



City of Whitefish

Department of Public Works

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Whitefish, MT 59937

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November 28, 2018

Mayor Muhlfeld and City Councilors
City of Whitefish
Whitefish, Montana

Mayor Muhlfeld and Councilors

Award of Wastewater Treatment Plant Equipment to Aqua Aerobic Systems, Inc.

Introduction/History

The City was issued an Administrative Order of Consent (AOC) by the Montana Department of Environmental Quality (DEQ) on October 5, 2012. The AOC currently includes a Compliance Plan detailing the completion dates that must be met in order to bring the WWTP into compliance with updated requirements for removal of ammonia, nitrogen and phosphorous in the city's updated wastewater discharge permit. As part of the AOC, the Whitefish City Council approved a Preliminary Engineering Report (PER) in 2016 recommending that a mechanical wastewater treatment facility be designed and constructed in the location of the city's existing wastewater lagoons.

Current Report

The type of wastewater treatment plant selected for construction in the Whitefish wastewater system planning process is called a Sequencing Batch Reactor (SBR) which is a type of activated sludge plant where multiple unit processes are contained within the same concrete basin, saving space and cost. Primarily through advanced control systems, the SBR has evolved in the last several years into a treatment process that is capable of a high degree of treatment including nutrient removal. Several systems have been built or are under design throughout Montana for communities wishing to take advantage of these benefits. Generally when selecting a SBR



system, an engineer will bid the equipment initially and design the treatment plant around a specific type of equipment, allowing for a better and more cost-effective design.

The equipment was first bid on August 15, 2018 with 6 different bids received from four vendors. Upon review, three of the four vendors made significant errors in their bids and with the guidance of the City attorney it was decided to reject this first round of bids to ensure that we had good competition and an acceptable range of equipment types from which to choose from. The second round of bids was opened on September 12, 2018 and we received seven different bids from five vendors. All bids were properly-completed and we had a good variety of equipment options to choose from. The bid selection process considered several factors for evaluating the bids including capital cost, operational cost, concrete and foundation cost, experience, warranty, references and ongoing support. The bids were scored and two vendors, presenting three different equipment types were selected for interviews which were held on October 5, 2018. Immediately after the interviews the bid proposals were reviewed and a vendor tentatively selected.

After consideration of all the pertinent factors, the scoring of proposals was extremely close for two types of treatment processes - the Sanitaire SBR process and the Aqua-Aerobic AquaNereda (Nereda®) system. The bid for the Sanitaire system was \$1.098 million with several potential adders, whereas the Aqua-Aerobic bid was for \$2.366 million, with no desired additions. While the Nereda® equipment bid cost is obviously significantly greater, this system requires much smaller basins, and a significant reduction in overall footprint. Consequently, after factoring in concrete and foundation expense, the Nereda® system ultimately was the least expensive overall option. Additionally, the operating costs for the Nereda® system were projected to be much less than the Sanitaire system. Ultimately, the Nereda® system was estimated to be \$1.298 million less in capital costs when considering concrete and foundation cost differences, and the Net Present Worth cost, which factors both operation and capital costs into the calculation, were estimated to be \$1.682 million less for the Nereda® system. Operational savings are primarily due to lower energy requirements.

While the cost differences definitely support the selection of the Aqua system, the process that this company is proposing is new to the US and utilizes a type of activated sludge process that has recently evolved as a viable treatment technology. A public-private research partnership in the Netherlands between led to the development of the first technology applying "Aerobic Granular Sludge, or AGS. Currently, over 30 full-scale Nereda® plants are operational or under design and construction across five continents, of which the oldest are more than 10 years in operation. As of September 2016, Aqua Aerobic Systems, Inc. became the exclusive licensee of the technology in the United States. The process is proprietary and Aqua Aerobic has gone to great lengths to develop agreements that we, our consultant and the installation contractor must sign to protect the confidential information associated with this technology. Since the proposal interviews, we have spent considerable time further researching this technology and developing the working agreements with the vendor to insure that the city is adequately protected with



sound warranties and process performance guarantees. We have been favorably impressed with the company that stands behind this process and we are excited to move forward with this new technology.

In wastewater treatment systems, most of the typical treatment processes function by converting the dissolved and particular organic matter in the raw wastewater into a more stable microbial biomass, which is settled out and removed to produce clean effluent that is suitable for discharge. The microbial mass, called “activated sludge” in certain processes, is just slightly denser than water and settling can be difficult. In the Nereda® process, specific environmental conditions are established which cause these microbial biomasses to become relatively large, described as Aerobic Granular Sludge (AGS), which has excellent settling properties. Within a single tank, the process creates proper conditions to develop and reliably maintain AGS which allows for unprecedented reduction in ammonia, total nitrogen, and phosphorus – the primary constituents in the city’s wastewater discharge permit. The photo below, provided by the vendor, shows typical activated sludge on the right compared to AGS on the left after a five-minute settling time.



In more practical terms, this technology will allow us to build smaller basins which are roughly half the size of more traditional SBR basins, allowing for construction savings, reduced energy consumption, and more effective use of the land at the treatment plant site.



Financial Requirement

The estimated capital costs for the wastewater treatment plant upgrade project is \$18.4M. This includes construction, engineering, administration and a 15% contingency. As discussed previously, after factoring in concrete and foundation expense, as well as energy and overall operating costs, the Nereda® system is estimated to be \$1.298 million lower in capital expenses, and \$1.682 million lower in overall net present worth.

Recommendation

After several discussions with Aqua, we believe that this company is a quality organization that will stand behind this equipment. Additionally, our conversations with several references that operate AGS treatment plants further supports the effectiveness of this relatively new technology in its capability to accomplish a high degree of treatment in a much smaller package. Aqua has also met with the Montana Department of Environmental Quality to present this technology. DEQ has contacted us regarding this meeting and indicated their general support of this new process. Consequently, we believe that this system is a good fit for the City of Whitefish

Based on these factors, it is the recommendation of the Public Works Department that Council award the Wastewater Treatment Plant Improvements Project Equipment Procurement to Aqua-Aerobic Systems, Inc. in the amount of \$2,365,911.

Sincerely,

A handwritten signature in black ink, appearing to read "Craig Workman".

Craig Workman, P.E.
Director of Public Works

**SECTION 00510
NOTICE OF AWARD**

To: Aqua-Aerobic Systems, Inc.
Address: 6306 N. Alpine Rd. Loves Park, IL 61111-7655
Contract: City of Whitefish
Project: Wastewater Treatment Plant Improvements Project – Equipment Procurement

You are notified that your Bid and Completed Proposal received September 12, 2018 for the above Contract has been considered. Your bid cost and proposal for equipment and special services, with documentation, has been found to be in the best interest of the City and are being provided Notice of Award for a Contract for the provision of wastewater equipment and special services for the Wastewater Treatment Plant Improvements Project.

The Contract Price of your Contract is: **two million three hundred sixty five thousand nine hundred eleven and ^{no}/₁₀₀ dollars (\$2,365,911⁰⁰).**

You must comply with the following conditions precedent **within 14 days** of the date you receive this Notice of Award.

1. Deliver to the OWNER 2 copies of the fully executed counterparts of the Contract Documents.
2. Deliver required certificates of insurance, as described in the contract documents.
3. Deliver Bond Documents.

Failure to comply with these conditions within the time specified will entitle OWNER to consider your Cost Quotation in default, to annul this Notice of Award.

Within ten days after you comply with the above conditions, OWNER will return to you one fully executed counterpart of the Contract Documents.

DATED this 3rd day of December, 2018.

CITY OF WHITEFISH

BY: _____

TITLE: _____

ACCEPTANCE OF NOTICE

Receipt of the above Notice of Award is hereby acknowledged this ____ day of December, 2018.

Aqua-Aerobic Systems, Inc.
Equipment Seller

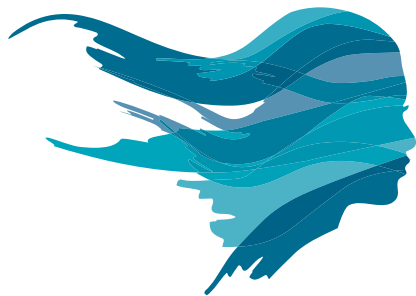
BY: _____
Title

Copy to ENGINEER

END OF SECTION 00510



AQUA-AEROBIC SYSTEMS, INC.
A Metawater Company



AquaNereda®

AquaNereda®

Aerobic Granular Sludge Technology

The AquaNereda® Aerobic Granular Sludge Technology is an innovative biological wastewater treatment system that provides advanced treatment using the unique features of aerobic granular biomass.

An aerobic granular biomass is comprised of compact granules, which are a layered microbial community that provides superb settling properties. Within a single tank, the process creates proper conditions to develop and reliably maintain a stable granule, without a supplemental carrier. The layered aerobic and anaerobic zones within the granule allow for simultaneous processes to take place in the granular biomass, including enhanced biological phosphorus reduction, and simultaneous nitrification and denitrification.

The unique process features of AquaNereda technology translate into a flexible and compact process that offers energy efficiency and significantly lower chemical consumption.

System Features and Advantages

- Optimal biological treatment is accomplished in one effective aeration step
- Settling properties at SVI values of 30-50 mL/g allow MLSS concentrations of 8,000 mg/l or greater
- Four times less space required compared to conventional activated sludge systems
- Energy savings up to 50% compared to activated sludge processes
- No secondary clarifiers, selectors, separate compartments, or return sludge pumping stations
- Proven enhanced nutrient removal (ENR)
- Robust structure of granule withstands fluctuations in chemical spikes, load, salt, pH and toxic shocks
- Significant reduction of chemicals for nutrient removal due to the layered structure and biopolymer backbone of the granule
- Ease of operation with fully automated controls
- Lowest life-cycle cost



SVI_s comparison of aerobic granular sludge (left) and conventional activated sludge (right)

Typical Applications

- Retrofit of existing tanks, increasing treatment capacity
- Upgrade of existing treatment systems to meet BNR requirements
- New construction plants
- Municipal and industrial



Three AquaNereda® reactors show compact design, typically 50% of a conventional plant.

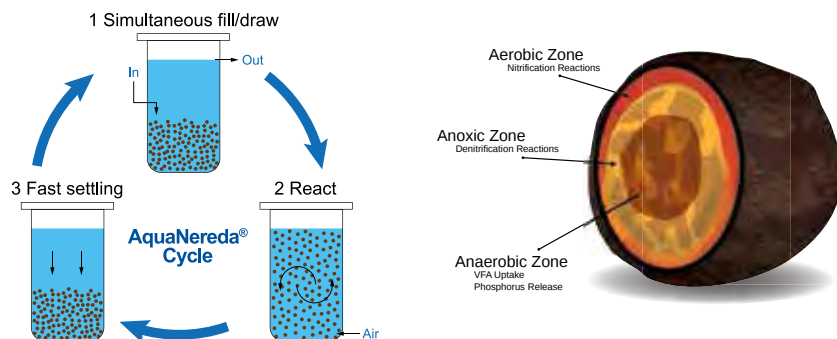


Treated effluent produced from an AquaNereda® reactor.

AquaNereda®

Batch Cycle Structure

Based on the unique characteristics of granular biomass, the AquaNereda® Aerobic Granular Sludge System uses an optimized batch cycle structure. There are three main phases of the cycle to meet advanced wastewater treatment objectives. The duration of the phases will be based upon the specific waste characteristics, the flow and the effluent objectives.



Phases of Operation

1

Fill/Draw Phase

- Influent flow, substrate and readily available carbon source enter the reactor
- Anoxic and anaerobic conditions are present
- Biomass conditioning phase
- Phosphorus release to promote enhanced bio-P removal
- Treated water is discharged

2

React Phase

- Influent flow is terminated
- The biomass is subjected to aerobic and anoxic conditions
- Simultaneous nitrification/denitrification occurs
- Nitrate is transported by diffusion between outer aerated and inner anoxic layers of the granule, eliminating the need for pumping large recycle flows in the plant
- Luxury uptake of phosphorus is promoted
- Automated control of the process allows energy savings and process optimization

3

Settle Phase

- Influent flow does not enter the reactor
- Granular biomass is separated from the treated water during a very short settling phase
- Excess sludge is wasted in order to maintain the desired amount of biomass
- The system is ready for a new cycle

The Development of Nereda®

A public-private research partnership in the Netherlands between the world-renowned Delft University of Technology, research institutes, water authorities and Royal HaskoningDHV led to the invention of the first technology applying aerobic granular sludge for the treatment of wastewater.



Royal HaskoningDHV

Since its development, Royal HaskoningDHV has transferred the process into an internationally applied, sustainable and cost-effective wastewater treatment technology. After 20 years of research and development, this innovative biological solution is now proving to be one of the most sought-after, progressive wastewater treatment technologies.

Aqua-Aerobic Systems, Inc.

In 2016, Aqua-Aerobic Systems partnered with Royal HaskoningDHV to expand aerobic granular sludge into North America and is the exclusive provider of this technology in the United States.

Providing **TOTAL** Water Management Solutions

Visit our website at www.aqua-aerobic.com to learn more about the AquaNereda® and our complete line of products and services:

Aeration & Mixing

Biological Processes

Filtration

Oxidation & Disinfection

Membranes

Controls & Monitoring Systems

Aftermarket Products & Services



**AQUA-AEROBIC
SYSTEMS, INC.**
A Metawater Company



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The information contained herein relative to data, dimensions and recommendations as to size, power and assembly are for purpose of estimation only. These values should not be assumed to be universally applicable to specific design problems. Particular designs, installations and plants may call for specific requirements. Consult Aqua-Aerobic Systems, Inc. for exact recommendations or specific needs. Patents Apply.