional and facility scenarios. These models also address major capital and operational costs to operate the system.

For example, various assumptions are made regarding yearly solid waste quantities, demographic information, escalation factors for waste growth and costs, administration, personnel and utility costs, transport, and processing cost (Figure 1). The costs of various programs and disposal options were estimated using published information on the municipal system, our firm’s experience on other similar projects, input from the private solid waste industry, other published information and planning-level cost estimates we prepared.

Asking the Hard Questions

This article presents a wide range of tools and approaches to help solid waste agency decision-makers to quantify the “known knowns” and the “unknown knowns”. All of these guidelines we discuss help in crafting useful solid waste master plans, capital and fleet replacement plans. As practioners in the solid waste

industry for well over 35 years, we have developed useful “go bys” that will provide valuable lessons learned. Given all that we have seen this past year, planning for risk or uncertainty is an important function for solid waste agencies. More agencies need to be asking these hard questions.

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Member News

City of Orlando Participates in First State-Wide Florida Waste Prevention Week

In April, the City of Orlando participated in the first state-wide Florida Food Waste Prevention Week. This event saw more than 100 private and public partners come together for a week-long campaign around preventing wasted food. Following the state, the City of Orlando released a proclamation officially recognizing April 5 – 9, 2021 as Florida Food Waste Prevention Week. The week was a culmination of themed social media days, webinars, university and high school hackathons, art contests and teacher education. The daily themes were:

- What does food mean to me?
- Unintended consequences of food waste
- Prevention for the commercial sector, prevention in schools, homes, and communities
- Keep it going

The city participated by releasing a food waste bingo card on social media and residents were asked to fill it out and upload their answers. The city also

used messaging from Save the Food and internally created messaging on social media, highlighting the financial impacts of food waste in the home and the ease of freezing foods for a later time. For the commercial sector themed day, the city released a promotional video for the Commercial Food Waste Recycling Program that highlighted a local business that was able to achieve an almost zero waste facility using the

program, saving them money. Internal employee newsletters and external resident newsletters were also used to extend the reach. During this outreach, people were asked to visit orlando.gov/stopfoodwaste to learn how to prevent food waste from happening.

During the week, the City of Orlando hosted a webinar aimed at reaching other Florida municipalities that gave an overview of current pilots and programs, with the hope it inspires other municipalities to start similar programs. Additional speakers on this webinar included Orange and Pinellas County. Visit savethefoodfl.com to get involved next year!

For more information, contact [Brittany McPeak](mailto:brittany.mcpeak@orlando.gov) at brittany.mcpeak@orlando.gov.



Miami-Dade County Believes in Safety First

Michael Fernandez, Department Director

Every June, the Miami-Dade Department of Solid Waste Management (DSWM) participates in National Safety Month to raise awareness on working safely to reduce the number of injuries, incidents and fatalities that might take place both in the office and on the road.

DSWM believes that during Safety Month, it is essential to recognize those employees who actively participate in keeping the workplace safe all year round. These employees behave as an example and remind others of the importance of keeping safe practices at work. Before COVID, DSWM held in-person events to recognize these employees.

“Being safe is part of what we do,” says Daniel Lopez, Department Safety Supervisor. “It’s an essential part of doing our jobs right, so it’s always good to practice and learn new ways to stay safe. In addition, Safety Month is well-timed in that June is the start of summer, school is out, kids are at home, and people might be a bit distracted planning their next vacation. Having the entire month dedicated to raising awareness and education around safety serves as a good reminder.”

Whether it is a new employee or someone who has been in the industry for decades, everyone can use a fresh reminder. DSWM sends out weekly flyers talking about safety and encourages employees to post them around different facilities and offices around the department, as well as holding tailgate meetings to go over SWANA Safety Alerts and Safety Monday. DSWM also promotes Slow Down to Get Around (SDTGA) on its

trucks. SDTGA is a campaign to save lives by reminding motorists to drive more carefully when near waste and recycling collection vehicles.

The most common accidents are vehicle collisions, such as when a truck backs up into an object or doesn’t see a vehicle when entering turn lanes. Then there are employees with back or shoulder injuries due to not properly lifting heavy materials. DSWM provides training to all new employees and refresher sessions to seasoned employees to prevent these cases.

DSWM is constantly seeking to improve its department and evolve its safety culture. The department is successful in what it does and, for the most part, rarely has any service interruptions due to safety issues. Even amidst the pandemic of 2020, the department served the community



A Miami-Dade County waste collection truck with “Slow Down to Get Around” decal.

as if nothing were happening. But, of course, behind the scenes, several safety precautions were taking place to protect employees and customers alike.

Personal protective equipment (PPE) such as gloves, masks, disinfectants,

hand sanitizers and handwashing supplies were distributed to worksites to ensure that staff was protected as much as possible while on the job. Additional cleaning operations at worksites also took place so that essential staff had a clean environment to work in.

DSWM aims to provide various solid waste collection and disposal services without interruption to more than 340,000 homes and managing more than 1.8 million tons, while keeping its employees and customers as safe as possible.

Michael Fernandez is Director of the Miami-Dade County Department of Solid Waste Management. He can be reached at (305) 514-6626 or e-mail mfern@miamidade.gov.



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Member News

Geosyntec Welcomes Two New Employees

Sarah Gustitus-Graham



Sarah Gustitus-Graham, Ph.D. joined the Tampa office as a Senior Staff Professional this January. She is returning to Geosyntec after interning with the Kennesaw office during summer 2017.

Sarah recently earned her Ph.D. in Civil and Environmental Engineering from University of Virginia in December 2020. Her research was focused on predicting the service life of bentonite-polymer composite geosynthetic clay liners for lining landfills with aggressive leachates. Sarah was an Environmental Research and Education (EREF) scholar, as well as a fellow in UVA’s Jefferson Foundation. During her doctoral studies, she was a co-instructor for Introduction to Environmental Engineering, and a teaching assistant for Environmental Engineering and Geotechnical Engineering lab courses. She thoroughly enjoyed teaching and won an All University Teaching Award from UVA.

Prior to attending UVA, Sarah earned her Master’s degree in Civil Engineering from Auburn University and her Bachelor’s degree in Environmental Engineering from University of Florida. Sarah first developed a passion for solid waste management during her time at UF, where she was worked on a campus-wide solid waste audit, among other solid waste research projects.

Outside of work, Sarah enjoys baking, crocheting and hiking, as well as watching Gator football and NASCAR. Since moving to Tampa, she has been particularly fond of taking walks with her family along the Hillsborough River—especially when she can snap pictures of sunsets and gators on the river! She is excited to be coming back to Geosyntec, and largely credits her great experience as an intern for her decision to return.

Bishow Shaha, Ph.D., E.I.



Bishow Shaha, Ph.D., E.I. joined Geosyntec’s Boca Raton, FL office in April 2021 as a Senior Staff Engineer under Florida GEAG. Bishow is originally from Bangladesh and completed his bachelor’s degree in Civil Engineering (with Environmental Engineering major) from Bangladesh University of Engineering and Technology, the topmost engineering school in the country. He then came to the U.S. in 2015 and earned his Master’s degree in Civil Engineering (with Environmental Engineering focus) from Florida Atlantic University (FAU), with a fully funded research position. In 2017, he started his Ph.D. in Sustainable Infrastructure track (with Solid Waste Management focus) with full funding at FAU and graduated in May 2020.

The main objective of Bishow’s Ph.D. research was to evaluate and understand the mechanism of biogeochemical clogging of Class I

municipal solid waste landfill leachate collection systems and propose management solutions. During his academic career at FAU, Bishow co-authored and published numerous research articles and participated in several SWANA student design competitions (finishing second in 2015 and first place award in 2017 and 2019). After graduation, Bishow joined CES Consultants, Inc. in West Palm Beach Florida as a project engineer in August 2019.

Since joining Geosyntec in April 2021, Bishow has been fully engaged in supporting the Florida GEAG in overseeing ongoing construction activities, geotechnical site investigations, soil and groundwater sampling efforts, design and technical report preparation. He is looking forward to expanding his role in Geosyntec’s GEAG practice areas and is very passionate about developing his professional network and building new relationships with current and future clients.

Fun Fact: Bishow is a pace bowler and plays competitive cricket in the Gold Coast Cricket League (GCCL) on weekends. He also loves travelling, hiking, photography, and other outdoor sports and activities with his wife Prity, family and friends.

For more information, visit www.geosyntec.com.



The SWANA Florida Sunshine Chapter proudly presents the WASTECON 2021 GOLF TOURNAMENT November 1st | 8:30 a.m. | Celebration Golf Club

SPONSOR & PLAY!

SWANA’s Florida Chapter invites you to join us for this year’s WASTECON golf tournament on Monday, November 1, 2021, at the Celebration Golf Club—less than 3 miles from the Gaylord Palms, where WASTECON is being held.

Opened in 1996, Celebration Golf Club is the final collaboration between Robert Trent Jones Senior and Junior. The course radiates an atmosphere of beautiful tranquility and fun but challenging golf. The layout is protectively framed by borders of native trees and natural wetlands. With five sets of tees, the course stretches to a total yardage of 7,028.

Sponsorship Opportunities:

• Breakfast	\$1,500
• Lunch	\$3,000
• Beverage Cart	\$1,500
• Grand Prize Hole – \$10K Hole-in-One Contest	\$750
• Contest Hole – Longest drive / Closest to the Pin	\$300
• General Hole	\$150

All sponsors will be recognized on signage displayed at the club house and at the conference, as well as on the WASTECON and SWANA FL websites. Sponsors can also provide marketing materials to be included in a goodie bag giveaway to all golfers. Breakfast and lunch sponsorships include an opportunity to address the participants during lunch (2 minutes for breakfast sponsor/5 minutes for lunch sponsor). Beverage cart sponsorship also includes signage on the cart. All hole sponsorships also include signage at the tee box.

REGISTER NOW – Space is Limited!

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Cost: \$130/player

Includes: Bus from/to the Gaylord Palms Hotel, breakfast, BBQ lunch, drink tickets, tournament play (greens fee and cart), prizes and more!

PING rental clubs are available onsite for \$39.



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Upcoming Events

2021 Chapter Road-E-O
September 10-11, 2021
Fort Myers, FL

**WASTECON 2021
Golf Tournament**
Hosted by SWANA FL
November 1, 2021
Orlando, FL

WASTECON 2021
November 1-4, 2021
Orlando, FL

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