THE FLOW OF INNOVATION

MEMBER FIRMS' WATER TREATMENT PROJECTS BOOST CAPACITY WHILE DELIVERING ENVIRONMENTAL GAINS

BY STEVE HENDERSHOT

THE WOOTEN COMPANY
THOMAS & HUTTON
WADE TRIM

PHILIP THURSTON/GETTY IMAGES

Two one-million gallon tanks store reserve finished water onsite.

In the finishing stages, calcite contact beds introduce minerals to the water.

These reverse osmosis trains treat brackish water withdrawn from aquifers.

A UTILITY DISTRICT DODGES PFAS BY DIGGING DEEP

Charlie Davis
Director of Marketing and Business Development
The Wooten Company

Bob Walker
Executive Director
H2GO

PROJECT: TAPPING AQUIFERS TO DELIVER CLEAN DRINKING WATER, BRUNSWICK COUNTY, NORTH CAROLINA

FIRM: THE WOOTEN COMPANY RALEIGH, NORTH CAROLINA

The threat to public health posed by per- and polyfluoroalkyl substances (PFAS), a set of compounds known as "forever chemicals," is affecting communities nationwide. But in Northeast Brunswick County, North Carolina, there's a particular urgency because up-stream introduction of PFAS subsequently contaminated the neighboring Cape Fear River.

When the news broke in 2017, it had the makings of a public health crisis—except that local officials were already at work on a project to provide a new source of clean drinking water separate from the river.

Brunswick Regional Water and Sewer H2GO, a self-governing public utility, was working with The Wooten Company on a high-pressure reverse-osmosis system that could extract brackish groundwater from aquifers up to 550 feet below ground. The project was originally conceived with long-term cost savings in mind, but H2GO's leaders also appreciated that the water in the aquifers had been there for hundreds of years and was untainted by contaminants.

"I'd like to say that we were ahead of the curve and saw PFAS coming," says Bob Walker, H2GO's executive director. "But we did know that there were vulnerabilities with the river and that with this approach, we would be protected. So when PFAS came out and everybody started scrambling, we were just kind of sitting back thinking, 'We're good.'"

The Wooten team devised a system capable of providing 6 million gallons of clean drinking water per day, with capacity for future expansion to 8 million gallons per day. It draws water from five sites, each consisting of two nested wells.

At its peak, the system boost-pressurizes the water at 380 pounds per square inch before passing the water through membranes that separate out the brackish salt content. The residual material is also free of contaminants and can be safely discharged into the river.

The system not only benefits the communities H2GO serves but also provides a blueprint for other coastal areas that could use high-pressure reverse osmosis to tap aquifers as a drinking water source. H2GO's system is set to go online in summer 2023.

"It shows that if you can do a project like this successfully, it can support sustainable growth and protect the environment," says Charlie Davis, director of marketing and business development at Wooten. "If treating groundwater can effectively reduce reliance on contaminated surface water, it might open up options for other areas, too."

A SHUTTERED TREATMENT SITE GETS A SECOND CHANCE

Chris Stovall
Environmental Group Leader
Thomas & Hutton

Trent Thompson
Principal and Vice President of Infrastructure
Thomas & Hutton

PROJECT: TRAVIS FIELD WATER RECLAMATION FACILITY
SAVANNAH, GEORGIA

FIRM: THOMAS & HUTTON
SAVANNAH, GEORGIA

In 2011, the city of Savannah moved on from its small Travis Field Water Reclamation Facility in favor of a new, modern, and expandable facility located on a spacious 12-acre plot. Travis Field was mothballed, its flow transferred to the new facility.

But Savannah's population has grown substantially over the last decade, taxing the region's infrastructure—while state and federal environmental regulators have placed limits on the amount of treated wastewater that each facility can release into the Savannah River.

Local leaders proposed the idea of revisiting the Travis Field site, which retained an active National Pollutant Discharge Elimination System permit. Savannah needed to add a lot of capacity, though, and the Travis Field site occupied just three acres.

So Thomas & Hutton devised a solution that used membrane bioreactor (MBR) technology to give the Travis Field facility a second life. The treatment process includes moving effluent through anoxic, aeration, and digestion processes before ultimately filtering it through membrane bioreactors.

The project began with the removal of existing equipment and materials, followed by the construction of the new facility, including the conversion of an existing on-site lift station into the new facility's influent pump station.

MBR technology is effective but expensive. But thanks to project efficiencies and careful selection of an MBR vendor, Kubota, the project ultimately cost about the same as it would have to expand the 12-acre site that had replaced Travis Field.

"It ended up being kind of a slam dunk to be able to do it this way," says Chris Stovall, environmental group leader at Thomas & Hutton.

Still, building the new facility wasn't the project's only challenge. The team also needed to run a new effluent line to the Savannah River, which meant navigating land controlled by the Georgia Air National Guard, multiple freight carriers at the Georgia Ports Authority, and a Chatham County canal, as well as working around several major roads in an area with heavy truck and container traffic.

"There are always little fun things you get to deal with on every project," says Trent Thompson, principal and vice president of infrastructure at Thomas & Hutton. "This one had many of those."

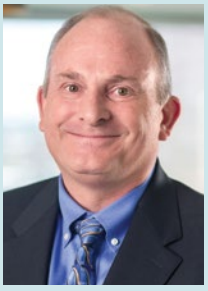
The new Travis Field facility began operations in late 2022.

The revived Travis Field facility uses membrane bioreactor technology to treat wastewater to reclaimed standards.

The VPSA Facility and the city of Miami in the background.

VPSA blowers, silencers, and switching equipment.

VPSA adsorbers, low pressure vessels, and valve skid.



Jeff Lowe
Vice President and Principal Engineer
Wade Trim

PROJECT: ENHANCED OXYGEN CAPACITY, CENTRAL DISTRICT WASTEWATER TREATMENT PLANT VIRGINIA KEY, FLORIDA

FIRM: WADE TRIM CORAL GABLES, FLORIDA

A NOISY UPGRADE GETS THE SILENT TREATMENT

When Florida's Miami-Dade County Water and Sewer Department set out to upgrade the oxygen capacity of its Central District Wastewater Treatment Plant, the department's leaders settled on vacuum pressure swing adsorption (VPSA) as the technology they wanted to deploy.

VPSA works by adsorbing nitrogen, water, and carbon dioxide from the air, then filtering the remaining air molecules to produce richer oxygen. It's an energy-efficient way to accomplish what the department wanted: sustainable capacity to support its high-purity oxygen advanced wastewater treatment process.

The challenge for Wade Trim was integrating the VPSA to work with the county's existing wastewater treatment plant cryogenic system, which is located on Virginia Key, a small island a couple of miles from downtown Miami and nestled between two of the region's toniest residential areas, Key Biscayne and Fisher Island. And quiet operation is seldom listed among the virtues of VPSA.

"It's as loud as a dragster taking off down the drag strip," explains Jeff Lowe, vice president and principal engineer at Wade Trim.

Lowe's team had to reduce the volume level from about 115 decibels down to 85 within 3 feet of the facility's exterior and 58 decibels at 500 feet from the building. They worked with a sound engineer to devise a plan that included adding thick concrete walls, sound absorption material on the intake and exhaust louvers, vibration isolation and sound-attenuating doors and windows, as well as isolating the floor from the rest of the building.

"Sound became a large part of this project to a degree that we hadn't anticipated," Lowe says. "Slowly but surely, we became experts on the topic."

Another engineering victory: Wade Trim worked with the VPSA manufacturer, Caire Inc.'s AirSep division, to modify its product by including a side discharge rather than a top discharge. That change enabled Wade Trim to reduce the height of the building by approximately 10 feet, saving money for the county.

Once the project was completed early last year, Miami-Dade's treatment plant benefited not only from lower operating costs and more dependable oxygen capacity but also from added resiliency. That's because both VPSA units were shielded from sea-level rise and severe weather-related threats and incorporated into the plant's enhanced standby power supply plans.