A more resilient campus through water reuse
An on-site eco-engineered water reclamation plant reduces campus water use by nearly 40% – minimizing the University's environmental impact.

In the last decade, Atlanta has witnessed numerous water-related stresses, including: severe drought, EPA mandates to resolve critical infrastructure failures and an extended political dispute over water rights in the so-called “Tri-State Water Wars.” As a result of these challenges, Emory University set out to explore ways to minimize its impact on community water resources and the environment with a more strategic and impactful water management solution: campus-wide water reclamation and reuse.

With an extensive district energy system supplying steam heat and chilled water to campus, the University has significant process water demands that equate to nearly 40% of campus water use. A majority (85%) of this water is used by the steam plant and five campus chiller plants. These utility plants provide an ideal opportunity for displacing a significant portion of the campus potable water footprint with a reliable and sustainable source of water.

Sustainable Water designed Emory’s reclamation system, the WaterHub, to integrate into the existing campus framework using two small parcels near Chappell Park Field. Up to 400,000 gallons of wastewater is mined directly out of the campus sewer system daily. Water is cleaned to Georgia Reclaimed Water Standards through an energy-efficient, eco-engineered treatment process supported by solar (PV) energy production. The system has 50,000 gallons of clean water storage capacity, providing N+1 redundancy for campus district energy systems. Recycled water is distributed to multiple utility plants and select dormitories for toilet flushing via a 4,400 linear foot “purple pipe” distribution system.

The WaterHub reduces Emory University’s draw of potable water by up to 146 million gallons annually. Since its commissioning in May 2015, the WaterHub has processed over 150 million gallons of water.

In addition to its function as a water reclamation system, the WaterHub is designed to promote research and community outreach, enhancing the concept of the campus as a “living laboratory.” With built-in lab space and easy access ports for water quality testing, the facility enables research in a variety of topics. The lower site also includes a demonstration reciprocating wetland system (ReCip®) as a showcase to visitors interested in other sustainable treatment technologies.

The WaterHub at Emory University has earned 14 awards and has been featured in numerous publications such as District Energy, Industrial WaterWorld, Sustainable Business Magazine, Georgia Operator, Treatment Plant Operator and CE News.
Technology Description

The WaterHub at Emory is an adaptive, ecological, campus-wide water recycling system designed to treat domestic sanitary sewage for beneficial reuse. Wastewater is mined from a 18” sewer line near the lower site and then pumped to the upper site where it enters a rotating drum screen before entering the moving-bed bioreactor (MBBR) system. The process design combines submerged fixed-film hydroponic reactors with a MBBR as an initial treatment step. After primary treatment, water passes through a small clarifier, a disk filter, and a dual-stage disinfection system consisting of ultraviolet (UV) light and an oxidizing agent (chlorine).

The hydroponic reactors utilize plants and their root systems to mimic and maximize natural treatment efficiencies associated with oxygen diffusion and habitat creation. Below the root zone is an artificial media, called BioWeb™, that extends the submerged fixed-film surface area for higher levels of microbial incubation. The system is designed to provide a high hydraulic throughput with a small physical footprint, and low energy demands. Along with outdoor hydroponic reactors, the lower site also boasts a small 5,000 GPD reciprocating wetland system, which is used by the University for demonstrative and research purposes.

Parameter

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WaterHub Design Parameters

- GlassHouse (upper site)
- Moving Bed Bio-Reactors
- Outdoor Reactors (lower site)
- Indoor Hydroponics
- Lab/Mechanical room
- Outdoor Hydroponics
- Demonstration Reciprocating Wetlands
- Distribution to Campus
- Clean Water Storage Tank
- Clarifier

Cooling towers at Michael St. Chiller Plant
Outdoor hydroponics & demonstration reciprocating wetlands
Research lab inside the WaterHub