



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

SUCCESS STORIES

PLANT NAME AND LOCATION

QUECHAN CASINO RESORT WWTP - WINTERHAVEN, CA

DESIGN DAILY FLOW

0.15 MGD (568 m³/day)

AQUA-AEROBIC SOLUTION

(1) Aqua-Aerobic® MBR SYSTEM

SMALL FOOTPRINT, HIGH QUALITY EFFLUENT, AND LOW ENERGY CONSUMPTION MAKE Aqua-Aerobic® MBR THE OPTIMUM SOLUTION

Quechan Casino Resort, a newly constructed gaming facility located on Native American owned land in Winterhaven, California, began its wastewater treatment operations in January 2009. Early into the project development, it was decided that the Aqua-Aerobic® MBR membrane bioreactor system was the optimum solution due to its small footprint, high-quality effluent and low energy consumption. The project was a design-build concept so that startup could be scheduled prior to the area's peak tourist season.

Aqua-Aerobic Systems worked closely with Clear Solutions Enviroengineering, Inc., Engineered General Contractor, Inc. and Roel Construction to get the plant built within a several month period so the casino could be fully operational before its Grand Opening.

The system was actually started up a month before the casino opened in order to get the biomass to necessary levels for treatment of the Grand Opening flows. The flow



Quechan Casino's membrane module in air scour mode.



One of Quechan Casino's batch biological reactors.

was expected to go from < 2% to nearly 100% capacity in one day! Because of Aqua-Aerobic Systems' unique, early startup plan, Quechan Casino avoided the large expense of hauling seed-sludge.

The casino's treatment plant is designed to meet California's strict Title 22 reuse requirements in which effluent is reclaimed to supply drip irrigation for landscaping and a future onsite golf course. Quechan Casino Resort's location and available land will also accommodate a second hotel and gaming facility as part of its planned expansion. The Aqua-Aerobic® MBR system will easily handle the plant's future demands, while continuing to provide sustainable water management for the facility.

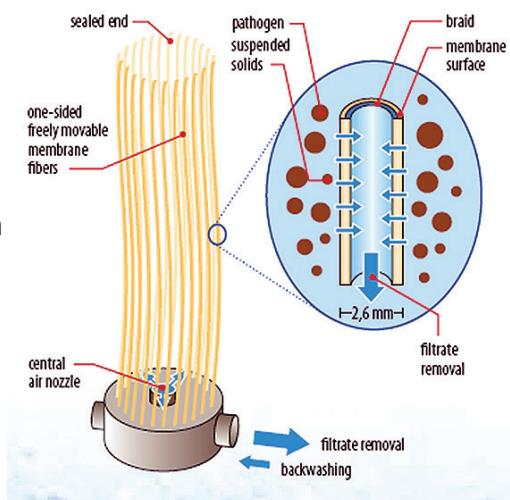
Aqua-Aerobic® MBR SYSTEM PROCESS

Fill Mode - the Aqua-Aerobic® MBR system is designed to receive raw, screened influent to the biological reactor system on a continuous basis. To attain optimal process performance, usually two or more biological reactors are employed, with only one reactor receiving influent at any given moment. In a typical two basin MBR system, one reactor will operate in a "fill" mode, while the other reactor is allowed to 'draw'. The unique hydraulic design of the Aqua-Aerobic® MBR system features in-basin equalization to benefit process performance and reduce the hydraulic impact on the membrane sizing.

Fill and Draw Mode - throughout the fill and draw sequence, each biological reactor processes through a completely mixed, time managed sequence of controlled aeration to achieve carbonaceous removal, and reductions in nitrogen and phosphorus. Because these process requirements are met within each biological reactor, the need for separate anoxic tanks, anaerobic selectors and recycle pumps is eliminated. By operating with mixed liquor suspended solids (MLSS) concentrations of 8,000 to 10,000 mg/l, the Aqua-Aerobic® MBR system offers the smallest footprint among activated sludge technologies.

Membrane Filtration - from the biological reactors, the MLSS is pumped to separate membrane tanks for complete solids/liquid separation to sub-micron levels. Filtration is accomplished by effluent permeate pumps that draw suction on the submerged membranes.

The excess sludge is returned by gravity to the proper biological reactor, which exists in a 'draw' stage. By providing at least two membrane tanks, the filtration system can provide continuous permeate production while allowing for automatic cleaning operations to maintain low trans-membrane pressures.



By using a single header construction and rugged hollow-fiber design, the membrane modules are ideally suited for long-term operation in elevated MLSS applications. With a nominal pore size of 0.05µ, the positive membrane barrier offered by the Aqua-Aerobic® MBR process assures the highest quality performance.

AVERAGE ANNUAL OPERATING DATA

LOADING	INFILUNT	EFFLUENT
AVG Flow mgd	0.15	----
BOD mg/l	400	5
TKN mg/l	50	----
TN mg/l	----	10
TSS mg/l	400	5
TP mg/l	12	----

Presently, the plant is performing exceptionally well, producing effluent Total Nitrogen near 3 mg/l with TSS levels consistently reported as non-detectable.

The Aqua-Aerobic® MBR system is designed to treat a future flow of 0.25 mgd with only the addition of two membrane modules. All of the tankage and biological treatment equipment is sized to meet this future flow for easy expansion. The design flow reflects weekend operation when peak flows are anticipated, therefore representing full-strength conditions.

The treatment plant resides inside of a building with separate rooms for: process equipment, pumps, chemical feed equipment, blowers, and controls. The building size is minimal since the Aqua-Aerobic® MBR system offers a smaller footprint than any other treatment technology.

Aqua-Aerobic® MBR SYSTEM ADVANTAGES

- Small footprint for space restricted applications
- Modular concept supports ease of expansion
- Flexible retrofit options with minimized civil costs
- Simplified pre-screening requirements
- True batch or continuous fill operation modes
- Superior performance reliability with membrane filtration
- Elevated MLSS for volume reduction or sludge recycle
- Positive barrier ensures high quality effluent is realized, even during severely under-loaded conditions
- Augmented disinfection capabilities
- Lowest energy consumption among MBR systems