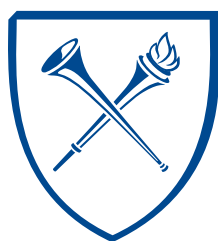


# APPA Effective & Innovative Practices Award



## The WaterHub at Emory University by Emory University



# EMORY



“ The Emory University WaterHub isn’t a typical treatment facility. It filters wastewater through plant roots and microbes clean out organic material...A model for us all! ”

– Gina McCarthy, Environmental Protection Agency Head Administrator

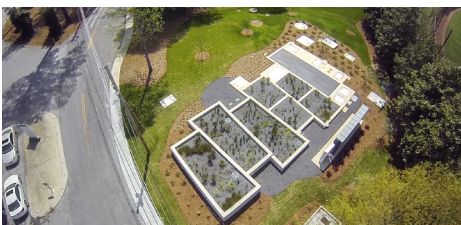




## The WaterHub at Emory University

The first system of its kind installed in the United States, the WaterHub is a campus-scale water reclamation system serving Emory University's main campus in Atlanta, Georgia. The WaterHub utilizes an eco-engineered treatment process to recycle nearly two-thirds of campus wastewater production for on-site, non-potable reuse. Moving the field of water reclamation forward by recycling 400,000 gallons of water per day, the WaterHub project serves as a practice for sustainable water management for bulk water consumers. The new system creates a more resilient campus by generating an alternative water supply for critical heating and cooling operations, while consistently providing significant cost-savings for utility operations.

In a region that witnesses significant community water stresses and periodic drought, the WaterHub reduces Emory's draw of potable water by up to 146 million gallons annually – displacing nearly 40% of total campus water demand. Since its commissioning in early 2015, the innovative, new system has recycled over 30 million gallons of water and shielded the University from municipal water main failures. The University collaborated with their municipality to provide a number of additional community benefits, which include pollution abatement through reduced wastewater discharge and extended lifespan of community water-related infrastructure.



**“ This WaterHub will shine as a model for other universities, other governments, and commercial campuses to replicate. The benefits of this project are not theoretical or abstract, they're very real, very measurable, and they're very immediate. Leaving no doubt of the direct beneficial impact that sustainable practices can have on our water systems. ”**

– Douglas Hooker, Director of Atlanta Regional Commission

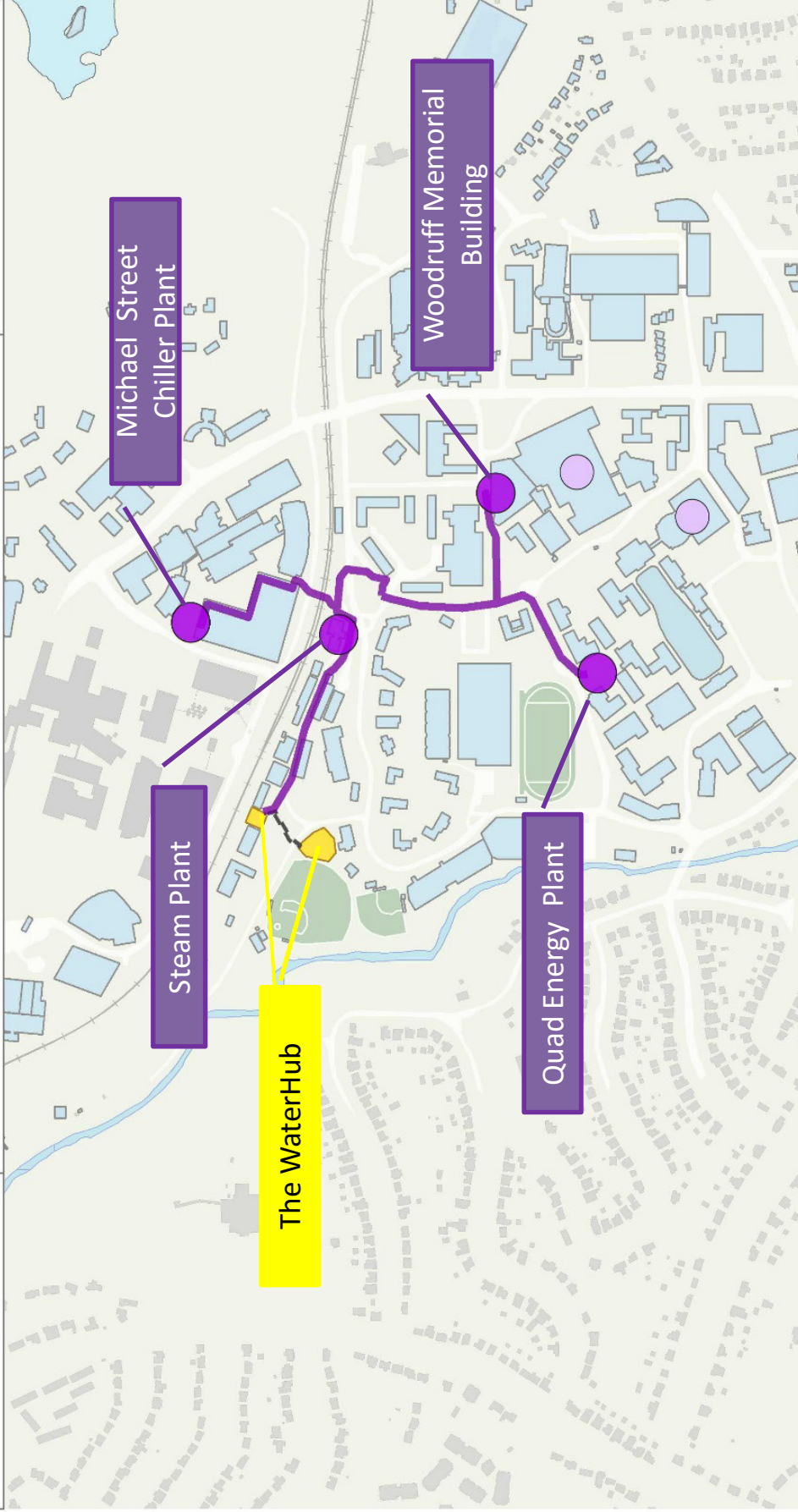




EMORY  
UNIVERSITY

## Reclaimed Water Distribution

Emory University  
Atlanta, Georgia



Revised 12/15/2014

0 500 1,000 Feet

Scale 1:8,000

Coordinate System: NAD 1983 StatePlane Georgia West FIPS 1002 Feet

Utility features portrayed on this map may not be survey verified.

**SUSTAINABLE WATER**

Sustainable Water Consultants LLC  
Olen Alesh, VA



## Institutional Benefits of the WaterHub at Emory University

Metropolitan Atlanta has become emblematic of 21st century water issues. The urban region has a mandated \$4 billion consent decree with the Environmental Protection Agency for improvements to Atlanta's over-burdened and aging sewer lines as well as continued problems with drought, low reservoir levels, lack of space for additional reservoirs, and a small watershed area. To help tackle these issues on campus, Emory has pioneered water reuse through the WaterHub—an innovative, on-site water reclamation facility that treats wastewater from Emory's facilities.

It meets the triple bottom line of sustainability by relieving an over-burdened municipal system that has a history of sewer overflows, saves Emory money over time and reduces its use of potable water by up to 400,000 gallons-per-day. Atlanta is the largest municipality in the United States reliant on the smallest single water source for its drinking water. The WaterHub, which draws from the wastewater streams of the nearby Centers for Disease Control and Prevention (CDC) headquarters campus and surrounding Emory facilities, continues to reduce Emory's use of drinking-quality water from Atlanta's municipal water supply by up to 146 million gallons of water annually, thus leaving more water for the community. Resembling a greenhouse, the WaterHub also provides a living laboratory for research and teaching. The WaterHub utilizes adaptive ecological and biomimicry processes to clean water for non-potable uses in Emory's three central chiller plants, the campus steam plant, and for toilet flushing.



Additionally, the WaterHub functions as an academic research facility for various disciplines. As the first ecological water reclamation treatment facility of its kind in the United States, the WaterHub provides an opportunity for teaching and applied research related to innovative, resourceful and sustainable water management practices. It is influencing and inspiring the academic and broader community to utilize natural systems, decentralized reclamation facilities, and adaptive ecological technology to meet water demands. Research and teaching is already underway in the WaterHub, in particular research by Emory's Rollins School of Public Health and its Center for Global Safe Water. The Center is using the WaterHub as a teaching tool for students to have hands-on training in testing the treated water at various points in the facility. The Center is also conducting research

on the treated water quality related to pathogens and looking into the replicability of this system to areas around the globe in need of similar low-energy intensity and relatively low-cost wastewater treatment. Students are being given applied research training regarding one of the greatest sustainability challenges facing our planet; and reuse research that may help improve water quality and water access around the world.

**“ This is a first of its kind facility in North America. It exemplifies how we as a society can take a more intelligent and responsible path to stewardship of natural resources, for the good of each other. ”**

– Jim Wagner, President of Emory University





## Characteristics or Qualities that Makes the WaterHub Different or Innovative:

The WaterHub model provides a unique and innovative approach to both water and wastewater management for large water consumers, which is divided into four major categories described below:

- **A new model of water management: Decentralized Water Reclamation & Reuse**

The WaterHub utilizes a concept called decentralized water reclamation and reuse through sewer mining to provide on-demand water resources, via a co-located water treatment facility, to meet seasonal non-potable water demands on-site. This model reduces the energy demands of water by decreasing the long transmission or distribution requirements of both wastewater and clean water to and from treatment, and to end use locations. Most importantly, however, this model creates impactful water conservation results (nearly 40% total water footprint reduction) without any drastic shift in human behavior by end-users. It also provides a high-level of redundancy and resiliency in the campus water system by providing a back-up water storage supply.

- **New Applications of Innovative, Ecological Treatment Technologies**

The WaterHub utilizes an ecologically-based treatment system that provides numerous benefits by mimicking natural approaches to water treatment. These benefits include, lower energy footprints, more efficient biological digestion / degradation of organic matter, and even aesthetics. The WaterHub at Emory is the very first application of decentralized water reclamation and reuse for bulk water use with this specific biological / ecological treatment approach. The overall design and technological method for the WaterHub resulted in an odor-free, aesthetically pleasing treatment system integrated directly into the existing urban environment. Situated in the dense campus community, the primary treatment facility resembles a greenhouse, while additional treatment capacity takes the form of inconspicuous outdoor planting beds filled with a host of native plant species.

- **Project Implementation through a New Project Finance Method**

Sustainable Water, the project developer, introduced an innovative new form of project finance to enable the implementation of new water management projects. Financed through a Water Purchase Agreement (WPA), the turn-key WaterHub Project was engineered and constructed at no upfront capital expense to the University. The system is also operated by the developer under a contract where water savings produced by the project are used to pay off the cost of the facility over time. This project finance method not only reduces construction and operational risk for the University, but provides substantial utility savings via decreased domestic water rates.

- **Opportunities to Advance the Campus as Living Laboratory**

In addition to its functional use as a water reclamation facility, the WaterHub is designed as a living laboratory to enhance the University's academic environment. With built-in lab space and easy access ports for water quality testing, the facility enables research in a number of disciplines and is used as an immersion learning tool to enhance curriculum. Emory's faculty have already integrated new curriculum into the facility, and believes it will also bring in additional research funds and enable the University to qualify for new grants in the future.

“ The region has committed to a very robust plan for water conservation, water efficiency, and reuse. This project clearly demonstrates how recycling our treated wastewater and appropriately reusing it will extend our resilience and free up water for future generations and other beneficial purposes. ”

– Douglas Hooker, Director of Atlanta Regional Commission





## How the WaterHub Can Be Used By Others:

The WaterHub at Emory model can be replicated in virtually any community, providing a range of environmental, social, and economic benefits. This practice is being used as a solution to regional water crises such as drought and diminishing water resources or as a tool to minimize impact on stressed municipal treatment plants or wastewater conveyance systems. The WaterHub enhances community collaboration and outreach through comprehensive tours of the treatment facility. With over a hundred tours conducted since its commissioning, the WaterHub has been admired by governmental agencies, higher education, and other institutions for the beneficial impacts it creates for the broader community. According to Douglas Hooker, director of Atlanta Regional Commission:

*“This WaterHub will shine as a model for other universities, other governments, and commercial campuses to replicate. The benefits of this project are not theoretical or abstract, they’re very real, very measurable, and they’re very immediate. Leaving no doubt of the direct beneficial impact that sustainable practices can have on our water systems.”*

As drought and water stress become increasingly prevalent, the model of decentralized water reclamation will likely appeal to many bulk water consumers. In many instances, municipal reclaimed water is not offered as an option due to extensive capital investment requirements for producing and distributing high-quality reclaimed water for reuse. With new project finance vehicles and flexibly-sited, odor-free ecological treatment technologies, the decentralized water reclamation model can be integrated into nearly any community – urban or rural.

With extensive non-potable water demands for centralized heating and cooling operations as well as the extensive production of wastewater resources, the WaterHub model is relevant to a number of water-intensive market sectors, including:

- **Manufacturing**
- **Hospitals & Healthcare Campuses**
- **Airports**
- **Mixed-Use Commercial Developments**
- **Military Bases & Governmental Complexes**
- **Higher Education**



For institutions of higher education, the WaterHub acts as a living, learning laboratory – creating unique opportunities for research, immersive learning and community outreach. This facility helps advance disciplines directly related to botany, microbiology, engineering, public policy, environmental sciences and urban planning among others. The Center for Global Safe Water (CGSW) at the Rollins School of Public Health has consistently performed research and training associated with reclaimed water-related sanitation, hygiene and health implications.

**“ The WaterHub was designed to advance the idea of the campus as a living laboratory, as well as a place of experimentation, engagement, and learning...This facility is a case study for how an institution can move a community toward a bold step in water conservation. ”**

– Ciannat Howett, Director of Office of Sustainability





## Documentation of Management Involvement and Employee Commitment

From the Board of Trustees to the Department of Energy & Utility Management, the WaterHub project has been embraced enthusiastically by the entire Campus Services Team. Throughout the development process, there have been several key University departments (and their associated staff) involved in the project. Together, Directors of the following departments united with cautious optimism to implement this “first-of-its-kind” program:

- Business & Administration
- Office of the Provost
- Campus Services
- Office of Sustainability Initiatives
- University Architect
- Planning, Design & Construction
- Energy & Utility Management
- Engineering Services & Facilities Management

Now operational, there are several key University staff involved in the project. Utility Plant operators in the Department of Energy & Utility Management collaborate with WaterHub operators on a daily basis. Together, University and plant staff monitor water chemistry to ensure suitability for reuse and oversee program operations.

There are also numerous staff members, primarily in the Office of Sustainability Initiatives, involved in project communications and outreach – providing tours, performing interviews and writing press releases. Serving as a living, learning laboratory, Directors of multiple academic departments have also created curriculum and immersive learning opportunities around the WaterHub. The Director of the Center for Global Safe Water, Dr. Christine Moe, is one example of this. Her class, called *Water and Sanitation in Developing Countries*, exposes students to fieldwork and to the experience of collecting real data, interpreting results and writing reports related to water research.



“ With this facility, we’re taking a major step forward by reclaiming our own wastewater, which will save tens-of-millions of gallons of potable water every year. ”

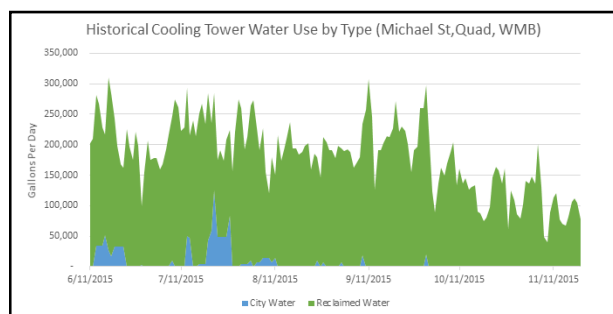
– Matthew Early, Vice President for Campus Services



## Documentation of Results, Analysis, Customer Feedback and Resulting Benchmarks

After 6 months of operations, the WaterHub has displaced over 30 million gallons of potable water with recycled wastewater. Once operational for a full year, the WaterHub is on track for meeting its goal to displace over 70 million gallons annually. Additionally, the WaterHub has helped:

- **Conserve precious water supplies in a water-stressed region**
- **Provided less expensive water for utility (cooling tower and boiler makeup) purposes**
- **Mitigated the campus impact of at least 1 major municipal water main failure**
- **Aligned itself with the University's educational and research mission**
- **Re-energized local attention to sustainable water management and resource conservation**
- **Reduced wastewater discharge by nearly 66% - minimizing the University's contribution to surface water pollution**



The WaterHub incorporates a sophisticated control and data analysis system that allows for continuous improvement related to treatment efficacy and water quality. This system spans into central utility plant operations and control, and is expected to help document the full impact of using reclaimed water on campus. These impacts range from cycles at the cooling towers to BTU savings for boiler feedwater, corrosion control in sensitive HVAC equipment to the total embodied energy of water for University water consumption.

As one of the largest employers and leading institutions in Atlanta and the Southeast, Emory University seeks to model responsible water stewardship for our region. The innovation of the WaterHub model has generated interest from diverse market sectors representing government agencies, higher education and Fortune 500 companies. Professionals ranging from college professors to sustainability coordinators, engineers, and executive officers have traveled to the WaterHub for tours and presentations.

Most importantly, Gina McCarthy, the head administrator for the Environmental Protection Agency, praised the WaterHub at Emory University by stating, "The Emory University WaterHub isn't a typical treatment facility. It filters wastewater through plant roots and microbes clean out organic material...A model for us all!"

In addition to professional involvement through facility tours, the WaterHub has been featured in multiple magazines. Organizations such as International District Energy Association, WaterWorld, Sustainable Business Magazine, and the American Institute of Architects have published articles highlighting the WaterHub for its design as a replicable, sustainable wastewater management solution.

“ **The WaterHub is Emory University at its best, and American Universities at their best.** ”

– Jim Wagner, President of Emory University