

**February 25-28, 2024**

Hyatt Regency Indian Wells Resort & Spa  
Indian Wells, California  
[wastesymposium.com](http://wastesymposium.com)



# Symposium Directory

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# Welcome to GWMS 2024!

Thank you for joining the ninth Global Waste Management Symposium (GWMS).

We're so glad to bring you North America's #1 technical conference for research and case studies on waste management.

This is your best opportunity to share ideas and problem solve with peers, researchers, vendors, and thought leaders in the global waste community.

At GWMS, get ready to enjoy:

- **Three days of world-class content and breakthrough research.**
- **100+ innovative oral and poster presentations.**
- **Plenty of networking opportunities during the Sunday, Monday and Tuesday receptions.**
- **Golfing at the Clive Clark designed Celebrity Course.**



GWMS would not be possible without the generous support of our sponsors, presenters, partners and most of all, our attendees. Thank you for your support!

**Enjoy your time at Global Waste Management Symposium 2024!**



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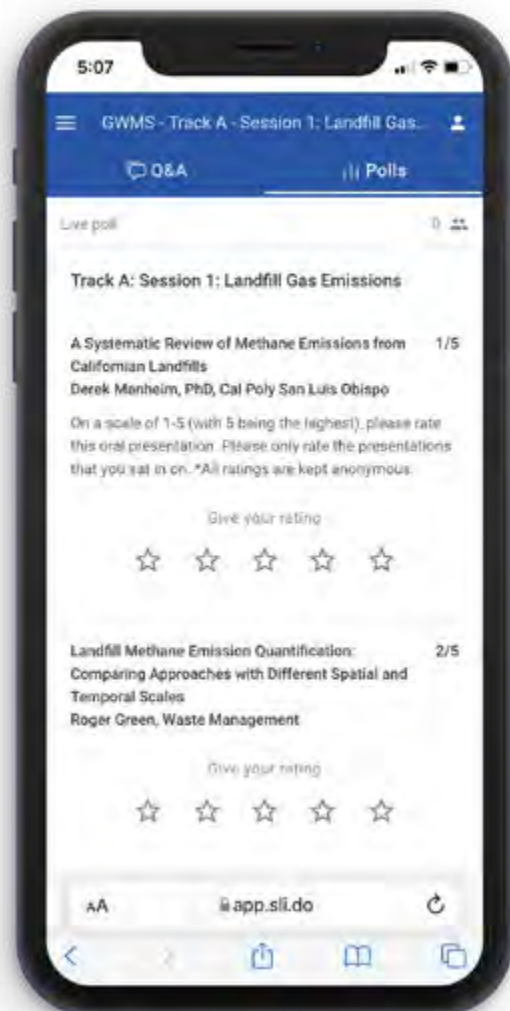
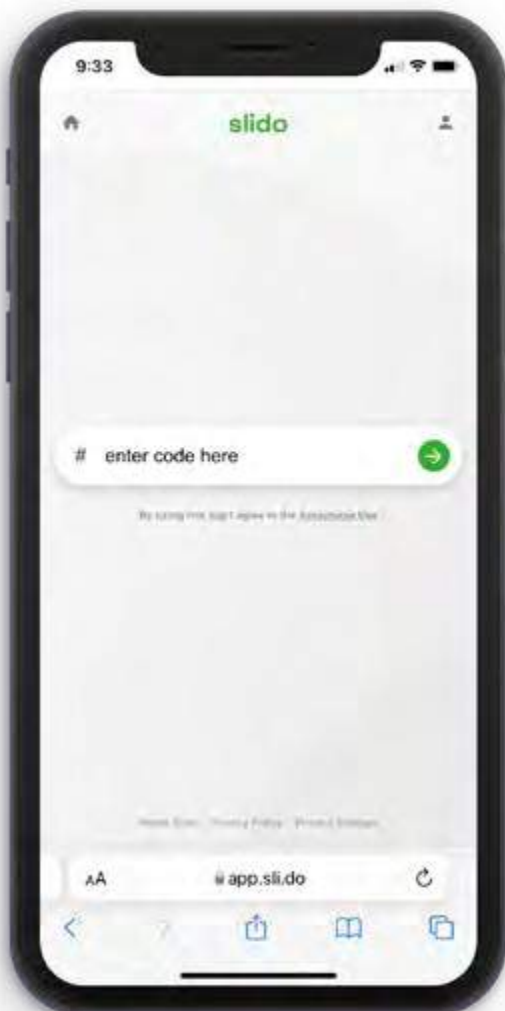
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Thank you! Your feedback shapes our future events.



# Conference Agenda

## Sunday, February 25

1:00pm – 6:00pm	Registration
5:00pm – 7:00pm	Welcome Reception

## Monday, February 26

7:00am	Registration
7:30am – 8:45am	Breakfast
8:45am – 10:00am	Welcome & Keynote
10:00am – 10:30am	Break

TRACK A ROOM: GRAND SALON (HOTEL)	TRACK B ROOM: DESERT VISTA 1 (CONFERENCE CENTER)	TRACK C ROOM: DESERT VISTA 2 (CONFERENCE CENTER)
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### 10:30am – 12:00pm **Session One**

Organics Diversion	Understanding Elevated Temperatures in Landfills	Waste Characterization
<b>Moderator:</b> Susan Thorneloe, US EPA <b>Slido Survey Code:</b> GWMS1A	<b>Moderator:</b> Kurt Shaner, Waste Connections <b>Slido Survey Code:</b> GWMS1B	<b>Moderator:</b> Bryan de Varona, Weaver Consultants <b>Slido Survey Code:</b> GWMS1C
<i>Household Landfill Diversion and the Impact on Methane Emissions</i> <b>Jackson Somers</b> , University of Connecticut	<i>Numerical Simulation of Self-ignition and Smoldering Combustion to Understand Initiation and Propagation in MSW Landfills</i> <b>Alborz Fathinezhad</b> , WSP	<i>Factors Influencing Municipal Solid Waste Generation and Management in the OECD</i> <b>Sagarika Srivastava</b> , Stony Brook University
<i>Measuring Organics Diversion Using Waste Composition Studies and Other Techniques</i> <b>Wilbert Yang</b> , Tetra Tech	<i>Development of Methods to Measure Heat Release from Hydration and Carbonation of Ash in Landfills</i> <b>Morton Barlaz</b> , North Carolina State University	<i>Desktop Waste Characterization: An Alternative to Traditional Waste Sorts</i> <b>Sean O'Donnell</b> , Geosyntec Consultants
<i>From Drilling to Digesting: An Anaerobic Digestion Feasibility Study</i> <b>Kelli Farmer</b> , SCS Engineers	<i>Evaluation of Heat Generation in Landfills Located in Arid vs Humid Climate</i> <b>Milind Khire</b> , University of North Carolina Charlotte	<i>Solid Waste Generation and its Impacts in the Mt. Everest Region</i> <b>Mohan Dangi</b> , California State University, Fresno
<i>LFG Recovery Forecasting Uncertainty and the Effects of Organics Diversion</i> <b>Alex Stege</b> , SCS Engineers	<i>Elevated Temperatures in Municipal Solid Waste Landfills Due to Exothermic Ash-Driven Abiotic Reactions</i> <b>Debra Reinhart</b> , University of Central Florida	<i>Analyzing New York State Solid Waste Composition Data 2022 Using Multivariate Techniques</i> <b>Firman Firmansyah</b> , Waste Data & Analysis Center, Stony Brook University

12:00pm – 2:00pm	Lunch & Poster Viewing
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### 2:00pm – 3:30pm **Session Two**

Landfill Gas Compliance & Data Reporting	Fate & Transport of PFAS	Sustainability in Waste Management
<b>Moderator:</b> Dave Vlastic, Republic Services <b>Slido Survey Code:</b> GWMS2A	<b>Moderator:</b> Lindsey Angell, Civil & Environmental Consultants, Inc. <b>Slido Survey Code:</b> GWMS2B	<b>Moderator:</b> Jenn Packer, GFL Environmental <b>Slido Survey Code:</b> GWMS2C
<i>OOO, XXX, AAAA, and Beyond – Looking at the Future of Landfill Air Compliance</i> <b>Melissa Green</b> , Weaver Consultants Group	<i>PFAS - Where Does It Come From - Where Does It Go?</i> <b>Ivan Cooper</b> , Civil & Environmental Consultants, Inc.	<i>What Sustainability Really Means to Business</i> <b>Bill Moore</b> , Moore & Associates
<i>12 Years of GHG Reporting – What Does the Data Show</i> <b>Jonathan Lumang</b> , Weaver Consultants Group	<i>The Fate of Per- and Polyfluoroalkyl Substances (PFAS) during Waste Management as a Function of PFAS Characteristics</i> <b>Debra Reinhart</b> , University of Central Florida	<i>Recoverable Materials: The Benefits and Potential Pitfalls on the Path to Circularity</i> <b>Bryan Staley</b> , Environmental Research & Education Foundation
<i>An Update on the WAG: Case Studies on Recent Innovations in Landfill Gas Data Analysis</i> <b>Ray Huff</b> , SCS Engineers	<i>Release of PFAS from Paper-Based Food Packaging and Municipal Solid Waste (MSW) to Gas and Leachate under Simulated Landfill Conditions</i> <b>Morton Barlaz</b> , North Carolina State University	<i>Sustainability and Climate Planning in the Solid Waste Industry</i> <b>Kate Howe</b> , Weaver Consultants Group
<i>SWICS GHG Emission Model - A Dive Into the Updated Version &amp; New Collection Effectiveness Calculation</i> <b>Ashley Evans</b> , WM	<i>Impact of Solid Waste Management Trends on PFAS Sequestration in MSW Landfills</i> <b>Arie Kremen</b> , Tetra Tech	<i>Landfill Mining: Mitigating Risk and Bringing Clarity to Scary Unknowns</i> <b>Prentiss Shaw</b> , Tetra Tech

3:30pm – 4:00pm	Break
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# Conference Agenda

4:00pm – 5:15pm		
Session Three		
Environmental Justice	Uncertainty in Landfill Emissions Measurement	Landfill Operations I
<b>Moderator:</b> Steve Menoff, Civil & Environmental Consultants, Inc. <b>Slido Survey Code:</b> GWMS3A	<b>Moderator:</b> Dylan Smith, Waste Connections <b>Slido Survey Code:</b> GWMS3B	<b>Moderator:</b> Douglas Junk, Geo-Logic Associates <b>Slido Survey Code:</b> GWMS3C
<i>EPA and State Approaches to Cumulative Impacts at Communities with Environmental Justice Issues: A Science Perspective</i> <b>William Rish</b> , ToxStrategies, LLC	<i>Wind Data and Uncertainty in GHG Emission Quantification</i> <b>David Barron</b> , Sniffer Robotics	<i>Seismically Induced Deformation Analysis of a Municipal Solid Waste Landfill</i> <b>Livingstone Dumenu</b> , Geosyntec Consultants
<i>Potential Implications of Environmental Justice on Landfills</i> <b>Julie Hall</b> , Weaver Consultants Group	<i>A Controlled Release Experiment for Investigating Methane Measurement Performance at Landfills</i> <b>David Risk</b> , Saint Francis Xavier University	<i>Design and Construction of a Leachate Side Slope Riser Pipe Vertical Extension through Waste</i> <b>Frank Adams</b> , WSP
<i>Not Here, Or There: How Solid Waste Facilities Will Co-exist with New and Emerging State Environmental Justice Laws</i> <b>Tiffany Medley</b> , Tetra Tech	<i>Assessing Diurnal Variations in Methane Emissions from Landfills</i> <b>Madjid Delkash</b> , Delkash Engineering	<i>Work and Rationale to Evolve GRI GM13 and GRI GM1</i> <b>Samuel Allen</b> , TRI Environmental Group
5:15pm – 6:45pm	Reception & Poster Viewing	

## Tuesday, February 27

7:00am – 8:15am

Breakfast

TRACK A ROOM: GRAND SALON (HOTEL)	TRACK B ROOM: DESERT VISTA 1 (CONFERENCE CENTER)	TRACK C ROOM: DESERT VISTA 2 (CONFERENCE CENTER)
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8:30am – 10:00am

## Session Four

Managing Unconventional Landfill Gas Issues	Black Goo (Panel)	Emerging Contaminants in Solid Waste
<b>Moderator:</b> David Ceiply, Interstate Waste Services, Inc. <b>Slido Survey Code:</b> GWMS4A	<b>Moderator &amp; Panelist:</b> Morton Barlaz, NC State University <b>Slido Survey Code:</b> GWMS4B	<b>Moderator:</b> Sarah Phillips, Waste Connections <b>Slido Survey Code:</b> GWMS4C
<i>Municipal Solid Waste Landfill Gas Well Liquid Hydraulics and Effects on Vertical Liquid Extraction</i> <b>David Penoyer</b> , Republic Services	<i>Fouling of Leachate Collection Infrastructure by Non-Traditional Clogging Agents (aka Black Goo, Flubber, and Taffy)</i> <b>Craig Benson</b> , University of Wisconsin - Madison <b>Steven Carl</b> , Progressive Environmental <b>Jiannan (Nick) Chen</b> , University of Central Florida <b>Brittney Crawford</b> , Region of Waterloo <b>Seth Ramaley</b> , WM	<i>Understanding Emerging Contaminants and Related State-Led Coalition Activities; Maximizing Others' Efforts to Benefit Your Waste Management Organization</i> <b>Shalene Thomas</b> , Battelle
<i>Targeted Analysis of Odorous Compounds Related to Municipal Solid Waste Operations Using Gas Chromatography Triple Quadrupole Mass Spectrometry</i> <b>Emmanuel Varona-Torres</b> , Weaver Consultants Group		<i>Solid Waste Radiation Monitoring Trends and Case Studies</i> <b>Samuel Nicolai</b> , Casella Waste Systems
<i>Investigation of Organic Silicon Compounds in Landfill Gas and Sludge Gas</i> <b>Qinghui Meng</b> , University of Michigan		<i>Tritium and Radium in Pennsylvania Landfills</i> <b>Suzie Boxman</b> , Environmental Research & Education Foundation
<i>Case Study of Design Elements and Construction Techniques Associated with Unique Landfill Gas Control System</i> <b>Charles Warren</b> , SCS Engineers		
10:00am – 10:30am	Break	

# Conference Agenda

10:30am – 12:00pm		Session Five		
Composting		PFAS Management		Coal Ash Management & Beneficial Use
<b>Moderator:</b> Caroline Saul, EREF <b>Slido Survey Code:</b> GWMS5A		<b>Moderator:</b> Terry Johnson, WM <b>Slido Survey Code:</b> GWMS5B		<b>Moderator:</b> Andy Nickodem, Civil & Environmental Consultants, Inc. <b>Slido Survey Code:</b> GWMS5C
<i>Meeting the Organics Infrastructure Challenge in Orange County, CA</i> <b>Tom Koutroulis</b> , County of Orange, OC Waste & Recycling (OCWR)		<i>Characterization and Quantification of Per- and Polyfluoroalkyl Substances in Landfill Gas from U.S. Landfills</i> <b>Florentino De la Cruz</b> , University of North Florida		<i>Forty Years of EPRI Research on CCP Leaching</i> <b>Bruce Hensel</b> , EPRI
<i>Which has Fewer Air Pollutants? Aerated Static Pile Composting or Anaerobic Digestion with Short Aerobic Composting</i> <b>Ramin Yazdani</b> , University of California, Davis		<i>Cost-Effective PFAS Removal from Landfill Leachates</i> <b>Martin Bureau</b> , Altra-Senexen		<i>Life Cycle Impacts of Harvested Coal Ash Used as Cement Replacement in Concrete</i> <b>Craig Benson</b> , University of Wisconsin-Madison
<i>PFAS in Compost</i> <b>Syed Md Iskander</b> , North Dakota State University		<i>Evaluation of PFAS through Leachate Evaporation</i> <b>Travis Smith</b> , Heartland Water Technology		<i>Long-term Performance of Bentonite-Polymer Geosynthetic Clay Liners Permeated with Typical Coal Combustion Leachates</i> <b>Kuo Tian</b> , George Mason University
<i>PFAS Legal and Regulatory Risks in the Composting Sector</i> <b>Wes Younger</b> , Trinity Consultants		<i>Cost Effective Leachate Pretreatment to Remove PFAS</i> <b>Jeffrey Murray</b> , HDR		<i>Sequestering PFAS in Concrete Made with Modified Coal Fly Ash</i> <b>Renzun Zhao</b> , North Carolina Agricultural and Technical State University
12:00pm – 1:30pm	Lunch & Poster Viewing			
1:30pm – 3:00pm		Session Six		
PFAS Treatment in Leachate		ETLF Lessons Learned & BMPs (Panel)		Landfill Emissions Regulation & Measurement
<b>Moderator:</b> Kevin Torrens, Brown and Caldwell <b>Slido Survey Code:</b> GWMS6A		<b>Moderator &amp; Panelist:</b> Debra Reinhart, University of Central Florida <b>Slido Survey Code:</b> GWMS6B		<b>Moderator:</b> Lara Phelps, US EPA <b>Slido Survey Code:</b> GWMS6C
<i>Taking Fear Out of PFAS with Foam Fractionation</i> <b>Brad Granley</b> , Leachate Management Specialists		<i>Lessons Learned and Best Practices for Preventing and Managing Elevated Temperature Landfills</i>  <b>Morton Barlaz</b> , North Carolina State University <b>Michael Beaudoin</b> , Republic Services <b>Craig Benson</b> , University of Wisconsin – Madison <b>Bill Meyer</b> , WM		<i>Landfill Emissions Regulations and Offset Opportunities in Canada</i> <b>Jenn Packer</b> , GFL Environmental
<i>The Effect of the Clay-GAC Combined Media on the PFAS Treatment System</i> <b>Farrokh Shoaie</b> , Orange County Waste & Recycling (OCWR)				<i>Large Scale Landfill Emission Measurement Across Canada</i> <b>Rebecca Martino</b> , Saint Francis University
<i>Landfill Leachate Column Test to Compare Adsorptive Media for PFAS Treatment</i> <b>Purshotam Juriasingani</b> , Tetra Tech				<i>Assessing Landfill Methane Emissions by Multiple Measurement Approaches</i> <b>Roger Green</b> , WM
<i>Electrochemical Destruction of PFOA and PFOS in Landfill Leachate – A Pilot Test</i> <b>John Tracy</b> , Aclarity				<i>Contrasting Field Monitoring and GHGRP Data within the Context of Reducing Landfill Methane Emissions</i> <b>Tarek Abichou</b> , Florida State University
3:00pm – 3:30pm	Break			

# Conference Agenda

3:30pm – 5:00pm		Session Seven	
Landfill Operations II	Landfill Gas Processing	Recycling & Circularity	
<b>Moderator:</b> Joe Benco, Republic Services <b>Slido Survey Code:</b> GWMS7A	<b>Moderator:</b> Tony Pelletier, GFL Environmental <b>Slido Survey Code:</b> GWMS7B	<b>Moderator:</b> Suzie Boxman, EREF <b>Slido Survey Code:</b> GWMS7C	
<i>Quantified Moisture Contributions from Precipitation, Waste, and Leachate for Active MSW Landfills</i> <b>Max Krause</b> , US EPA	<i>Increasing Renewable Energy Potential of Landfill Gas by Electrocatalytic Conversion of Carbon Dioxide to Methane at Low Temperature</i> <b>Asma Akter Rony</b> , The University of Texas at Arlington	<i>Leveraging Personalized Education &amp; Automated Cart Audits: An Analysis on Recycling Contamination and Resident Engagement</i> <b>Sam Dietrich</b> , Prairie Robotics	
<i>Installing a Drilled Vertical Riser to Return a Leachate Collection Sump to Compliance</i> <b>Tamara Perkins</b> , Weaver Consultants Group	<i>Process Modeling and Techno-Economic Analysis of Intensified Biogas to Liquid (IBGTL) Process</i> <b>Rarosue Amaraibi</b> , University of South Florida - Tampa	<i>Utilization of Industrial By-products in Sustainable Construction of Transportation Superstructure</i> <b>Alireza Mohammadinia</b> , WSP	
<i>Geotechnical Assessment of Landfilled Oilfield Waste: Implications for Waste Management Practices</i> <b>Scott Graves</b> , Geosyntec Consultants	<i>Tandem Catalytic Reactor for Single-Step Production of Value-Added Hydrocarbons from Biogas</i> <b>Olusola Johnson</b> , University of South Florida	<i>Improved Sampling Methods of PV Modules for Toxicity Testing to Support End-of-Life Decisions</i> <b>Stephanie Shaw</b> , EPRI	
<i>Landfill Leak Location Case Study: Utilizing Multiple Leak Location Survey Methods to Locate a Defect in a Landfill Baseline System</i> <b>Christopher Dohner</b> , Civil & Environmental Consultants, Inc.	<i>Ohio Landfills - Gas Desulfurization</i> <b>Kyle Bertke</b> , ET Design - Build		
5:00pm – 6:30pm	Reception & Poster Viewing		

## Wednesday, February 28

7:00am – 8:15am	Breakfast		
TRACK A	TRACK B	TRACK C	
ROOM: GRAND SALON (HOTEL)	ROOM: DESERT VISTA 1 (CONFERENCE CENTER)	ROOM: DESERT VISTA 2 (CONFERENCE CENTER)	
8:30am – 10:00am			
Session Eight			
Landfill Post Closure	Waste Collection	Case Studies in Leachate Management	
<b>Moderator:</b> Chad Ireland, WSP <b>Slido Survey Code:</b> GWMS8A	<b>Moderator:</b> Marcos Elizondo, GFL Environmental <b>Slido Survey Code:</b> GWMS8B	<b>Moderator:</b> Pavan Puttamraju, Republic Services <b>Slido Survey Code:</b> GWMS8C	
<i>Performance Based Post Closure and Current Approaches Used in Different States</i> <b>Bryan Staley</b> , Environmental Research & Education Foundation	<i>How to Achieve Maximum Landfill Diversion of Organics: Food Waste Collection vs Single Bin Mixed Waste Collection</i> <b>Luc De Baere</b> , OWS	<i>Lessons Learned on the Use of Analytical Tools For Recovering Treatment Plants From Loss of Capacity</i> <b>Ronald Overholt</b> , US Water Industrial Group	
<i>Temporary Exposed Geomembrane Cap in Large Areas</i> <b>Rick Buffalini</b> , Civil & Environmental Consultants, Inc.	<i>Leveraging Branded Litter Audits to Foster Extended Producer Responsibility</i> <b>Rebecca Yandam</b> , Zoomlion Ghana Limited	<i>Understand Your Scale Challenge: Precipitate New Solutions with Chemical Modeling</i> <b>Shubhashini Oza</b> , Brown and Caldwell	
<i>Solar on Landfills: A “One Stone Two Birds” Solution for Landfill Closure and Renewable Energy Generation</i> <b>Ming Zhu</b> , Watershed Geosynthetics	<i>Condition and Risk Assessment of Critical Infrastructure</i> <b>Jeremy Heyerly</b> , Civil & Environmental Consultants, Inc.	<i>Improving Ammonia Volatilization From Leachate Through PH Adjustment</i> <b>Suzie Boxman</b> , Environmental Research & Education Foundation	
<i>Maximizing Solar Potential on Closed Landfill Sites</i> <b>James Walker</b> , Tetra Tech			
10:00am – 10:15am	Break		

# Conference Agenda

10:15am – 11:45am		Session Nine			
PFAS in Biosolids & Special Wastes		Leachate Treatment		PFAS & Landfill Liners	
<b>Moderator:</b> Martin Bureau, ALTRA - Sanexen <b>Slido Survey Code:</b> GWMS9A		<b>Moderator:</b> Sarah Phillips, Waste Connections <b>Slido Survey Code:</b> GWMS9B		<b>Moderator:</b> Samuel Nicolai, Casella Waste Systems <b>Slido Survey Code:</b> GWMS9C	
<i>Effect of Sample Mass on PFAS Characterization of WWTP Biosolids using EPA Method 537M</i> <b>Christopher Prucha</b> , WM		<i>Using Landfill Gas Condensate as a Carbon Source for Landfill Leachate Denitrification</i> <b>Md Ashik Ahmed</b> , North Carolina Agricultural and Technical State University		<i>Migration of Per-polyfluoroalkyl Substances (PFAS) in High-density Polyethylene (HDPE) Geomembrane Liners</i> <b>Kuo Tian</b> , George Mason University	
<i>Fate of PFAS through Thermal Processes Treating Wastewater Solids</i> <b>Lloyd Winchell</b> , Brown and Caldwell		<i>Leachate Phytomanagement Pilot Test Implementation at a Closed Landfill in Northern Virginia</i> <b>Yovanna Cortes Di Lena</b> , Geosyntec Consultants		<i>Key Parameters of Per- and Polyfluoroalkyl Substance Transport in Landfill Composite Liners</i> <b>Yu Tan</b> , University of Wisconsin Madison	
<i>Does the Disposal of PFAS-containing Special Wastes Impact Leachate PFAS Concentrations?</i> <b>Vie Villafuerte</b> , North Carolina State University		<i>Effects of Foam and Best Practices for Defoamer Usage</i> <b>Ronald Overholt</b> , US Water Industrial Group		<i>New "Hybrid" Geosynthetic Clay Liners as Barrier Systems for PFAS Waste Containment</i> <b>Michael Donovan</b> , CETCO, Inc.	
12:30pm	Golf				

As of 02/12/24





# 2024 Poster Session Presentations

*Anaerobic Digestion of Food Waste Components:*

*Modeling Biogas Production*

**Opeyemi Adelegan**, University of Texas Arlington

*Termite Hindgut Bacteria TAV5: Key to Lignocellulose*

*Waste Decomposition*

**Hussain Ali**, University of Texas at Arlington

*Using Data and Mapping to Capture Attention and Tell*

*Your Story*

**Cecile Carson**, Keep California Beautiful/Carson Consulting

*Ionic Gasification: Biosolids Management & PFAS Destruction*

**Mike Ditton**, Heartland Water Technology

*Life Cycle Assessments of Residential Curbside Waste Collection*

*Programs*

**Mert Gokgoz**, University of Central Florida

*Remediation of Contaminated Dumpsite Soil: An Evaluation of Soil*

*Amendments in Combination with Phytoremediation*

**Sasha Jones**, University of Texas at Arlington

*Waste Composition in New York State: 2022 Sampling Results*

**Sameena Manzur**, Stony Brook University

*Characterization of Particulate-Bound Per- and Polyfluoroalkyl Substances (PFAS) in Landfill Gas*

**Happiness Mbandu**, University of North Florida

*Textile Solid Waste Recycling: A Circular Economy Approach*

**Maeen Md Khairul Akter**, Stony Brook University

*PFAS Management Practices in an Evolving Regulatory Landscape*

**Travis Evans and Garry Risse**, Trihydro

*Trends in Surface Emissions Monitoring*

**Keshav Parikh**, Civil & Environmental Consultants, Inc.

*Ovivo's Integrated Solution for Onsite PFAS Destruction -*

*A Case Study Utilizing E2Metrix ECOTHOR®-EOx Technology*

**Tom Whitton**, E2metrix Inc.

# Keynote Speaker and Special Events

## Keynote

February 26, 2024 at 8:30am | Indian Wells Ballroom



## Dave Call

*Senior Vice President of Operations Support - Republic Services*

### How Sustainability is a Platform for Growth

Leveraging sustainability as a platform for growth requires driving innovation and making investments in projects that deliver significant environmental and economic benefits. How? By making commitments to advance circularity, reduce fleet emissions and decarbonize operations.

Hear Dave's perspective on these timely topics and more.

### Sunday Welcome Reception

Grand Salon Ballroom

5:00pm – 7:00pm

Sponsored by:



### Monday Reception

Indian Wells Ballroom

5:15pm – 6:45pm

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### Tuesday Reception

Indian Wells Ballroom

5:00pm – 6:30pm



# Golf

## Indian Wells Golf Resort – Celebrity Course

Wednesday, February 28, 2024 | 12:30pm



Golf architect Clive Clark's much anticipated Indian Wells Celebrity Course opened November 2006 to rave reviews. In addition to spectacular mountain views, the Par-72 Celebrity Course features undulating fairways, and flowing water in the form of streams, brooks, and split-level lakes connected by striking waterfalls, with vibrant floral detail. This California golf course is unrivaled in beauty and playability. From start to finish, the Celebrity Course offers an unmatched golf experience that will have players returning again and again.



### Format of Play

**Team Scramble:** Team Scramble: Each player shall play his/her drive from the teeing ground on every hole. The TEAM shall select the best DRIVE and from that position play will continue with each player playing his/her ball from this selected position. After the "second" shots have been completed, play shall continue in the same manner as the "third" and "fourth" strokes are played from the most advantageous position. Remember putting shall follow the same formula until the ball has been holed.

**TEES: Men-White; Women-Red**

### Special Events:

**#12 CLOSEST TO PIN** (Ball must be on GREEN to qualify)

**#7 LONG DRIVE** (Ball must come to rest on FW to qualify)

*Golf Sponsors:*



# A HUGE thanks to our esteemed GWMS Organizing Committees, including:

## Technical Committee

- **Chris Bareither**, PhD, PE, *Colorado State University*
- **Morton Barlaz**, PhD, PE, *North Carolina State University*
- **Craig Benson**, PhD, PE, NAE, *University of Wisconsin-Madison*
- **Nicole Berge**, PhD, *University of South Carolina*
- **Bryan Staley**, PhD, PE, *Environmental Research & Education Foundation*

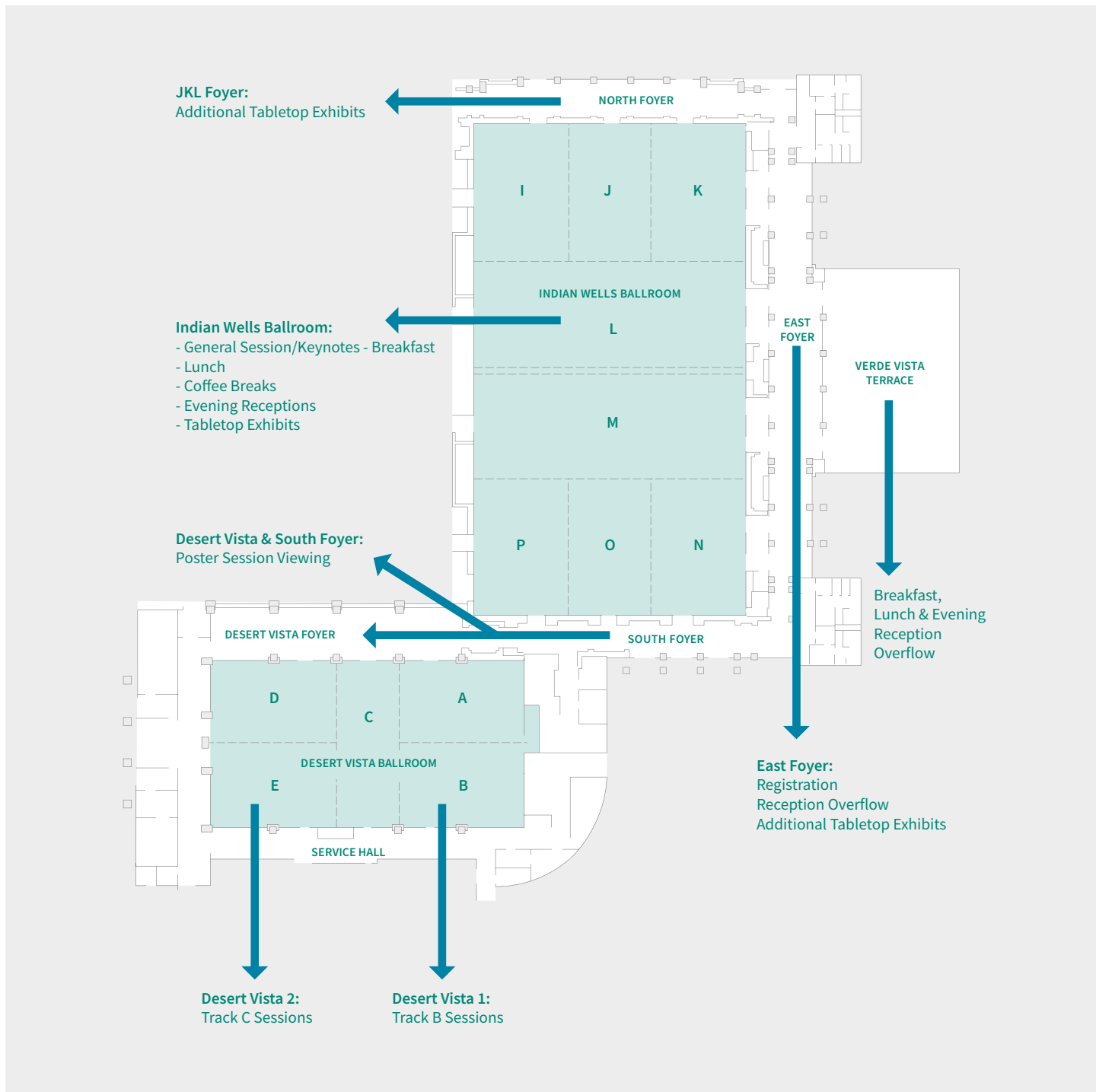
## Business Committee

- **Joe Benco**, PE, *Republic Services*
- **Steve Menoff**, PE, *Civil & Environmental Consultants, Inc.*
- **Greg Cekander**, *Waste Management*
- **Kurt Shaner**, PE, *Waste Connections*



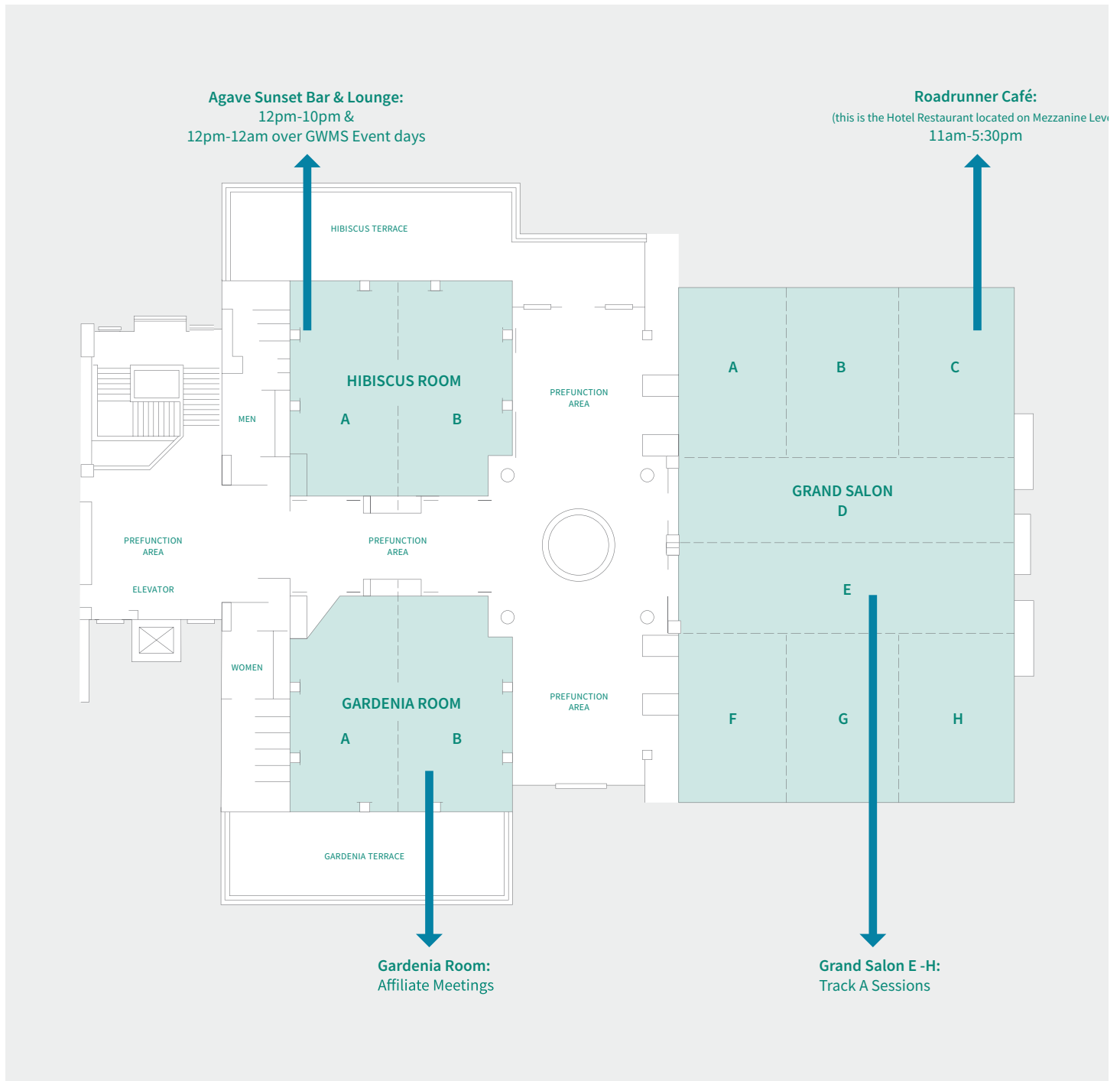


# Floor Plan – Conference Center



**\*\*\*WELCOME RECEPTION WILL BE HELD OUTDOORS IN THE GROVE\*\*\*  
SEE OUTDOOR MAP ON LAST PAGE FOR LOCATION**

# Floor Plan – Main Building



**\*\*\*CITRUS MARKETPLACE WILL ALSO BE AVAILABLE LOCATED  
IN THE HYATT MAIN LOBBY\*\*\*  
SEE OUTDOOR MAP ON LAST PAGE FOR LOCATION**

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As of January 10, 2024



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## Tuesday Night Reception Sponsor



## Welcome Reception Sponsors



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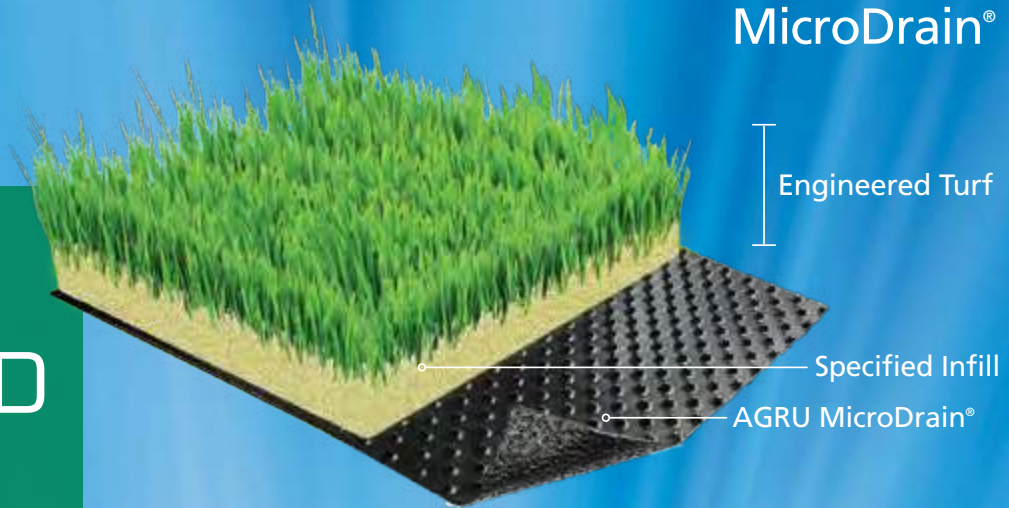
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05

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06

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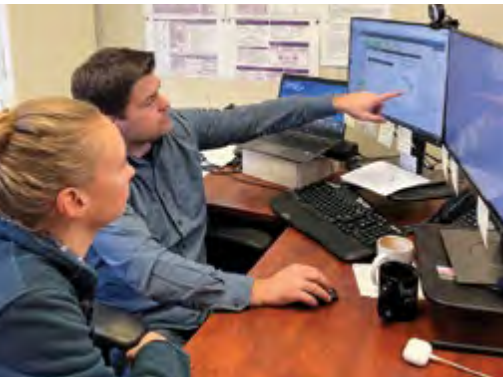
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## Waste Containment Applications

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- Industrial waste containment such as secondary petroleum containment



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- Open communication between project managers and installation crews helps identify potential issues as well as opportunities on every job
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The management team at GCS has been instrumental in the development of both state and federal legislation concerning waste disposal and is extensively involved in worldwide organizations such as IAGI (International Association of Geosynthetic Installers) and GRI (Geosynthetic Research Institute)

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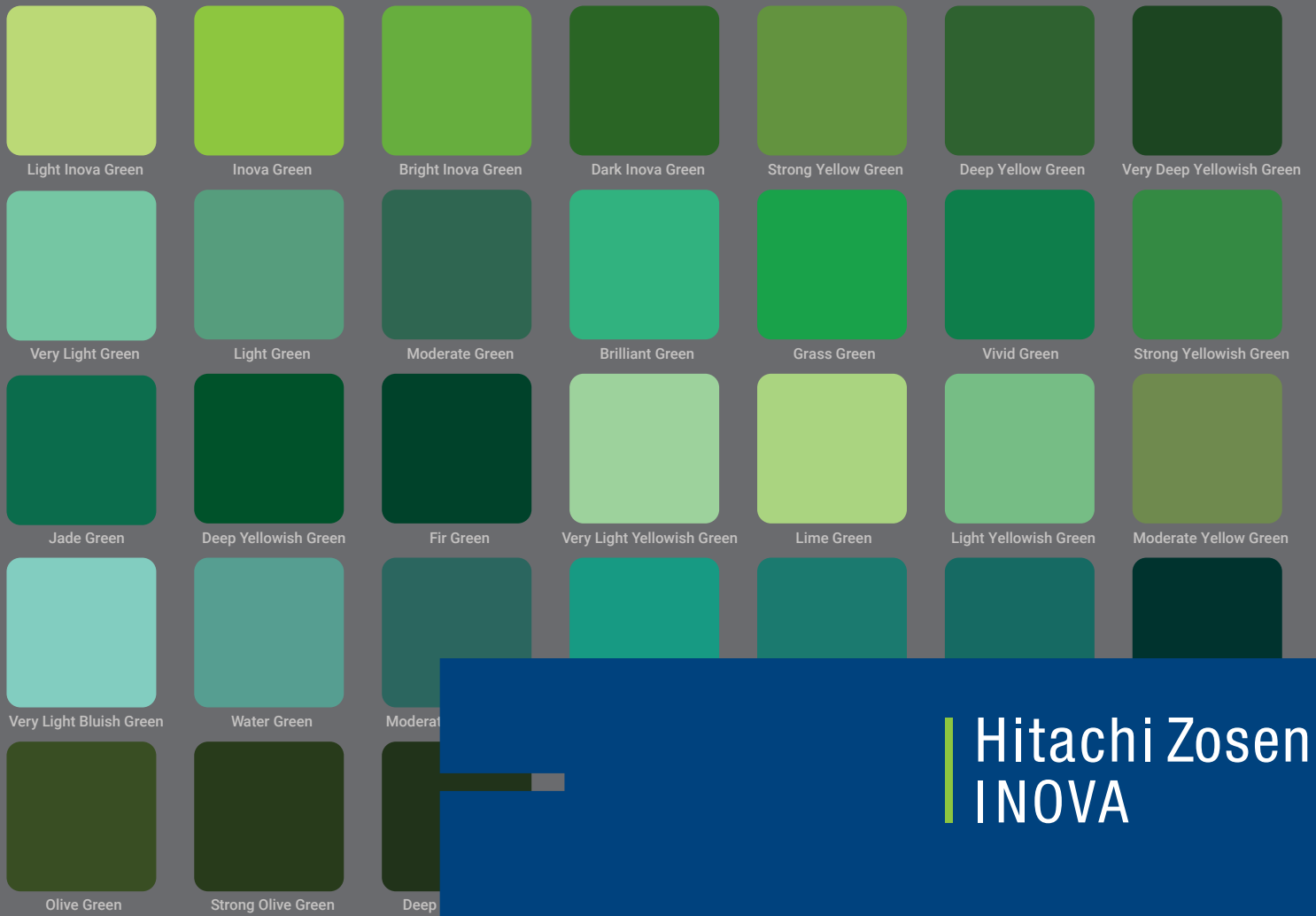
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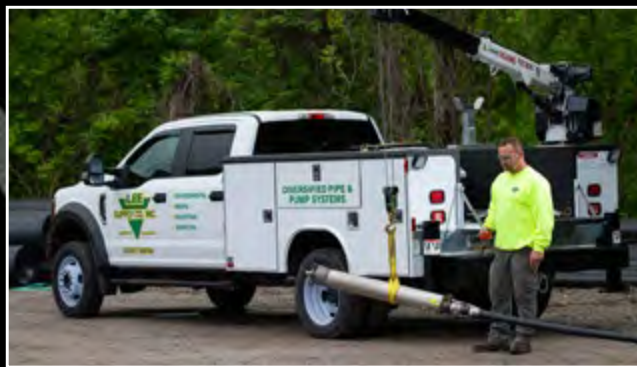
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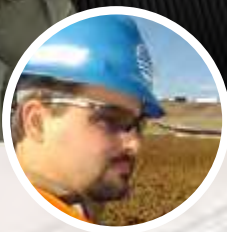


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## Rochem Reverse Osmosis Removes PFAS

Per- and polyfluoroalkyl substances (PFAS) are a class of man-made fluorinated compounds found in many of the benefits of modern life. From anti-stick coatings on pans, stain resistant carpet, water repellent yet breathable clothing, personal care products, and firefighting foams, many of the things on which we have come to rely contain PFAS. Unfortunately, PFAS compounds are believed to have health impacts at very low levels and some currently have an EPA advisory limit of 70 nanograms per liter (parts per trillion).



Reverse Osmosis (RO) is the best option for treating PFAS in landfill leachate. While PFAS can be absorbed by carbon or specialty absorbents, the complex mix of organics in leachate often interfere with proper adsorption. Due to their unique chemistry, these compounds do not break down in the environment, can bioaccumulate in higher organisms and are difficult to remediate.

A landfill that has been operating a Rochem Reverse Osmosis (RO) unit on their leachate for many years was recently sampled for fluorinated compounds for the first time and found that their system was already effectively treating the PFAS in their leachate. Their purchase of a Rochem system had effectively “future proofed” their operation to handle compounds that were not even considered for regulation when the system was installed.

Contact us now to see how we can help with PFAS in your leachate and help you to future proof your leachate treatment.

### PFAS/PFOS

Compound (ng/l)	Leachate	RO 1 Permeate	RO 2 Permeate	Rejection
Perfluorobutanesulfonic acid (PFBS)	280	<2	<1.9	>99.3%
Perfluorobutanoic acid (PFBA)	1100	5	<1.9	>99.8%
Perfluoroheptanoic acid (PFHpA)	480	<2	<1.9	>99.6%
Perfluorohexanesulfonic acid (PFHxS)	690	<2	<1.9	>99.7%
Perfluorohexanoic acid (PFHxA)	2100	7.8	<1.9	>99.9%
Perfluorooctanesulfonic acid (PFOS)	200	<2	<1.9	>99.1%
Perfluorooctanoic acid (PFOA)	820	2.5	<1.9	>99.8%
Perfluoropentanoic acid (PFPeA)	880	2.7	<1.9	>99.8%

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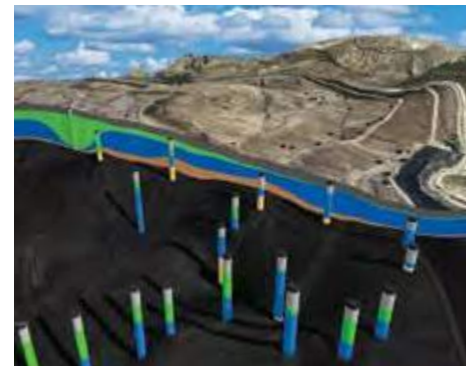
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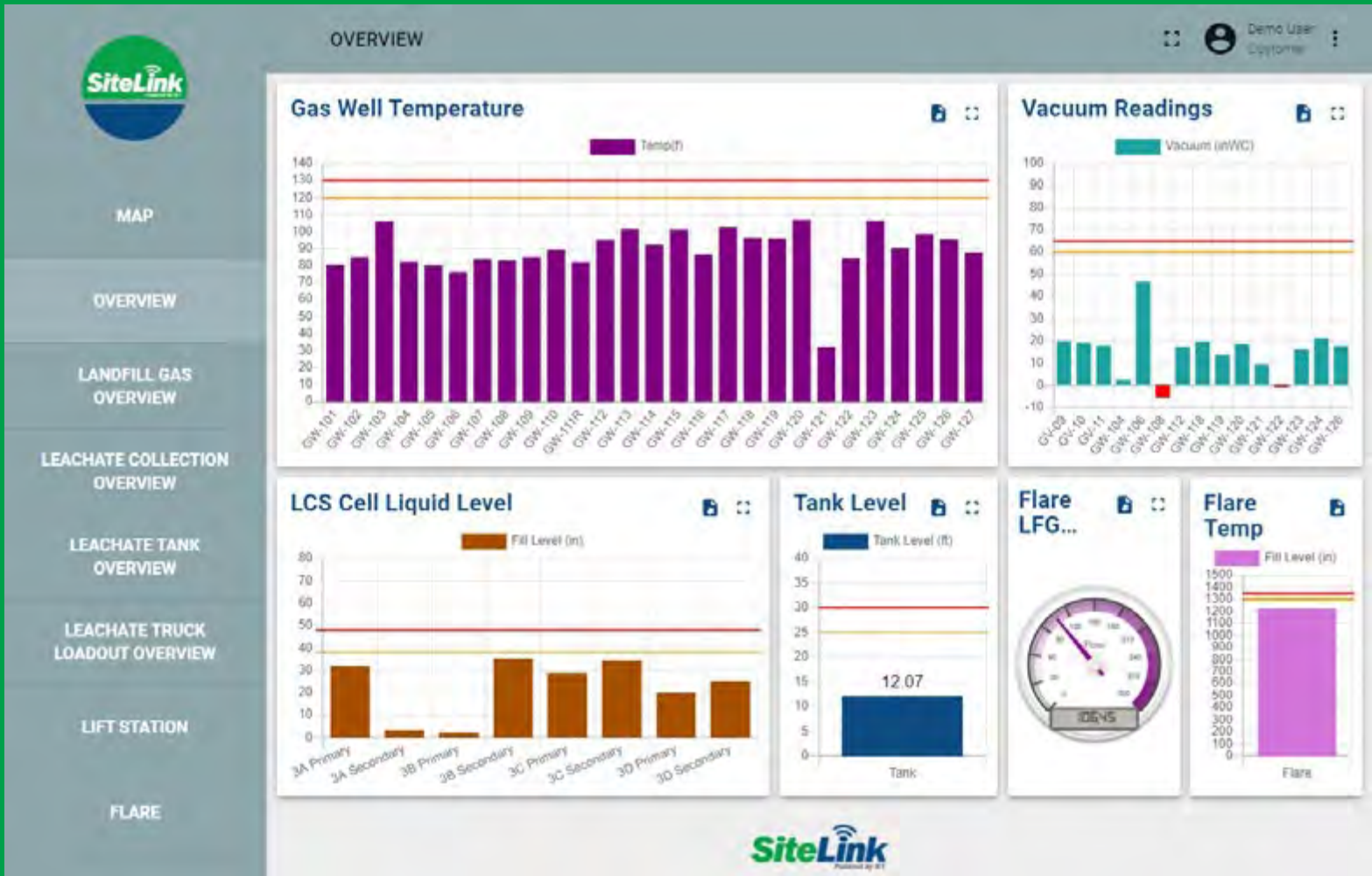


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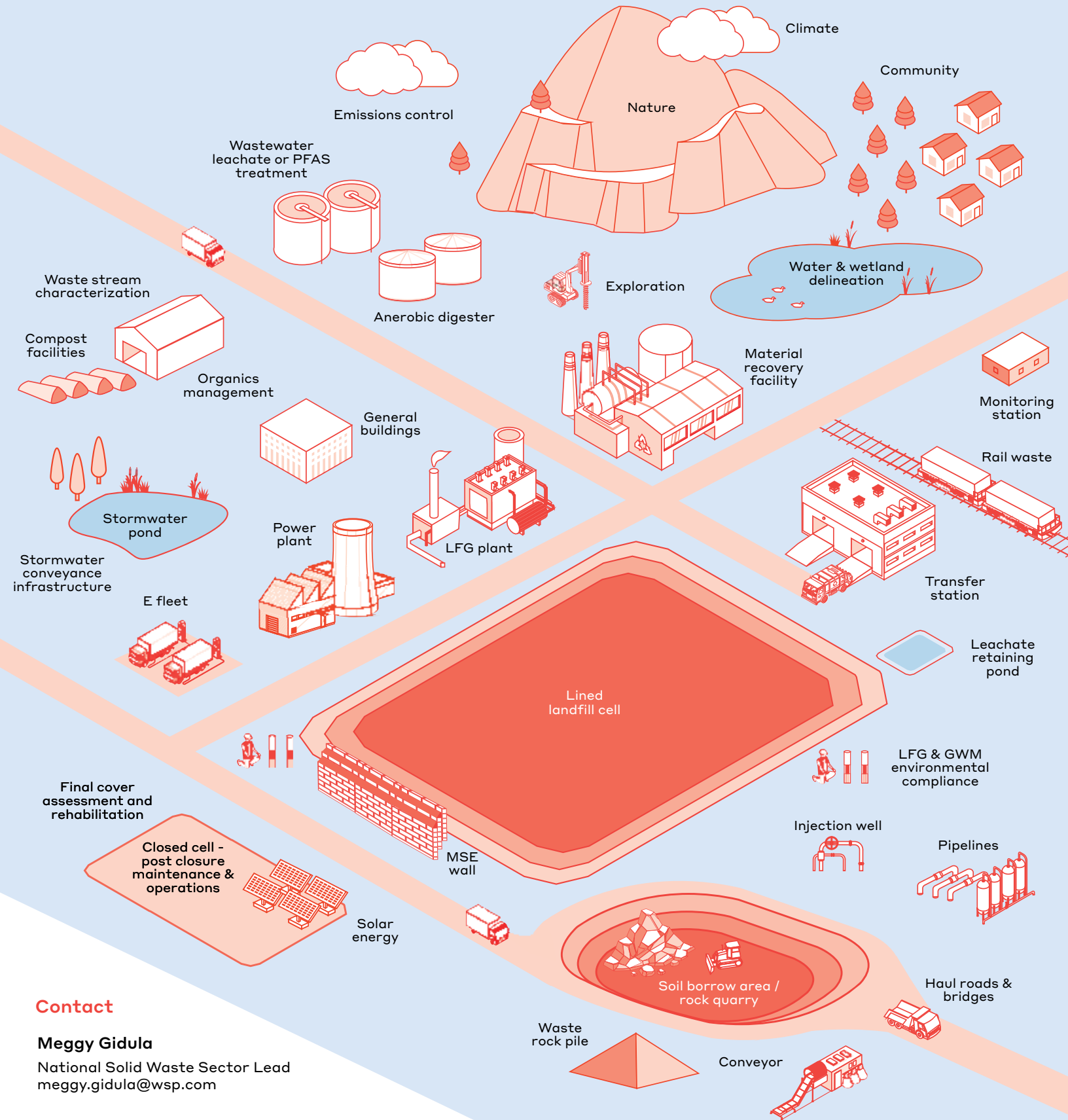


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## Contact

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