AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company

SUCCESS STORIES

PLANT NAME AND LOCATION
WHITEFISH WASTEWATER TREATMENT PLANT - WHITEFISH, MONTANA

DESIGN DAILY FLOW/PEAK FLOW
2.07 MGD (7,836 m³/day) / 6.06 MGD (22,948 m³/day)

AQUA-AEROBIC SOLUTION
AQUANEREDA® AEROBIC GRANULAR SLUDGE TECHNOLOGY

AquaNereda® Aerobic Granular Sludge Technology Offers Exceptional Water Quality for the Growing Community of Whitefish, Montana

Located in the Flathead Valley of Northwest Montana, the City of Whitefish has experienced significant growth in recent years. Its location near ski resorts and Glacier National Park offers an abundance of recreational activities making the area desirable for both tourists and year-round living. This increase in permanent and transient populations put an even greater strain on the WWTP's lagoon system that had already exceeded its design life. In an effort to meet current and future growth needs, the City of Whitefish embarked on the search for a new treatment process that would not only increase hydraulic capacity but also meet stricter nutrient standards imposed by Montana's Department of Environmental Quality.

Working with an outside design team, the city evaluated various technologies including conventional activated sludge, expanded lagoon treatment, and aerobic granular sludge. They prioritized a treatment solution that checked all the boxes on their wishlist – from water quality and cost considerations to footprint savings and environmental impact. The City of Whitefish selected the AquaNereda® Aerobic Granular Sludge Technology to meet those requirements and serve the community.

Treating a large volume of water in a smaller footprint was critical for this plant due to poor bearing capacity of the soil. AquaNereda technology allowed for a compact footprint that mitigated the investment needed for ground improvement, while also offering long-term savings with higher energy efficiency and reduced chemical consumption.

Aqua-Aerobic Systems, Inc. is the exclusive North American provider of Nereda® technology developed by Haskoning.

The AquaNereda system in Whitefish is now one of many that are currently operational or under construction in North America. Since going online in 2021, the results have exceeded expectations in process flexibility, effluent quality, and overall plant efficiency.

AquaNereda® system in operation at Whitefish WWTP - Whitefish, MT

Looking towards the future, the AquaNereda system will have a positive impact on the City of Whitefish from a social, environmental, and economic standpoint. In recognition, the project received the 2025 Engineering Excellence Waste and Storm Water Honor Award from the American Council of Engineering Companies of Montana. This award underscores the value this project will provide to other municipalities as they assess their own wastewater treatment needs.

"*AquaNereda® was selected because it is a lower energy process and smaller footprint. I believe it allows a better use of public lands for more efficiency*" - Dana Smith, City Manager, City of Whitefish, Montana

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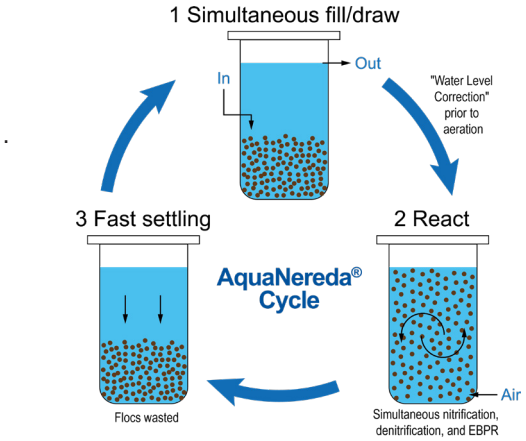
AquaNereda® SYSTEM PROCESS

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.

Aerobic granular sludge is a microbial biomass that grows into a granular shape as opposed to the flocculent nature of CAS due to the inherent nature of the technology's operation: the granules are forced to develop through hydraulic and biological selection mechanisms. Aerobic granules range in size from 200µm to 4mm in diameter allowing for a dissolved oxygen gradient to develop. This enables each granule to achieve simultaneous nitrification/ denitrification with strong biological phosphorus removal capabilities. The granule sizes also allow for a rapid settle phase of only 15 minutes.



DESIGN CHARACTERISTICS

The AquaNereda system at the Whitefish WWTP consists of three aerobic granular sludge reactors. The system operates under continuous flow (no pre-equalization required) as the fill/ draw phase alternates sequentially between reactors. Upstream processes include fine screening and grit removal; downstream treatment consists of UV disinfection before discharge to the Whitefish River.

The light floc that is selectively wasted from a reactor is pre-thickened in a small gravity thickener prior to being sent to the existing aerated lagoons. Drying beds complete the plant's solids treatment prior to hauling. Return streams are collected from the pre-thickening tanks, lagoon, and drying beds and recycled back to the headworks.

AVERAGE OPERATING DATA (2024-2026)

Loading	Design Influent	Avg Influent	Design Effluent	Avg Effluent
Avg. Flow (mgd)	2.07	1.20	--	--
Max Flow (mgd)	6.06	3.14	--	--
(c)BOD_5, mg/L	258	217	30	7
TSS mg/L	205	133	30	6
TKN, mg/L	32	41.1	10.5^S 14.5^W (TN)*	8.4 (TN)
NH_4-N mg/L	--	--	9.6	4.0
TP mg/L	4.6	4.4	1.0	0.47

*Permit is based on mass load; concentration calculated at average flow.

The AquaNereda technology was highly appealing as an innovative approach to secondary treatment for a number of reasons – The innate biological nutrient removal capabilities provided by the layered microbial community of the granules enable the plant to meet nutrient limit, and the excellent settling properties of aerobic granular sludge allows for high operational MLSS concentrations in excess of 8,000 mg/L resulting in a significantly smaller footprint requirement.

AquaNereda® ADVANTAGES AT WHITEFISH WWTP

The AquaNereda system offered the city and plant staff the following advantages:

- **Smaller footprint:** Resulted in lower concrete and construction costs
- **Reduced energy consumption:** Compared to conventional processes, AquaNereda saves the City of Whitefish 570,000 kWh, or about $30,000, annually
- **Process flexibility:** Robust granular sludge helps to handle variation in process flow and nutrient loads
- **Cold weather treatment:** AquaNereda technology is able to reliably meet total nitrogen limits at a minimum influent waste temperature of 8° C at this site

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