

2016 Engineering Excellence Awards Project Review

American Council of Engineering Companies of Washington

Yahoo! Eco-Friendly Cooling System Upgrades

M.A. Moretnson Company

Landau Associates

Water Conservation Technology International (WCTI)

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YAHOO! ECO-FRIENDLY WATER MANAGEMENT SYSTEM

QUINCY, WASHINGTON

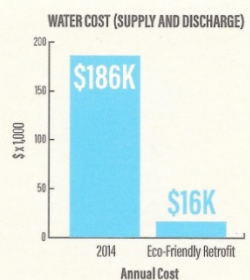
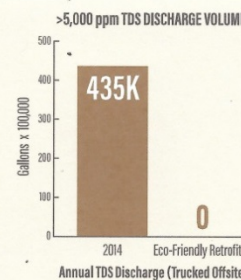
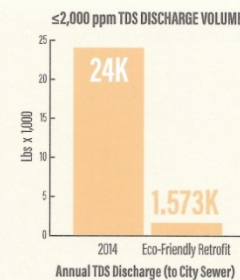
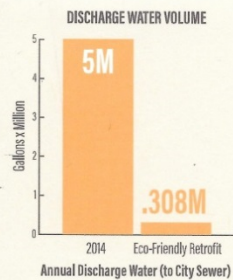
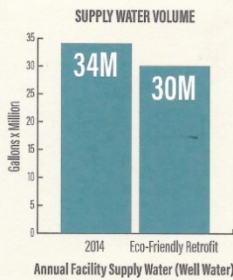
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The retrofit will conserve more than 200 million gallons of groundwater over 15 years and reduce the data center's annual water/sewer bills by 92 percent.

Data centers require substantial cooling in order to keep servers cool, which can require significant amounts of water. Yahoo! constructed an eco-friendly design to retrofit the evaporative cooling systems for their 300,000 square-foot data center in Quincy, Washington. The innovative design results in less environmental impact to the rural community, and provides a more sustainable process at a significant cost savings. The retrofit included optimizing the water use for two separate high-efficiency cooling technologies, and construction of double-lined evaporation ponds to manage wastewater onsite.

The water management system design modifications focus on water conservation as a primary goal, while simultaneously improving data center overall effectiveness and sustainability.

1. USE WCTI SOFT WATER TECHNOLOGY IN THE COOLING WATER SUPPLY
2. CAPTURE AND RECIRCULATE EVAP COOLING WASTEWATER DISCHARGE
3. LEVERAGE LOW TDS EVAP WASTEWATER IN COOLING TOWER WATER SUPPLY
4. SEPARATE DIFFERENT HIGH TDS WASTEWATER AND REROUTE TO ONSITE EVAPORATION PONDS
5. CONTAIN HIGH TDS WASTEWATER ONSITE IN EVAPORATION PONDS WITH REDUNDANT CAPACITY



OWNER, PROJECT MANAGER

CONSTRUCTION

ENTRANCE, EVAPORATION POND DESIGN AND CONSTRUCTION CO., GEOTECHNICAL PERMITTING

WATER TREATMENT

MECHANICAL

CONTROLS

CIVIL SURVEY

ARCHITECTURE

ELECTRICAL

STRUCTURAL

LANDSCAPE ARCHITECTURE

Data centers require cooling systems to keep server computers from overheating. The cooling systems can use millions of gallons of water annually and discharge substantial volumes of high total dissolved solids (TDS) wastewater to local municipal wastewater treatment facilities. With a primary focus on water conservation, a team of mechanical, electrical, civil, chemical, controls, geotechnical and environmental engineers designed five major improvements to the data center's water management systems:

1. Use WCTI soft water technology in the cooling water supply. Using soft water in the cooling supply takes advantage of the existing onsite softener technology which allows greater water reuse within the cooling system and extends the lifespan of the cooling system's evaporative media (filters) from three to six years.
2. Capture and recirculate Evap Cooling wastewater discharge. Design modifications allow for 99 percent of water discharged from the Evap Cooling process to be captured and recirculated, promoting water conservation.
3. Leverage low-TDS Evap wastewater in Cooling Tower (CT) water supply. Evap Cooling wastewater is directed as CT supply water, made possible by using a conductivity-controlled blow-down valve that limits TDS to 1,000 ppm. This not only contributes to significant water conservation, which reduces wastewater, but also allows scalability to future facility development as Yahoo's business grows.
4. Separate different high-TDS wastewater and reroute to onsite evaporation ponds—removing the need for dedicated resources for transportation of wastewater offsite, promoting cost savings and sustainability—independent of the City of Quincy sewer.
5. Contain high-TDS wastewater onsite in evaporation ponds with redundant capacity. Three evaporation ponds designed and constructed with sufficient volume provide separation of High-Efficiency Softening waste from Cooling Tower waste, freeboard for storm events, and redundancy. This significantly reduces the volume of wastewater sent to the City's wastewater treatment plant and will allow the ponds to be used for up to 10 years without having to empty the solids.

This project won a Silver Award for the Local (State) Social Economic and Sustainable Design Consideration category