



## KANSAS CITY WATER

### PROJECT-AT-A-GLANCE

FlexRake<sup>®</sup> bar screen replaces grinder, drastically improves operational reliability of downstream equipment and discharge clarity by removing solids

SITE: *Todd Creek Wastewater Treatment Plant*  
EQUIPMENT: *One (1) Duperon<sup>®</sup> FlexRake<sup>®</sup> FPFS-F*  
INSTALLED: *March 2020*

## GETTING RID OF RAGS

Kansas City is a dynamic metropolis on the banks of the Missouri River, home to nearly half a million residents—and a constant stream of visitors coming to enjoy the world-class barbecue and music scene. All that activity puts steady pressure on the city's water and wastewater infrastructure. KC Water is the utility charged with meeting those needs.

Like other U.S. cities, KC Water is in the process of implementing a 25-year, federally mandated Overflow Control Program (OCP). The program, called Smart Sewer, has received national attention for being among the first to incorporate significant green solutions. This multi-billion-dollar initiative includes extensive sewer rehabilitation and “green infrastructure” projects, all aimed at reducing sewer overflows during periods of heavy rain or snow melt.

As part of its comprehensive approach to preventing overflows, enhancing water quality and service reliability, KC Water is also investing in capital improvement projects. This case study details how one system upgrade greatly impacted wastewater treatment compliance and efficiency, simply by effectively removing debris at the headworks before it could impact downstream plant operations.

“Our pumps don't get clogged with rags any more. I never realized how many rags came through the plant we had until we started using the FlexRake.”

## APPLICATION

KC Water's wastewater collection and treatment system serves more than 166,000 customers across a 320-square-mile area within and beyond the city limits. The utility is responsible for six wastewater treatment plants, 40 wastewater pump stations and 2,800 miles of sewer mains for a combined rated treatment capacity of 150 million gallons per day (MGD). All wastewater transported to KC Water

receives secondary treatment to remove residual organics and suspended solids in compliance with federal and state environmental regulations.

Built in 1968, The Todd Creek Wastewater Treatment Plant is designed to handle an average flow of three million gallons per day (MGD) with a peak capacity of 5.5 MGD. Substantially renovated and expanded in 1990, the activated sludge process plant features an influent pump station, holding cells for primary sedimentation, concentric aeration basins, clarifiers and a UV facility that disinfects treated effluent before it is discharged into the adjacent Todd Creek, a tributary of the Little Platte River. The plant services more than 7,500 customers in the Northwest region of the city, including Kansas City International Airport, which served nearly 11.8 million travelers in 2019.

## THE PROBLEM

The plant was experiencing high levels of debris in the influent - including flushable wipes, rags, female hygiene products, plastic bottles, cigarette butts, scrap wood and even clothing items generated by travelers at the airport. When the facility was built in 1968 it was equipped with a comminutor, which was replaced with a new grinder during the 1990 upgrade of the plant. Rather than remove debris, the channel grinder was designed to shred it into small pieces and keep it in the waste stream. This strategy proved inadequate in several ways.

**“The grinder was ineffective. Why grind the plastic and other debris and put it back in the influent? It gets caught on pumps, on bubblers, on the UV bulbs.”**

The shredded debris would reconstitute downstream, creating basketball-sized clumps that caused considerable maintenance throughout the plant. This debris would get caught on pumps, on bubblers, and on the UV bulbs, and clog pumps. “The grinder was ineffective,” says KC Water Division Engineer Shaun O’Kelley. “Why grind the plastic and other debris and put it back in the influent? It gets caught on pumps, on bubblers, on the UV bulbs.” Manual removal of ground up debris in downstream equipment accounted for at least an hour of staffs’ time and two to four buckets of trash daily.

In addition, the grinder routinely became clogged or shut down due to a low hydraulic fluid level, often multiple times a week. This downtime created a backup of influent, disrupting plant operation. Technicians had to be dispatched to the plant to clear the grinder and perform maintenance on the unit.

Another problem emerged when rain and snow melt raised the level of influent at the headworks. The grinder was located down in the channel, which was only four feet deep. Yet during rain events, the water level would rise well above this, allowing debris to bypass the grinder completely. Again, this required manual removal by staff.

“When it rained, the water level could be 18 feet high. You could put a Volkswagen past the grinder,” O’Kelley says.

In addition to impacting plant operations and consuming valuable staff time, these debris infiltrations threatened the plant's compliance for levels of total dissolved solids (TDS), the dissolved inorganic and organic substances; total suspended solids (TSS), a measure of inorganic and organic substances that are not dissolved; and biochemical oxygen demand (BOD), a key measure of biodegradable material in the treated effluent.



## SCREENING FOR A SOLUTION

Recognizing the need for a more effective solution for removing debris, KC Water engineers believed a wastewater bar screen would provide the answer. But which one?

Plant engineers looked at bar screen products from two leading vendors. Following an in-depth review of the designs, features, and field history of the systems, they selected the Duperon® FlexRake® automated bar screen.

A key advantage of the FlexRake is its unique design featuring Duperon's proven FlexLink™ design—the toughest link system in the industry, rated at 60,000 pounds—and Jam Evasion Technology™. When it encounters large debris, the lower portion of the FlexRake can pivot out to accommodate the object and transfer it up the screen, without causing a jam or requiring operator intervention. By contrast, the competing unit featured a fixed lower sprocket, reversing the cleaning motion in an attempt to clear the object. This could interrupt operations or require manual debris removal if the jam is not successfully removed.

KC Water has installed FlexRake screens at two other facilities previously. This experience, together with FlexRake's more than 25-year application history, installed base of nearly 2,000 units, and the expertise and responsiveness of the Duperon engineering team were key factors in their decision to install one at Todd Creek.

## TAILORING THE BAR SCREEN

The FlexRake can be customized to fit a variety of site configurations. To accommodate the high water events at the Todd Creek plant, the Duperon team designed a vertical FlexRake unit measuring 5.5 feet wide by 34 feet high. To further safeguard against overflows, plant management installed a bypass/manual screen with ¼" openings. Engineering at the site was performed by Brown & Root Industrial Services, LLC of Kansas City.

The FlexRake currently deposits debris into a wheeled dumpster that is emptied approximately twice a week. The plant is installing a shaftless screw conveyor to further automate debris management.

## A HAPPY PLANT STAFF

Since the FlexRake went operational in July 2020, the staff report significant improvements in operational efficiency. The unit is highly effective at removing the rags and other debris that formerly caused so many problems, dramatically improving downstream operation.

Plant operators estimate that the FlexRake removes 90% of all incoming debris, eliminating the problem of rags, plastic and other items clogging pumps or passing into the clarifier. Daily maintenance of draft tubes has been reduced about 65% and the UV disinfection bulbs require far less cleaning. Overall, plant operators report debris-related maintenance has been substantially reduced since the FlexRake was installed.

“Now we’re actually able to remove the trash from the plant, rather than just grinding it as we did before. We are now getting 99 percent of the trash, including things like cigarette butts and soda straws,” O’Kelley says. “That’s made a big difference.”

Both the FlexRake and the company behind it have proven reliable. Soon after installation, there was an issue with a motor bearing. Duperon responded quickly, replacing the component and getting the FlexRake back on line with minimal disruption. The FlexRake operates 24x7 and plant operators report flawless operation—it just runs.

“I’ve worked with a lot of equipment companies but nobody stands behind their products better than Duperon. They are the best, hands down,” O’Kelley says.

## FROM GOLD TO PLATINUM STANDARD

The Todd Creek plant has a good history of compliance with water quality requirements for its discharge. Since deploying the FlexRake, this has only improved—taking the plant from its typical Silver or Gold rating to the highest Platinum rating.

All critical quality measures have now been reduced to “non-detect” levels:

- Total dissolved solids (TDS)
- Total suspended solids (TSS)
- Biochemical oxygen demand (BOD)

This is a significant result, as the plant’s discharge permit allows daily amounts of TDS of up to 5.3 mg/L (April 1 to September 30) and 12.1 mg/L (October 1 to March 31).

“The FlexRake really helps with our clarifier and our compliance,” says Plant Operator Margaret Wilson. “We have two other Platinum plants and we could never compete with them until we got the FlexRake.”

## ABOUT DUPERON

*Duperon Corporation is the leader in innovative preliminary liquid/solids separation systems. For more than 35 years, Duperon has provided simple yet innovative solutions for a variety of screening and solids handling applications in the water and wastewater industry. Duperon technologies are designed and manufactured in Saginaw, Michigan.*

