Decentralized Wastewater Treatment Applications in Action

By Dennis F. Hallahan, P.E., Technical Director, Infiltrator Water Technologies

As seen in Water Quality Products, May 2020 issue- *https://www.wqpmag.com/small-systems/decentralized-treatment-action*

University of Wyoming AMK Ranch Research Center, adjacent to Grand Teton National Park's Jenny Lake, needed a treatment solution that could comply with federal wastewater regulations for national parks.

Where centralized sewering is not practical or desirable, the numerous new approaches to decentralized wastewater treatment offer communities, owners, and developers a way to move forward without waiting for sewer extensions to reach their site or the treatment plant to be expanded.

In the decentralized approach groundwater is extracted, utilized, and treated onsite; then it is returned close to its point of origin to recharge the aquifer. From small residential systems to large scale facilities or community discharges of more than 1 million gallons per day, these natural approaches provide suitable long-term treatment solutions, better development practices, and can be more cost-effective than centralized systems. Due to the compactness of the model there is also less energy consumption.

The technologies available for large-scale decentralized systems are now available for small-scale systems as well. This is a real boost to rural and growing communities that need wastewater solutions. Because of these advances on the treatment and disposal side, decentralized systems are no longer limited to small flow systems and those in remote locations. Today there are several decentralized facilities operating at a capacity of over 4 million liters per day.

Every situation is unique and wastewater volumes, treatment needs, design challenges, and local regulations vary greatly. When communities choose a sustainable development and wastewater treatment path, they base the choice on factors including community planning, anticipated growth, economics, and environmental sensitivity.

AMK Ranch selected a 6,500-gallon per day combined treatment and dispersal advanced enviro-septic (AES) treatment system with 3,120 linear feet of AES pipe.

University of Wyoming AMK Ranch Research Center

An upgrade of the existing, inadequate potable water and onsite sanitary sewer system was needed to serve the existing lodge, houses and cabins at the University of Wyoming's AMK Ranch Research Center. The center is adjacent to Jackson Lake in Grand Teton National Park and is owned by the U.S. National Park Service's Grand Teton National Park. A new wastewater treatment system had to comply with all federal wastewater regulations for national parks.

The adjacency to Jackson Lake posed additional challenges in selecting and designing the best system to preserve the pristine environment. Additionally, construction of the new system could only begin once the AMK Ranch was closed for the season, and it needed to be completely operational for the 2020 season. A solution with a small footprint was desirable to minimize impact and disturbance of the pristine area. Any solution also had to be compatible with the extreme cold and frost depths prevalent in area winters.

A 6,500-gallon per day (gpd) combined treatment and dispersal advanced enviro-septic (AES) treatment system with 3,120 linear feet of AES pipe was selected because it removes up to 99% of wastewater contaminants without using any electricity or replacement media. The passive AES system has smaller footprint than conventional systems, offering minimal disturbance during installation. The depth of allowable cover over the system was also a contributing factor in the selection of the AES system, given the extreme winter conditions.

Yogi Bear's Jellystone Park in Waller, Texas needed a wastewater treatment solution to handle a daily flow of 30,000. A Delta package treatment plant was selected.

Package Treatment Plant Enables Expansion and Reduces Maintenance at Texas RV Park

Yogi Bear's Jellystone Park in Waller, Texas is a popular full-service campground and recreation center featuring cabins, tent sites, RV camping, swimming pools and a lazy river, and two food service venues. The park's existing sewage treatment system was at capacity, restricting park service expansion and requiring costly and time consuming maintenance. Engineers were charged with designing a new system to handle the wastewater flow of 30,000 gallons per day (GPD) from all park facilities. The design

selected needed to meet all Texas Commission of Environmental Quality standards, including the requirement for a mechanical clarifier.

System designers chose a Delta Package Treatment Plant that includes A36 steel coated with epoxy. The tanks were prepared using steel chard/grit to a near white metal condition. This coating system provides optimum service life due to the superior adhesion of the epoxy coating to the base metal. The package plant sits on an engineered, reinforced concrete structural slab. The duplicative plant features dual aeration basins, sludge holding tanks, blowers and pumps, and a single 10-foot diameter mechanical clarifier with skimmers and a clarifier bridge. A separate pump tank was also incorporated into the design.

The Jellystone Park package plant processes wastewater via an extended aeration and oxidation process that purifies the sewage using naturally-occurring bacteria to destroy the organic compounds.

The Jellystone Park package plant processes wastewater via an extended aeration and oxidation process that purifies the sewage using naturally-occurring bacteria to destroy the organic compounds.
Continued mixing with air feeds the biological organisms, which consume the volatile materials and convert them into water, carbon dioxide, and ash. The result is a clear and odor-free effluent.

Conclusion

Finding cost effective and sustainable solutions for wastewater infrastructure challenges is a balancing act for rural and growing communities. When community leaders and residents define the challenges and future needs, they make the best wastewater treatment choice for that situation. In most cases, the decentralized approach is cost effective and offers communities exceptional performance, design and installation versatility, and longevity.

About the Author
Dennis F. Hallahan, PE
dhallahan@infiltratorwater.com
Dennis Hallahan has more than 30 years of experience with onsite wastewater treatment systems' design and construction. Currently Technical Director at Infiltrator Water Technologies, he is responsible for technology transfer between Infiltrator and the regulatory and design communities and consults on product research and testing for universities and private consultants. Hallahan received his MS in civil engineering from the University of Connecticut and his BS in civil engineering from the University of Vermont. He is a registered professional engineer in Connecticut and holds several patents for on-site wastewater products.