



## Water Wastewater

**Client**  
Clayton County Water Authority

**Location**  
Atlanta, GA, USA

*"CH2M HILL is a great company to work with in setting our future direction for the Water Authority. We really appreciate the versatility they bring. Anytime we need any kind of expertise, they're able to find the talent and provide us with the right person for the job. And as we look to the future, constructed wetlands are a great opportunity for us. It's a natural treatment system and a great polishing step after we treat the wastewater, making the water available for reuse."*

*Mike Thomas, Clayton County  
Water Authority*

## Constructed Wetlands System

### Project Description

Located south of Atlanta, Georgia, the Clayton County Water Authority (CCWA) has operated the Shoal Creek and Huie Land Application Systems (LAS) since 1982. Recent studies conducted by CH2M HILL, commissioned by CCWA, indicate as the LAS reach permitted capacity, the soils on-site may not adequately sustain the current loading rates and maintain long-term viability of the site. Additionally, increasing flows from continued growth in the metro Atlanta area require that the site treatment capacities be expanded. Expansion of spray irrigation systems onto additional land areas is not an economically viable solution, as soils prevalent throughout the county are limited in their hydraulic capacity. With the rapid growth in the entire metro area, which continues to drive land prices higher, LAS expansion has become impractical even though this natural treatment system technology has a sustained history of serving the needs of CCWA and Clayton County residents.



A Master Plan prepared by CH2MHILL for CCWA in January 2000 recommended the construction of treatment wetlands to meet the needs for expanded capacity at the new wastewater reclamation facilities. The ability of wetland ecosystems to improve water quality naturally has been historically recognized. The use of engineered wetlands has evolved from a research concept to an accepted pollution control technology. Wetlands are effective at decreasing the concentrations of BOD, TSS, nutrients, metals, pathogens, and trace organics.

Ultimately, constructed treatment wetlands were chosen by CCWA due to their ability to treat large volumes of effluent while minimizing land area requirements. For example, the permitted hydraulic loading rate for the Huie spray fields is 2.52 inches/week which equates to approximately 1-mgd of treatment capacity per 100 acres. Based on projected effluent water quality data from the newly constructed W.B. Casey Water Reclamation Facility, treatment wetlands will be able to treat in excess of 1-mgd per 15 acres based on regulatory permitting requirements. Perhaps the greatest challenge of implementing treatment wetlands on this site is reflected in the application for a NPDES permit as the existing land application system does not require a discharge permit

Two separate but related wetland projects described in the Master Plan were then implemented to create the new Panhandle Wetland system at supplement the Shoal Creek LAS and to partially convert the Huie LAS to a wetland system.

### Panhandle Wetlands

The Shoal Creek system includes the 2.1-mgd Shoal Creek WRF, a storage reservoir, a pump station, and the LAS, consisting of approximately 360 acres (including approximately 150 acres of sprayfields) with a permitted capacity of 1.1 mgd. In addition, up to 1.0 mgd can be further treated to an urban reuse landscape irrigation quality and applied on a nearby golf course. The Panhandle Wetlands provide in excess of 3.0 mgd of additional



capacity, and encompass about 55 wetland acres subdivided into 22 separate wetlands, or cells. Flow previously sent to the LAS is now diverted to constructed wetland cells for additional treatment. The reclaimed water from the wetlands is collected and returned to the Shoal Creek Reservoir, eventually flowing to the J.W. Smith Reservoir to augment potable water supply.



Beside the grading, planting and structural installation of 22 separate wetland cells, the construction of the Panhandle Wetlands included a new pump station and force main to convey effluent from the Shoal Creek WRF to the wetlands, an access road, earthwork associated with construction of wetland cells, and a pump station and force main to convey reclaimed water to the Shoal Creek Reservoir. The total project cost was approximately \$6,093,000, which included the construction of the wetlands, transmission pipelines, pump station, and outfall structure. The cost of the wetland construction only was approximately \$4,000,000. This cost is approximately \$72,700 per wetland acre, or \$1.09 per gallon of installed capacity without considering the cost of the pump station. The construction cost for the wetland effluent pump station, transmission pipelines, and the post-aeration structure at the Shoal Creek Reservoir was approximately \$2,093,000. Principal costs for operation and maintenance (O&M) of the wetland alternative are power for pumping, monitoring, and maintenance of the levees (infrequent mowing). The approximate estimated annual O&M cost for this option is about \$0.15 to \$0.30 per 1,000 gallons.

CH2M HILL has assisted the County throughout this ambitious and complex undertaking, from the preparation of environmental compliance documents to final construction plans, specifications and operations and maintenance manuals. This effort included an Environmental Information Document (EID), and its companion document, the Shoal Creek Land Application System (LAS) Design Development Report (DDR), to comply with Georgia Department of Natural Resources (DNR) EPD requirements for planning proposed wastewater treatment projects.

## Huie Wetlands

The Huie LAS site covers approximately 4,000 total acres with about 2,500 acres being irrigated through approximately 18,000 sprinkler heads. The capacity of the Huie site is currently rated for up to 19 mgd. Secondary effluent applied to the site undergoes further treatment within the soil medium as it drains to the Blalock Reservoir. The natural recharge of this reservoir from the existing CCWA facilities is critical, as the Blalock is a major source for drinking water within the county.

A phased implementation plan for the wetlands was carefully developed to optimize the site capacity during wetland construction. During the initial construction phase, a critical planning concern has been the ability of CCWA to maintain a site treatment capacity close the existing condition while taking out areas of land application. This need is met by the optimized sequence of wetland construction. Cell G will remove a total of 123 acres in 2 spray application fields with an initial site capacity loss of 1.2 mgd, but with a gain of 3.6 mgd of wetland capacity after completion of the wetlands for a net in



increase of 2.4 mgd. The net increase in capacity gained from each wetland phase will be utilized for the next phase of construction until site build-out. The ultimate goal is to provide a combined treatment capacity of 24 mgd using the newly constructed wetland treatment systems (15 mgd) and the remaining forested land application spray fields (9 mgd).

CH2MHILL is currently providing design and services during construction for Phases 1 through 4 of the implementation of the Huie Wetlands.