Charles River Watershed Association

**Utilizing Existing Stormwater Infrastructure for Cost Effective Phosphorous Removal**
**Wednesday, April 14, 2021**
**12 to 2 PM**

**AGENDA**

**12:00 p.m.** **Welcome and Program Introduction**
Janet Moonan, P.E., Stormwater Program Director, Charles River Watershed Association

**12:15 p.m.** **Summary of MS4 Permit Requirements Related to Phosphorous Control in the Charles River Watershed**
Andrea Braga, P.E., CPESC, Principal Water Resources Engineer, Jacobs

**12:30 p.m.** **Using Alum Treatments on Existing Stormwater Ponds for Enhanced Phosphorous Removal**
David Austin, P.E., Senior Certified Ecologist ESA and Natural Treatment Systems Leader, Jacobs

**12:50 p.m.** **From Waste to Reward – The case for using water treatment residuals to support enhanced stormwater treatment for nutrient reduction in the Charles River Watershed**
William Lucas, PhD, Chief Technology Officer, Sustainable Water Infrastructure Group

**1:10 p.m.** **Optimizing Stormwater Management with CMAC**
Dayton Marchese, P.E., Account Executive, Opti

**1:30 p.m.** **Moderated Discussion**
**Moderator:** Andrea Braga, P.E., CPESC, Principal Engineer, Jacobs
**Panel Members:** all speakers

**2:00 p.m.** **Adjourn**

**PRESENTATION ABSTRACTS**

**Using Alum Treatments on Existing Stormwater Ponds for Enhanced Phosphorous Removal**
*Ultra-low, continuous dosing of alumina effectively lowers total phosphorus in stormwater ponds and pond discharges. Called geochemical augmentation, this continuous dosing method operates to keep aluminum concentrations below the US EPA 2018 chronic toxicity concentration threshold. At low concentrations aluminum hydroxide complexes, ultimately binding to organic particles and settling out. Phosphate is permanently bound. In this presentation we will learn about dosing methods for alum treatment, the results of long-term treatment on phosphorous concentration leaving stormwater ponds, and ultimately the load reduction that can be expected when using this treatment technology.*

**From Waste to Reward – The case for using water treatment residuals to support enhanced stormwater treatment for nutrient reduction in the Charles River Watershed**
*Harmful algae blooms (HABs) are a major concern in the Charles River, and the reason why the MS4 mandates phosphorus (P) load reductions of 13,800 lb/yr. The Sustainable Water Infrastructure Group (SWIG) has invented, patented, and developed a media technology using water treatment residuals (WTRs), which have a very high affinity for P. Combined with other amendments, SWIG media has been applied at*

*an industrial scale to remove P in the recycled wastewater effluent contributing to HABs in Florida. SWIG's Phosphorus Elimination System (PES) removal rates can exceed 95%. This allows the PES to remove 4,000 lb/yr of P from wastewater effluent in only a 1.4 acre site footprint. By retrofitting larger stormwater retention basins with pumped PES systems, the PES systems can run continuously between events until the entire basin is treated and no more P is left. This removes far more P than if constrained to what can only be treated during event inflows. With the MS4 permit calling for a reduction of 13,800 lb/yr, the entire watershed would require only 20 to 30 acres of PES systems retrofitted on retention basins throughout the watershed. This presentation first discusses the Florida wastewater PES, and then shows how the technology can be applied to the Charles River Watershed.*

**Optimizing Stormwater Management with Continuous Monitoring and Adaptive Control (CMAC)**
*There are now reliable, robust, and secure solutions for cost effective continuous monitoring and adaptive control (CMAC) of stormwater infrastructure. These solutions have an important role to play in accelerating the enhancement and conversion of existing stormwater facilities and construction of new facilities. CMAC solutions integrate information directly from field deployed sensors with real-time weather forecast data (i.e., NOAA forecasts) to directly monitor performance and make automated and predictive control decisions to actively manage stormwater storage and flows. The approach is non-proprietary, commercially deployed throughout the county for other stormwater management applications, and the outcomes have been verified by separate independent research efforts. Stormwater BMPs with forecast-based adaptive control achieve better pollutant removal and runoff reduction outcomes because, among other benefits, they can increase the amount of time that stormwater remains in the treatment facility without compromising capture rate while also reducing the frequency of erosive flows. CMAC has been deployed in 21 states across the U.S. with regulatory approvals from the Washington State Department of Ecology's TAPE Program and the Chesapeake Bay Program.*

## SPEAKERS

**Janet Moonan**, P.E., Stormwater Program Director
Charles River Watershed Association
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Janet (Jennie) Moonan serves as the Stormwater Program Director, where she is responsible for managing the extensive stormwater and nascent greenways program areas. Jennie's passion for the environment and inclination towards problem solving led her to become a Professional Engineer. She has 15 years of experience working both as a consulting engineer and a regulator in planning, permitting, design, and construction related to drinking water, wastewater, and stormwater, as well as watershed management and climate resiliency.
She earned a B.S. in Civil Engineering from Worcester Polytechnic Institute and a M.Eng. in Water Resources from Tufts University.

**Andrea M. Braga**, P.E., CPESC, Principal Water Resources Engineer
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Andrea is a Principal water resources engineer with extensive experience leading projects of varying size, type, scope, and complexity. Her technical specialties include stormwater management system design, surface water hydrologic and hydraulic modeling, and National Pollutant Discharge Elimination System (NPDES) compliance. Andrea has considerable experience in low impact development and green stormwater infrastructure planning, design, permitting, construction oversight, monitoring, and maintenance. Andrea is a Registered Professional Engineer in MA, NY, and RI, a Certified Professional in Erosion and Sediment Control and a Certified Municipal Vulnerability Preparedness Provider.

**David Austin**, P.E., Senior Certified Ecologist ESA, Natural Treatment Systems Leader
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David Austin is a Technology Fellow at Jacobs where he is the Global Technology lead for Natural Treatment Systems. He is an environmental P.E. (MN), Certified Senior Ecologist (Ecological Society of America), Certified Lake Manager (North American Lake Management Society), and a past President of the American Ecological Engineering Society. His projects concentrate on reservoir management, treatment wetlands, wastewater reuse, estuarine remediation, and mine water reclamation. Degrees: Mathematics (BA, University of Minnesota-Twin Cities), Water Resources Management (MS, University of Wisconsin-Madison), and Civil & Environmental Engineering (MS, University of California-Davis).

**William Lucas**, PhD, Chief Technology Officer
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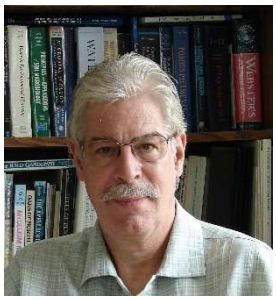

Dr. Lucas has provided innovative stormwater management designs for both new construction and urban retrofits for well over 30 years. He wrote Delaware's Green Technology Manual, and is co-chair of the LID Computations and the CSO-LID Task Committees of the ASCE/EWRI. His rigorous approach to modeling was used to confirm the SWMM model developed for Philadelphia Green Infrastructure. Perhaps the first to use SWMM aquifers to model subsurface flow, he combined this with LID controls to demonstrate the benefits of LID SCMs to control CSOs. Based on his doctoral research into nutrient retention in bioretention systems, he developed the advanced bioretention system to optimize phosphorus and nitrogen removal from runoff. His 6 refereed papers published on this technology alone have well over 300 citations. His work has been awarded two US and 10 international patents. Field scale systems have been installed in four states. Recently, Dr. Lucas and partners formed the Sustainable Water Infrastructure Group (SWIG) to apply this technology (and others) at an industrial scale.

**Dayton Marchese**, P.E., Account Executive
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Dayton Marchese is responsible for developing and managing client relationships at Opti. He helps municipalities and utilities leverage Opti technology to improve stormwater management and support smart city initiatives. Dayton is a licensed Professional Engineer in the State of California, having experience in water resources management and watershed modeling. His previous experience includes work with the U.S. Army Corps of Engineers Research and Development Center, and he has authored multiple scientific publications on technology-enhanced infrastructure. Dayton attended the University of California at Berkeley, where he earned an M.S. in Environmental Fluid Mechanics and Hydrology and a B.S. in Environmental Science.