Overview:
A truly sustainable approach to site and project design must address the impacts of wastewater. Conventional sewer and wastewater treatment systems are expensive, energy intensive, and highly polluting. An alternative—decentralized constructed wetlands—uses the landscape to treat wastewater naturally, cleanly, and at lower cost.

Constructed wetland technology is a well established, fully tested, broadly used, but still relatively unknown alternative to the conventional water treatment regime. Its primary characteristics include decentralization, small scale, closed loops, infrastructure integration, and a holistic approach to potable, stormwater, and wastewater management. At the decentralized scale, naturally-based wastewater treatment facilities cost 50% as much to build and operate as conventional systems, and can provide revenues from water reuse and integration with energy and food systems. These savings accrue directly to the communities, institutions, and companies that wish to apply the sustainability objective beyond individual buildings and landscapes, to their entire water equation.

This session is designed as a continuation of last year’s popular introductory workshop on this topic. It will offer enough review for first-timers to not be lost, but will then jump quickly into a more sophisticated technical discussion which addresses regulation and permitting and sizing tools to enable the suitability of the technology to be quickly established for specific projects. A collection of case studies will be presented to demonstrate the full range of applications.

Speaker Bios:
MODERATOR: EDDIE WU, OALA, CSLA, ASLA, LEED BD+C, Vice President, HOK
Eddie Wu is a Vice President and the Landscape Design Director with the HOK Planning Group at the Toronto office in Canada. He is a leading advocate for sustainable design solutions from master plan to detailed landscape design. Eddie’s most recent projects include: the Maipore community in Colombia using landscape-as-infrastructure concepts to integrate waste and storm water management and user amenities; the Abu Dhabi Capital District South Spine Precinct detail master plan public realm and open spaces design, based on the Abu Dhabi Plan 2030 and Estidama in achieving the new sustainable bench marks in Abu Dhabi; the Navi Mumbai Energy City in India using water as a design narrative in defining neighborhood character and identity while doubling as an urban storm water management infrastructure; and the Zhuhai Lovers Road landscape design in Southern China for the redevelopment of 19 Km urban roads and 35 ha of associated waterfront parks, urban wetlands, and major civic spaces.
PAUL KNOWLES, PH.D. Sustainability Engineer and Knowledge Officer, Natural Systems Utilities
Paul Knowles leads Natural Systems Utilities’ research efforts on sustainability metrics and decision support tools, and also leads technical design efforts for natural systems in NSU’s new build, municipal, and industrial sectors. Prior to joining NSU, Paul spent four years working with Severn Trent Water Plc. (UK), performing his doctoral studies on the hydraulics and clogging of constructed wetlands at municipal wastewater treatment plants. His findings helped to extend the longevity of constructed wetlands, thereby further improving the affordability of these systems for adoption on a wider-scale. Paul has authored many technical papers, including publications in Water Research, Ecological Engineering, and Desalination, and has received several awards for his work at International scientific conferences. Paul’s experience spans the fields of mechanical, civil and environmental engineering.

Learning Objectives:
- Learn about when constructed wetlands are the best solution compared to other technologies, and how they can be used for water reuse, energy production and value addition.
- Learn about specific installations worldwide and how their lessons might be applicable to your projects.
- Learn how constructed wetlands work and how they compete against conventional water treatment systems.
- Learn useful rules-of-thumb to enable you to determine the suitability of constructed wetlands for your projects.

Outline:
I. Background (Eddie Wu):
- Applicability of this presentation to developers, authorities, planners, architects, landscape architects, engineers and other.
- The history of water treatment in the context of landscape architecture practice.
- Concepts for future water management to improve the sustainability, robustness and resilience of water and wastewater infrastructure; and the new opportunity for landscape architects.

II. Treatment Wetlands vs. Conventional Wastewater Practice (Panel)
- Design considerations for wastewater treatment technology including area, location, climate, cost, energy, regulations, level of operational service, implementation, failure mechanism, environmental impact, social impact.
- The principle of a decentralized site’s water, energy and nutrient equations, and how to maximize for optimal sustainability and savings.
- Based on the above factors, the most suitable solution for a range of project applications and treatment solutions, from residential to industrial and from rural to urban.
III. Constructed Wetland Technology (Paul Knowles):
- Overview of the constructed wetland technology transect
- How they work for a broad range of pollutants including contaminants of emerging concern
- Why the technology is not yet ubiquitous
- Design for robust performance
- Design for compliance with strict nutrient discharge requirements
- Design for cold-climate resilience
- Design for low energy
- Design for water reuse
- Design for integration with energy infrastructure
- Design for integration with vegetative systems
- Design for industrial effluents
- Challenges and potential pitfalls
- Summary of rules-of-thumb for sizing and applicability

IV. Design case studies (Panel):
- Maiporé social housing community – spotlight project. Including drivers for a constructed wetland solution, implementation challenges, solution.
- The MN decentralized wetland utility network. Illustrating the economic viability of operating decentralized wetlands as a utility operation.
- Indoor application of natural treatment systems for buildings
- Alternatives to wetlands to achieve decentralized infrastructure in high urban density environments
- A brief overview of other applications of constructed wetlands including seasonal flows, industrial flows, storm water, sludge treatment.

V. Conclusions (Eddie Wu):
- Reiterating the learning outcomes and important sizing tools
- Thoughts on the future of constructed wetlands in the wastewater infrastructure spectrum and the role and opportunity for landscape architects