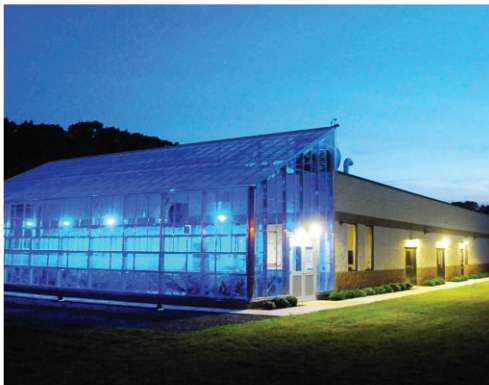




San Francisco
Water Power Sewer

Services of the San Francisco Public Utilities Commission



Onsite Water Reuse System Projects Outside of San Francisco

San Francisco Public Utilities Commission
September 2021

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An onsite reuse system (image courtesy of Aquacell)

Buildings are sources of water and produce a variety of alternate sources of water including rainwater, stormwater, foundation drainage, graywater, and blackwater. When collected and treated properly, these water sources can be used for non-potable applications such as toilet flushing, irrigation, and cooling towers. Onsite water treatment systems embody the One Water principle of matching the right resource to the right use because it promotes treating water to the appropriate level that is needed for its end use. Moreover, these systems can transform the way water is managed in buildings. For example, onsite water systems can reduce potable water use up to 45% in residential buildings, and up to 75% in commercial buildings.

This report is intended for developers, architects, and designers of onsite water reuse systems. Numerous people around the world were contacted to share their stories, projects, and lessons learned so that they may share proof of concepts to encourage transformation in the water sector. These projects range from individual buildings recycling wastewater to entire neighborhoods actively engaged in the management of their water. While water reuse remains a central theme within the case studies, each project showcases a unique, innovative approach to using more water efficiently.



2nd stage of a wetland treatment (image courtesy of Denver Water)



An onsite reuse system's mechanical room (image courtesy of Sustainable Water)

DGS Natural Resources Building – Sacramento, CA



DGS Natural Resources Building under final stage of construction (image courtesy of HTEC)

Project Status: Under Construction
(Estimated Completion Late 2021)

Project Size: 838,000 Square Feet

Alternate Water Sources:

- Graywater

End Uses:

- Toilet Flushing

Treatment System Size: 6,000 Gallons/Day

Potable Water Use Reduction:

25%; 1.52 Million Gallons/Year

Drivers: Leed Platinum Certification

System Cost: \$300,000 (Estimated)

Annual O&M Cost: \$3,500 (Estimated)

Owner: State Of California

Project Description:

Installation is underway for a 6,000 gallon per day graywater reuse system in the State of California's Department of General Services Natural Resources Building in Sacramento, CA. The building, located on P Street in the heart of downtown Sacramento, will serve as the new Department of Natural Resources headquarters. The 20-story, 838,000 square foot tower will include a 300-seat auditorium, office space, retail space, a food court, and a childcare facility that will be able to accommodate 120 children.

The reuse system filters graywater from showers and bathroom sinks through an 800-micron prefilter before it is collected and treated in a combined collection/bioreactor tank. The membrane bioreactor is NSF-350 certified and allows the water to be transferred to a treated water storage tank without any additional chemical treatment. The treated water will be recycled for toilet and urinal flushing. System performance and maintenance will be monitored locally by the building management system, with the capability of remote monitoring via cellular connection.

Drivers for Onsite Water Reuse:

The system was implemented to help the building achieve its LEED Platinum rating by reducing the potable water demand by 25%.

Ownership Model:

The building and its internal graywater treatment system is owned by the State of California. Heat Transfer Equipment Company will either conduct the O&M services or provide the necessary training for owner operation.

Role of Public Utility:

No involvement in design or operations.

Project Cost and Funding:

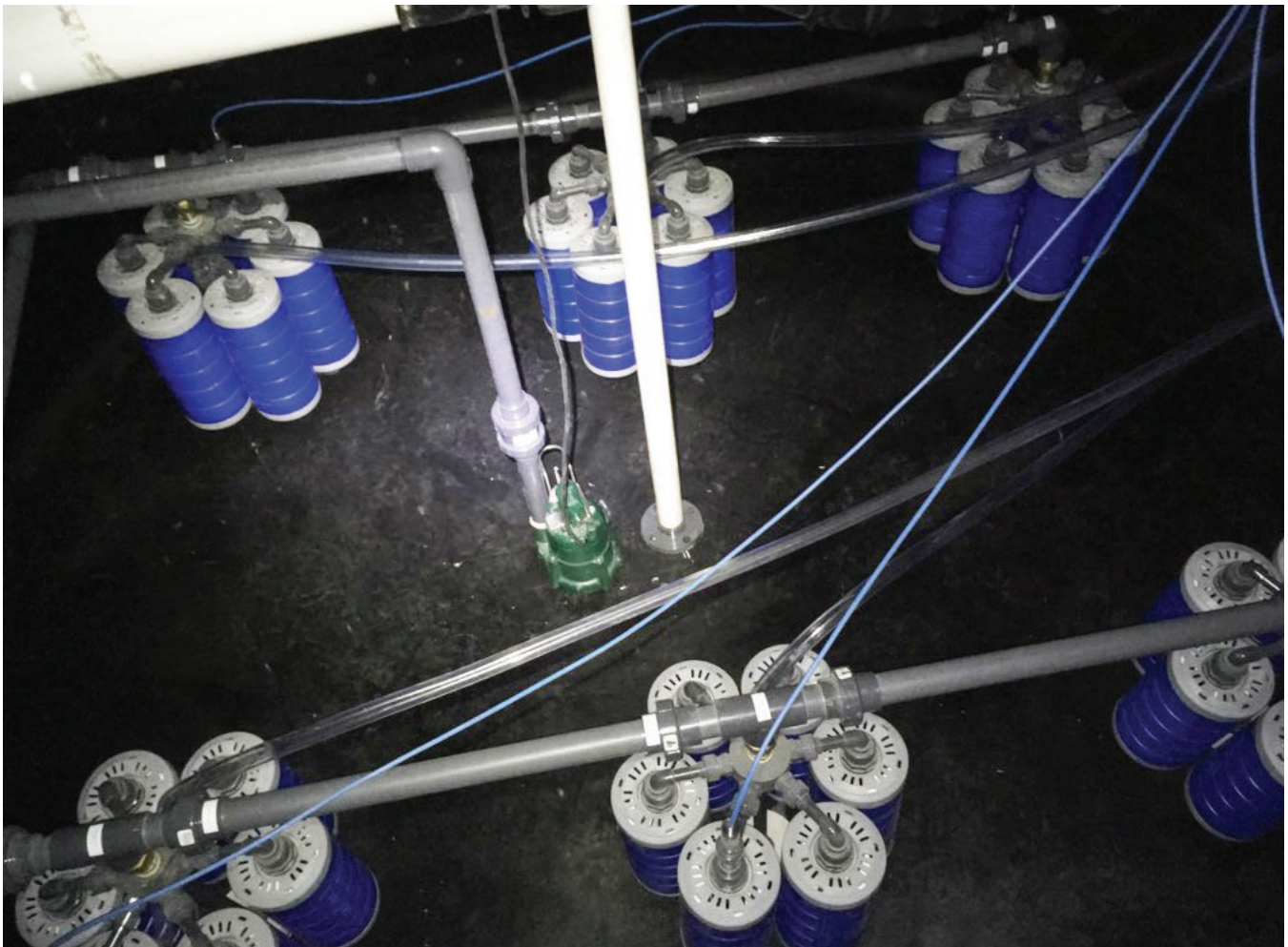
It is estimated that the graywater treatment and reuse system cost roughly \$300,000, and the O&M will cost about \$3,500 annually.

Lessons Learned:

It was a challenge to accurately estimate the volume of graywater flows. Over the course of project design, fixture counts and occupancy numbers were constantly being revised and updated, which caused the estimated amount of graywater supply to drastically change. As a result, the originally specified system could no longer handle the revised design conditions. Due to the necessary design update being recognized late in the project development process, additional space could not be allocated for increasing the system's treatment capacity.

Fortunately, the manufacturer was able to scale up the graywater treatment capacity within the limitations of the existing footprint so that the facility could still meet its LEED Platinum design goals of a 25% water reduction without having to allocate additional space for the increased system capacity.

Reference: Bill McCabe, Heat Transfer Equipment Company (bill@htecompany.com)



Onsite reuse system's filter cartridges (image courtesy of HTEC)