



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

SUCCESS STORIES

PLANT NAME AND LOCATION

WOLCOTT WASTEWATER TREATMENT PLANT - KANSAS CITY, KS

DESIGN DAILY FLOW/PEAK FLOW

2.0 MGD (7,570 m³/day) / 6.0 MGD (22,710 m³/day)

AQUA-AEROBIC SOLUTION

AquaNereda[®] Aerobic Granular Sludge Technology + AquaDisk[®] Cloth Media Filtration

AquaNereda[®] Provides The Lowest Total Cost of Ownership for 10x Capacity Increase and Nutrient Removal Limits

Wyandotte County in northeastern Kansas is predominantly made up of the bustling town of Kansas City. As such, the County shares the Unified Government (UG) with Kansas City, Kansas in overseeing wastewater treatment for over 170,000 residents. As the western edge of the County began to expand in the early 2000s, a small, pre-owned package plant was purchased for the Wolcott neighborhood to serve residents in this growing area.

The 200,000 gpd package plant proved suitable for about a decade until population trends continued to demand more capacity. The plant's location in a floodplain also made maintaining operation during heavy rainfall challenging. Flooding of the Missouri River in 2019 not only caused electrical problems but also access issues. A new plant would need to provide a 10x capacity increase and nutrient removal capabilities but also offer a compact footprint as the site would need to be raised out of the floodplain.



Original package plant during a flood event at Wolcott WWTP

The UG partnered with HDR and pursued a Construction Manager at Risk (CMAR) delivery method with Garney Construction for greater flexibility, cost transparency, and accelerated delivery. A number of treatment technologies were evaluated including conventional activated sludge (CAS), fixed-film, and SBR options. The technologies were compared against the UG's goals for a compact footprint, increased capacity, future permit requirements, and a low cost of ownership.



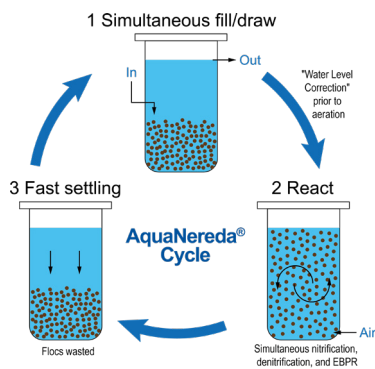
AquaNereda[®] system at Wolcott WWTP

The evaluation showed the AquaNereda technology offering both the lowest capital and operating costs. It required the smallest footprint which contributed to a significant reduction in construction costs as the amount of fill needed to raise the plant's elevation was minimized. Such a significant upgrade also allowed the UG to take some pump stations offline reducing long-term operational costs.

AquaNereda® SYSTEM PROCESS

Aerobic granular sludge is a microbial biomass that has grown into a granular shape as opposed to the flocculent nature of CAS. The granules are forced to develop through hydraulic and biological selection mechanisms. A granule must have a diameter of at least 200 µm to achieve a dissolved oxygen gradient through the particle. This enables each granule to achieve simultaneous nitrification/ denitrification with strong biological phosphorus removal capabilities.

The AquaNereda technology is a batch process that operates on optimized cycles with three distinct phases: 1) a simultaneous fill/draw phase under anaerobic conditions to initiate phosphorus release; 2) the react phase in which reduction of organics, nitrogen, and phosphorus occurs; and 3) solids separation which consists of rapid settling and sludge wasting to preferentially select for fast-settling sludge.



AquaNereda® SYSTEM ADVANTAGES at WOLCOTT

The AquaNereda system offered the UG many advantages:

- Compact footprint resulting in significant capital cost savings and more efficient layout for operators
- Ease of operation with fully automated controls
- Operations flexibility to target a variable effluent ammonia limit between 0.6 to 2.1 mg/l
- Less mechanical equipment reduces required maintenance
- Elimination of chemical use for biological nutrient removal
- Significant reduction in polymer use for waste sludge thickening

AVERAGE OPERATING DATA (2023)

Loading	Design Influent	Avg Influent	Permit Effluent	Avg Effluent*
Avg Flow mgd	2.0	1.0	--	--
Max Flow mgd	6.0	3.0	--	--
BOD ₅ mg/l	275	127	30	6.1
TSS mg/l	275	171	30	3.3
TKN mg/l	45	31	monitor	6.2 (TN)
NH ₄ mg/l	--	--	0.6-2.1	0.7
TP mg/l	7	4.7	monitor	1.3 [†]

*Following tertiary filtration [†]without chemical addition

DESIGN & OPERATION

The AquaNereda system at the Wolcott WWTP consists of three aerobic granular sludge reactors. The system operates under continuous flow as the fill/draw phase alternates sequentially between reactors. AquaDisk® Pile Cloth Media Filters are located downstream followed by ultraviolet disinfection. Waste sludge is thickened then hauled off to a nearby plant for further solids handling.

The UG seeded their AquaNereda reactors with CAS from one of their nearby plants in January 2022. Effluent compliance was achieved with one week of startup, including superb nutrient removal results. The site saw a significant improvement in sludge settleability with granules developing in less than a month.



Granules at Wolcott WWTP

CUSTOMER SATISFACTION

"We saw this process, and it was very intriguing. It's state-of-the-art, it's cutting edge, and we wanted to bring that to the UG... Performance-wise, the plant is doing exactly what it's supposed to."
- Rick Bird, Wastewater/Collection Manager – UG of WYCO/KCK