

CASE STUDY: Orlando, Florida Water Conserv II WRF



Application:	Anoxic Biological Nutrient Removal (BNR) Selectors
Design Flow (ADF):	21 MGD
Mixing Efficiency:	≈ 0.09 HP/1000 FT ³
Compressors:	Two (2) 20 HP Rotary Screw
Nozzles:	144
Design Engineer:	Hazen & Sawyer



BioMix nozzles and nozzle headers seamlessly integrate with the existing diffused aeration system.

Orlando Facility Achieves Enhanced BNR, Reduced DO, and Reduced Costs with BioMix™ System

In 2016, the City of Orlando completed facility improvements at the Water Conserv II Water Reclamation Facility (WCIWRF) that enhanced the plant's biological nutrient removal (BNR) capabilities. The primary goal of the upgrade was to install a mixing system in the first anoxic basin of each train in order to reduce dissolved oxygen (DO) concentrations and enhance denitrification.

Prior to the project, a low level of diffused air was used to mix the anoxic zones. However, it was determined that even low levels of air increased the DO concentration enough to impact denitrification. To improve mixing within the basins and reduce DO levels, EnviroMix's BioMix Compressed Gas Mixing System was evaluated against hyperboloid mixers.

After thorough analysis, BioMix was chosen as the solution with the lowest total cost of ownership — capital costs were similar between the two options, but O&M costs were significantly lower with BioMix. **In a 20-year net-present-worth life cycle analysis, BioMix's total cost was shown to be \$218,000 lower than the hyperboloid mixers.**



ENERGY EFFICIENCY

Mixes with
30% less energy
than hyperboloid
mixers



STRAIGHTFORWARD OPERATION

Significant reduction in
operating equipment
to be maintained —
only 1 duty
compressor versus
10 hyperboloid mixers



PROCESS OPTIMIZATION

Proven negligible
oxygen transfer
Easy integration with
aeration equipment
in the tank



UNPARALLELED FLEXIBILITY

Variable mixing
intensity based on
process parameters
enables optimal
anoxic conditions and
mixing uniformity



The BioMix system uses only one operating compressor as opposed to multiple mechanical mixers, significantly reducing maintenance for the City of Orlando.



Short-duration bursts of compressed air fired intermittently produce optimal anoxic mixed conditions with a coefficient of MLSS variation of less than 2%.

Following the upgrade with BioMix, effluent total nitrogen concentration dropped from 5-10 mg/l to less than 1 mg/l.

When compared to hyperboloid mixers, BioMix provides optimal mixing for solids suspension with a significant reduction in power consumption. In addition to energy savings, use of the system allowed the city to minimize structural modifications to the basins furthering the cost effectiveness of BioMix. All maintenance items of the BioMix system, including the compressors and control system, are installed out of the basins in easily accessible areas.

Since the facility improvements were completed, WCIWRF has realized:

- **Enhanced nutrient removal** and treatment performance stability.
- **Improved effluent quality and ease of operation** — the BNR process was enhanced due to improved mixing and optimal anoxic conditions.
- **Improved process recovery time following high-flow events**, such as hurricanes — BioMix improved plant resiliency and allowed for a quicker recovery of effluent quality following periods of high inflow.

The BioMix Compressed Gas Mixing System enhanced denitrification within the biological process and improved overall plant performance. Implementation of the BioMix system played a vital role in this highly successful project for the City of Orlando.



Contact sales@enviro-mix.com today to discuss the ways EnviroMix can optimize your mixing solutions.