

ORANGE WATER AND SEWER AUTHORITY

MASON FARM WASTEWATER TREATMENT PLANT AERATION AND ODOR IMPROVEMENTS PROJECT

April 2016

PROJECT PURPOSE: The Mason Farm WWTP Aeration System and Odor Control Improvements Project was the largest Capital Improvement Program (CIP) project undertaken since 2007, and made lasting improvements to treatment capacity, energy consumption, odor control, and equipment maintenance efforts at the WWTP. The project consisted of improvements to address two distinct needs:

1. Aeration system improvements: The Hazen and Sawyer *2010 WWTP Hydraulic and Treatment Capacity Study* found that the plant's aeration capacity would need to be expanded by 2019. The study also recommended that the WWTP change from a coarse bubble aeration and jet mixing system to a fine bubble aeration and vertical mixing system as a means to provide additional capacity to the plant's biological treatment process and to reduce costs for this energy-intensive portion of the overall wastewater treatment scheme.

By installing highly efficient equipment, the aeration system improvements reduced energy use for aeration and mixing in the biological treatment process by almost half when compared to the prior system. As a result, the project significantly reduced total electrical use (including peak demands) at the plant:

- FY 2015 electricity use totaled 8.368 million kWh, which was 4.975 million kWh, or 37% less, than in FY 2012. That savings is almost equivalent to the total amount of electricity used in CY 2014 for our drinking water treatment, finished water pumping and distribution, and wastewater pumping functions combined.
- FY 2015 Duke Energy costs for the WWTP totaled about \$464,000, which was 37% lower than FY 2012 costs (\$741,000) and 33% lower than FY 2014 costs (\$697,000). A portion of that cost savings was due to the lower contract demand charge we now pay to Duke Energy.

In anticipation of these energy efficiencies, the State of North Carolina provided OWASA a 20-year, no-interest Clean Water Revolving Fund Loan in the amount of \$6,560,000 for the aeration system improvements portion of the project.

2. Odor control improvements: The Black and Veatch *2007 Odor Study at the Mason Farm WWTP* determined that OWASA would need to complete three phases of capital improvements to achieve its stated goal of no objectionable offsite odors. The first two phases of improvements were completed by 2009. The third phase recommended by the study ("Phase III") involved the covering of and treatment of the air emanating from certain basins within the activated sludge biological treatment process. (The 2010 Hazen and Sawyer study reestablished the number and location of these basins, as certain operational parameters had changed as a result of OWASA's efforts to increase the efficiency and effectiveness of the plant's biological treatment process.) In 2009, the OWASA Board of Directors passed a resolution committing to the Chapel Hill Town Council that the Phase III odor control improvement work would be completed by December 2014.

Because of the savings that can be achieved from the inherent economies of scale and from avoiding the need to remove the covers installed during the odor control improvement work that would be necessary to make future aeration system improvements, the aeration and odor control improvements were consolidated into a single construction contract. The work under the contract was phased to minimize impacts on the WWTP's operation, so that the aeration system improvement work was completed in a particular basin prior to covering that basin.

PROJECT INFO:

Construction Start:	February 11, 2013
Substantial Completion:	August 22, 2014
Final Completion:	October 7, 2014
Total Project Cost:	\$ 11.6M
Design Engineer:	Brown and Caldwell
Contractor:	Haren Construction3