



Wastewater Municipal Plant Upgrade: Converting a 2.2 MGD SBR into a 4.6 MGD flexMBR™

APPLICATION: Municipal Wastewater

CAPACITY: 4.6 MGD (17.4 MLD)

LOCATION: Decatur, Arkansas, USA

COMMISSIONED: January 2019

CHALLENGE

The City of Decatur wastewater treatment plant is located in northwest Arkansas where it had operated as a Sequencing Batch Reactor (SBR) for over 10 years. The facility had reached its maximum capacity of 2.2 MGD and was struggling to achieve the required effluent criteria. A design-build team was hired to evaluate different options for the expansion of the system including constructing additional SBR trains, to add to the existing 3 trains, to accommodate the growing influent flow.

At the end of the evaluation the design-build team determined that a retrofit of the existing system into a Membrane Bioreactor (MBR) was the best approach which would make the City of Decatur Wastewater Treatment Plant the first MBR in the state of Arkansas.

SOLUTION

After a competitive bid with various MBR manufacturers, H2O Innovation was chosen as the MBR supplier based on their competitiveness and unique design approach. Virtually all the existing infrastructure was leveraged for the MBR retrofit. The SBR basins were converted into continuous flow reactors, return activated sludge lines were added and steel membrane tanks were installed on top of the existing post-equalization tank.

The retrofit design includes submersible pumps that send mixed liquor up to the elevated membrane tanks and it overflows back to an anoxic zone. The existing Jet aeration system continues to be used for sending mixed liquor forward into an aerobic zone and for facilitating the Jet Aeration process.

To help with the expansion a 3rd Jet Aerator was installed in each train to ensure sufficient oxygen transfer capabilities. An existing anaerobic zone that was located at the front end of each train was kept in service leading to a treatment train that is similar to the UCT process.



flexMBR™ System installation



BUILT WITH flexMBR™

The membrane system employs H2O Innovation's flexMBR design with Hydranautics hollow fiber membranes installed. Five membrane modules are installed in each train with space for a 6th module for future expansion. The elevated membrane tanks allow for the use of a siphon permeation system which was included in the design to minimize the use of the permeate pumps to save energy.

The unique variable influent trends for the City of Decatur facility allowed an energy saving controls strategy to be implemented that alternates between trains depending on the flowrate to ensure minimal energy use during low flow periods. Furthermore, the oxygen supply blower use is minimized through the inclusion of VFDs and dissolved oxygen control loops as well as the ability to automatically turn off blowers when possible, leading to an extremely energy efficient process.

H2O Innovation was also selected as the SCADA integrator for the City of Decatur wastewater treatment plant. The new SCADA system included replacement of the existing annunciator light panel with a state-of-the-art 55" touchscreen SCADA control panel. It also allowed integration of the existing headworks, dewatering system, influent pumps and UV system in addition to the new MBR controls system. Extensive process monitoring functionality and the addition of automated report generation was provided using the Ignition software platform.

RESULTS

The City of Decatur's new MBR Facility now operates at 4.6 MGD within the same footprint that the old SBR system used. It provides non-detect BOD and TSS values and consistently exceeds the effluent criteria for ammonia, nitrate and phosphorus.



Decatur Plant Retrofit Construction