Project Name
Stockton State Park
Cedar County, Missouri

System Specifications
6300 GPD Low Pressure Pipe and recirculating pea gravel filter system

Infiltrator Products Used
9000 linear feet of EZflow by Infiltrator

Installation Date
Summer 2013

Engineer
White River Engineering
Springfield, Missouri

Distributor
Stewart Concrete
Halfway, Missouri

Owner
Missouri Division of State Parks

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Low Pressure Pipe (LPP) System Using EZ*flow*® by Infiltrator Handles Large Flows for Long Term Performance

Stockton State Park in Cedar County, Missouri is a popular recreation and boating area that attracts thousands of visitors each year. Extensive guest facilities include campsites, cabins and duplexes, restroom/shower houses, and a 300-slip marina with a 22-seat snack bar, and watercraft pump-out station. A recreational vehicle (RV) dump station is also provided.

The existing wastewater treatment system was more than 15 years old and consisted of a single-cell lagoon and slow rate land application system. There was also an inactive, dried up lagoon on the site. Total design capacity was less than 150 persons, well below existing or future needs. The discovery of karst activity near the existing site caused the Division of State Parks to initiate efforts to construct new wastewater treatment facilities and properly close the existing active and inactive lagoons.

Challenges
Design wastewater flows at an average of 6300 GPD with peak daily flows near 12,000 GPD, seasonal operations, karst activity at the site, and stringent effluent limitations imposed by the Missouri Department of Natural Resources (MDNR) Division of Environmental Quality (DEQ) prior to subsurface discharge limited design options.

System Details
The initial design by White River Engineering included a new facultative lagoon and land application system at the site, however, a sinkhole opened in the bottom of the new lagoon during construction and the MDNR halted the lagoon completion. The revised design includes a recirculating pea gravel filter system preceded by a septic tank to achieve denitrification followed by ultraviolet light disinfection and subsurface disposal of the treated effluent via a Low Pressure Pipe (LPP) system. The LPP system includes 9,000 linear feet of EZflow by Infiltrator (1201 LPP-GEO) expanded polystyrene (EPS) geosynthetic aggregate bundles. The recirculating pea gravel filter system and LPP subsurface dispersion system were selected based on their ability to achieve a very high degree of treatment to protect shallow ground water, and avoid a surface discharge of treated wastewater effluent directly into the Stockton Lake.

Because of the large size of the LPP system each field be divided into multiple zones to minimize dosing pump size with distribution laterals within each field divided into 6 equally sized zones dosed sequentially. The EZflow geosynthetic aggregate bundles are used in lieu of gravel. The LPP system dosing pump control system incorporates a repeat cycle timer with high and low level overrides to control pump cycles. The EZflow bundles were selected for ease of installation, labor cost savings, and to minimize construction traffic on the fields. Because preservative chemicals (Formaldehyde) contained in RV waste are toxic to microorganisms that carry out wastewater treatment, a pre-treatment system for the RV Dump Station including an aerobic treatment unit (ATU) preceded by a 1500 gallon settling (trash) tank was installed.

Result
The new $800,000 treatment system was placed in continuous operation in July 2013 and provides a reliable and environmentally friendly wastewater treatment method.