

Federation of Canadian Municipalities Green Municipal Fund – Pilot Funding Nitrification Expansion

ISSUE

Saskatoon Water is currently planning to pilot a nitrification technology that will allow the H.M. Weir Wastewater Treatment Plant (WWTP) to achieve year-round nitrification. Nitrification is a treatment process currently used at the WWTP to remove ammonia from wastewater. Standards for ammonia in wastewater are becoming more stringent. The Federation of Canadian Municipalities (FCM) allows municipalities to obtain up to 50% funding for pilot projects with environmental benefits through their Green Municipal Fund. Administration has sent a formal application to FCM to obtain 50% funding for the nitrification pilot under the Green Municipal Fund. If successful, authorization from City Council is needed to execute an agreement with FCM.

RECOMMENDATION

That the Standing Policy Committee on Environment, Utilities, and Corporate Services recommend to City Council that the Mayor and City Clerk be authorized to execute a funding agreement with the FCM under the Corporate Seal if the formal application to the Green Municipal Fund is approved by FCM.

BACKGROUND

The City of Saskatoon (City) has a Long-Term Capital Development Plan (Strategy) to provide a forecast of upgrades and expansions required to meet expected treatment objectives at the WWTP. The Strategy was recently updated to provide optimal alignment with forecasted expansions and upgrades to the year 2050 (see Appendix 1). The updated Strategy includes a commitment to update the capital expansion forecast every two years, prior to the budget cycle.

The Strategy was developed using influent wastewater flow and loading projections based on historical operating data and populations. In addition, the Strategy used a decision matrix to account for noneconomic values, such as the City's strategic goals and corporate values, including Triple Bottom Line. Economic values, including net present value and impact to the utility rate, were also used in the matrix to evaluate future upgrades and expansion options.

The evaluation determined that the WWTP would proceed with nitrification expansion to meet future ammonia removal requirements implemented by the Water Security Agency, following a technology review study.

DISCUSSION/ANALYSIS

The WWTP Bioreactors reduce the concentration of dissolved organic compounds and remove unwanted carbon, phosphorus, and nitrogen from wastewater without the addition of chemicals by using a natural process called Biological Nutrient Removal. When constructed,

the Biological Nutrient Removal system was not designed for the removal of ammonia in the winter. Due to the cold climate in Saskatoon, the microbial activity in the Bioreactors slows down in the winter, resulting in insufficient hydraulic retention time for complete nitrification of influent ammonia. Nitrification of ammonia results in nitrogen being released to the atmosphere, which is 78% nitrogen, instead of ammonia being released to the river which has detrimental effects.

A multi-objective decision analysis (MODA) was utilized for the nitrification technology review. MODA is a tool that uses values, weight factors, and trade-offs to evaluate options for a decision that has complex issues and multiple criteria. Through the MODA it was determined that a new leading-edge technology referred to as Mobile Organic Biofilm (MOB), is the preferred option for the WWTP to achieve year-round nitrification. The MOB process scored highly in many of the MODA criteria such as sustainable growth and resource efficiency, with the key benefit being that the MOB process has the potential for immediate and long-term financial savings to the City.

A one-year technology pilot study is being conducted to validate process performance and long-term capacity impacts prior to proceeding with a full-scale technology upgrade. The pilot consists of utilizing organic media in the Bioreactors as well as adding equipment to recycle the organic media in one bioreactor train at the WWTP.

FCM offers a funding opportunity under their Green Municipal Fund which grants up to \$500,000 to cover up to 50% eligible costs for innovative wastewater treatment system pilots. MOB is a leading-edge nitrification technology that has been demonstrated to be successful in year-round nitrification in 24 locations in North America and Europe; however, it has not been implemented at an operation as large as the Saskatoon WWTP with a seasonal low wastewater temperature of 6°C.

Administration has been pre-approved by FCM to submit a formal application to the Green Municipal Fund for funding a one-year MOB pilot study to validate the process at the WWTP. A formal application has been submitted as of April 30, 2023.

FINANCIAL IMPLICATIONS

The one-year MOB pilot study is estimated to cost \$952,953 in equipment installation costs and staff time. If approval from FCM is obtained under the Green Municipal Fund, 50% of the pilot study would be funded yielding \$476,470 of savings for the City. Should the technology be successful, the annual operating costs are estimated to increase by \$145,000 annually (not compounding). This estimate will be further refined by comparing the pilot process train with existing WWTP process train during the pilot period. A traditional nitrification expansion is estimated to cost more than \$50 million, should the pilot be successful, this expansion would not be required in the growth plan to 500,000 people.

The City has allocated funds to achieve year-round nitrification at the WWTP to P.02585.01 Bioreactor Expansion. The P.02585.01 Bioreactor Expansion funding source has adequate funding to support the one-year MOB pilot study.

OTHER IMPLICATIONS

There is no privacy, legal, or social implications identified.

NEXT STEPS

A decision from FCM is expected three to five months from the formal application submittal date. If the City's formal application is approved by FCM, Administration is recommending that the Mayor and City Clerk be authorized to execute the agreement from FCM.

APPENDICES

1. WWTP Strategy Executive Summary

Report Approval

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