Project Completion: Summer 2020

Development Size: 260,000 square feet office and conference space for up to 1,000 employees

Alternative Water Sources:
- Rainwater
- A/C condensate
- Blackwater

End Uses:
- Toilet/urinal flushing
- Irrigation
- Landscape water feature

Treatment System Size: Up to 5,000 gpd blackwater treatment; 1,500,000 gallons per year of total non-potable water provided

Potable Water Use Reduction: 75%

Drivers: Demonstration project, public education and promotion of onsite water reuse

System Cost: $1,700,000 for blackwater system including $145,000 for dual-distribution plumbing; $625,000 for rainwater and condensate storage

Annual O&M Cost: TBD

Meet
OSCAR & CLARA
The Future of Water Management

The City of Austin's new Permitting and Development Center is home to two innovative and integrated onsite water reuse systems.

OSCAR is an **O**n-**S**ite **C**ollection **A**nd **R**euse system that collects air-conditioning condensate and rainwater to reuse for irrigation and landscape maintenance around the building.

CLARA is a **C**losed-**L**oop **A**dvanced **R**eclaimed **A**ssembly that treats the building's wastewater and recycles it for toilet and urinal flushing.

Together, OSCAR and CLARA are helping the City of Austin to save over one million gallons of drinking water each year, reducing the site's potable water use by 75%. As Austin's population grows and climate change stresses drinking water supplies, more OSCARs and CLARAs installed throughout the city will help to extend our water supplies and conserve precious drinking water.

Pilot Project Benefits

- This first-of-its-kind project in Austin will help pave the way for future development projects to capture and reuse onsite water sources (rainwater, stormwater, graywater, A/C condensate and blackwater) for non-drinking water needs, helping to extend our core water supplies from the Colorado River and Highland Lakes.
- Austin Water treatment plant operators are getting hands-on experience with cutting-edge membrane technology capable of advanced treatment and removal of nitrogen with a reduced energy requirement.
- The data collected from these systems will be used to inform design requirements and criteria as well as operations and maintenance needs for onsite water reuse systems to help advance the City of Austin's water conservation and reuse goals.

Austin WATER
austinwater.org

How the Systems Work

OSCAR

Before entering the underground storage tanks, the rainwater passes through 350-micron filters capable of handling flows up to 1,500 gallons per minute. The filters are self-cleaning, meaning less maintenance to perform to keep the system running. OSCAR has 40,000 gallons of total storage to supply water for landscape irrigation, and to occasionally send water to CLARA to help dilute solids and aid in the blackwater treatment.

CLARA

Every day, CLARA can treat up to 5,000 gallons of wastewater from the building's sinks, toilets and drinking fountains. The wastewater passes through six stages of biological, physical and chemical treatment before it is sent back to the building to flush toilets.

1. Primary Screen Tank

Wastewater from the building enters the dual trash tank system by gravity where settleable and suspended solids are removed during primary treatment. Screened solids are pumped from the trash tank to the city's sewage collection system, and filtered effluent from the settling tank is pumped to the pre-anoxic tank.

2. Pre-Anoxic Tank

Biological treatment begins in this reactor where high-efficiency membrane aeration stimulates microorganism growth in a fixed-film process. This membrane aerated bioreactor (MABR) can provide nitrification as well as denitrification in the same reactor. Nitrification occurs when aerobic bacteria growing on the membrane oxidize ammonia and ammonium from the influent wastewater to nitrite and nitrate. Denitrification occurs when the nitrites and nitrates in the recycled wastewater from the hydroponic reactor are utilized by bacteria to oxidize carbonaceous biochemical oxygen demand (cBOD) contained in the influent from the primary screening tanks.

3. Hydroponic Reactor

The primary function of the hydroponic reactor is to remove residual cBOD and to provide nitrification. To maintain aerobic conditions, oxygen is supplied by fine-bubble air diffusers. Hydroponic plant racks support a diverse community of plant species with long roots that extend into the water column and provide surface area for treatment microorganisms that remove cBOD. Nitrified waste recycle is pumped back to the pre-anoxic reactor for denitrification and sodium hydroxide is added to adjust the alkalinity of the water.

4. Post-Anoxic Tank

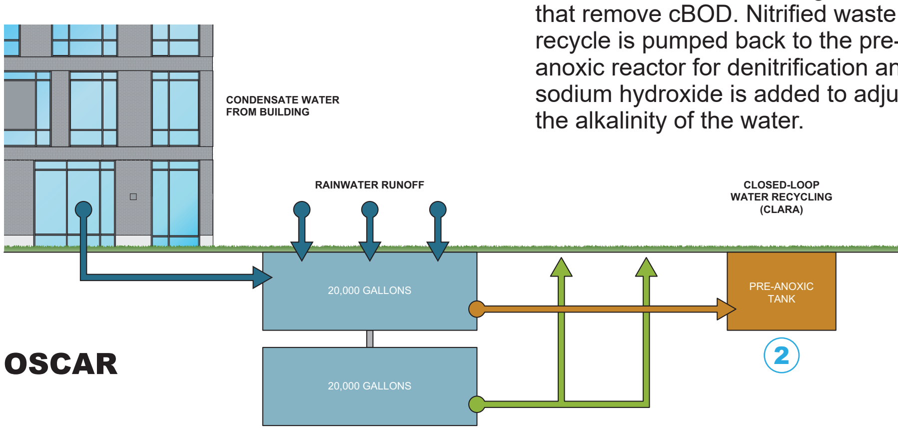
Effluent from the hydroponic reactor flows by gravity into the post-anoxic reactor where a low-oxygen environment stimulates microorganisms to remove residual nitrate from the wastewater with the aid of a supplemental carbon feed. From here, an end-suction pump moves the wastewater into the membrane tank for final biological treatment and solids separation.

5. Membrane Tank

A permeate pump draws wastewater through a flat sheet membrane filtration unit to remove biosolids and pathogens. The membranes retain solids down to approximately 0.1 micron resulting in a high-clarity permeate. Return activated sludge (RAS) is pumped back to the hydroponic reactor to maintain adequate mixed liquor suspended solids (MLSS) concentrations in the upstream bioreactors and some MLSS is recycled to the pre-anoxic reactor for denitrification. Waste activated sludge (WAS) is periodically pumped to the sanitary sewer to decrease the MLSS concentration. Continuous air scour across the membranes prevents solids buildup and an automatic clean in place (CIP) system backwashes the membranes periodically with a dilute sodium hypochlorite solution.

6. UV Reactor and Reuse Tank

To complete the pathogen destruction process, the permeate from the membrane reactor is disinfected by ultraviolet radiation (UV) and chlorine dosing. An on-line turbidity sensor before the UV unit continuously monitors the permeate for turbidity levels that would inhibit UV effectiveness. After UV disinfection, sodium hypochlorite is added to provide a disinfectant residual to control odor, prevent regrowth of bacteria and control biofilms. The reuse tank provides contact time for the chlorine as well as storage for the treated water, which is pumped into the building via a triplex pump system to flush toilets and urinals.



OSCAR

CLARA