ENGINEERING DEPARTMENT
MEMORANDUM

TO: **MAYOR J. LEHMAN AND MEMBERS OF COUNCIL**

FROM: **R. SUTTON, P. ENG., DIRECTOR OF ENGINEERING**

NOTED: **R. FORWARD, MBA, M.SC., P. ENG., GENERAL MANAGER OF INFRASTRUCTURE AND GROWTH MANAGEMENT**

M. PROWSE, CHIEF ADMINISTRATIVE OFFICER

RE: **WASTEWATER TREATMENT FACILITY ADVANCED NUTRIENT REMOVAL UPGRADES PROJECT UPDATE**
(FILE: A19-ADV)

DATE: **JANUARY 8, 2018**

The purpose of this Memorandum is to provide members of Council an update on the progress of the Wastewater Treatment Facility (WwTF) - Advanced Nutrient Removal Upgrades Project. The project is needed to ensure uninterrupted compliance with the requirements of the Lake Simcoe Phosphorus Reduction Strategy that was developed under the Lake Simcoe Protection Act, 2008. Currently, the Wastewater Operations Branch (WWOB) continues to exceed the compliance objectives identified by the Ministry of the Environment and Climate Change (MOECC). As the City's population continues to grow, increased flows to the WwTF will make it more difficult to meet the MOECC's requirements, therefore, significant upgrades to the WwTF will be required as outlined below.

Background

a) Phosphorous is a key water quality concern in Lake Simcoe. In addition to effluent discharged from municipal wastewater treatment plants, other sources of phosphorus discharged into Lake Simcoe include septic systems, creeks, overland flows, atmospheric contributors, agricultural practices etc. To protect the health of Lake Simcoe, phosphorous needs to be restricted to prevent algae growth which can have detrimental effects on the fish population.

b) In 2010, The Provincial government approved The Lake Simcoe Phosphorus Reduction Strategy that established ambitious and aggressive reductions in phosphorous loadings to restore Lake Simcoe's water quality and ecological health. The phosphorus discharge limits imposed on the WwTF are considered to be the most stringent requirements in North America.

c) To meet the new loading requirements, the WwTF requires upgrades to its wastewater nutrient removal processes, noting that this is <u>not</u> a hydraulic (i.e. flow capacity) expansion.

d) In August 2013 an innovation workshop was undertaken with leading wastewater experts. Various alternatives were evaluated, such as tertiary membranes and a new membrane facility. The workshop concluded that the City would meet its requirements and gain the most additional benefit by installing membrane technology through retrofitting several existing tanks with membrane bio-reactor (MBR) technology as it was the least expensive, best value, most flexible, allowed for reusing existing infrastructure and would be easily expandable within the existing infrastructure.

e) In 2015, Stantec Consulting Ltd. (Stantec) was retained as a result of a public RFP competition to provide engineering consulting services on the project. Stantec has undertaken several pre-design modelling/studies/analyses that have led to the refinement of design criteria and that established the project direction.

f) In general, the scope of the MBR project works include retrofitting of several existing tanks with membranes along with the associated upgrades necessary to support the membranes, including protective screens, ultraviolet disinfection and other process, electrical, mechanical and structural components.

Operational Considerations

a) The following are the operational considerations being designed into the project:

i. Reducing the operational complexities since there will be essentially two types of plants (ie, conventional and MBR) running side by side.

ii. Keeping energy management efforts at the forefront.

iii. Continuing to improve WwTF performance management through instrumentation and testing.

iv. Incorporating operational flexibility for items such as, maintenance practices, minimizing risk of spills, etc.

v. Planning ahead to ensure the WwTF is adequately staffed with people that have the appropriate type of training and certifications (resource levelling/skill-sets).

vi. Optimizing consumables such as, fuel, chemicals usage and others.

Project and Schedule Update

a) City staff are working with Stantec to develop the membrane vendor preselection RFQ that is needed since the various manufacturers/suppliers have different approaches to the design and configuration of the membrane technology. The successful vendor's membrane design will significantly impact the design for the rest of the project. As part of the procurement process, the proponents will be requested to provide their pricing for design services and for the supply of the membranes and associated equipment, however only the design services of the successful vendor will be initiated at this time.

b) A fairness monitor has been retained to monitor and report on the procurement process, including document review and evaluation phases to confidently ensure process fairness.

c) The preselection document is planned to be issued January 2018 with evaluations/negotiations continuing into the first quarter of 2018.

d) The predesign is anticipated to be completed by the end of 2018. The MBR project timing will be revisited based on factors such as WwTF performance, MOECC comments and risk to the corporation.

e) The Wastewater Master Plan project that is currently underway will be providing the growth numbers that will be used to estimate when the MBR is required to be in operation.

f) The main construction is anticipated to start in 2020, with some pre-work (electrical upgrades) to be done in 2019. This is reflected in the draft 2018 Business Plan.

Budget

a) The project budget continues to be monitored and remains unchanged at this time. It is noted that the upcoming vendor preselection and negotiations will provide a key component in improving the precision of the project budget.

b) As the predesign has progressed, several independent projects at the WwTF that were anticipated to be completed in the short term have had their implementation schedule adjusted to support and dovetail with the MBR project to ensure cost and scheduling efficiencies. The following projects have been included in the draft 2018 Business Plan:

   i. WwTF - Concrete Rehabilitation of Tanks.

   ii. WwTF Electrical Substation and Transformer Upgrade.

   iii. WwTF In-plant Peak Attenuation/Equalization Tank.

   iv. WwTF UNOX Tank Isolation Gates.

c) In addition, a preliminary cost savings analysis has been developed to support the conversion of the existing UNOX tanks (utilize high purity oxygen) to aeration tanks (utilize ambient air). The technical aspects of the proposal will be further developed including overall treatment performance, constructability, life cycle costs, etc. It would be prudent for the UNOX-to-aeration tanks conversion to be completed in conjunction with the MBR project.

Risk Management

a) Due to the WWOB ongoing successful operation of the WwTF and achieving low phosphorous levels beyond the existing performance design for the plant, the construction has been deferred for two years. It is recognized that maintaining the production of high quality effluent will become increasingly more difficult as the City grows and wastewater flows get closer to the rated plant capacity of 76 MLD. Additional deferrals are not likely possible as managing the WwTF regulatory compliance during the MBR construction becomes more challenging.

b) Pre-consultation is ongoing with the approval agencies to minimize delays during the approval process.

c) Project risks are tracked on a monthly basis to ensure project risks are mitigated, avoided or accepted.

Additional information and updates to the community may be found on the City website www.barrie.ca under the “Living/Design and Construction Projects” and then by clicking on the “Advanced Nutrient Removal” project.

If there are any questions regarding the Advanced Nutrient Removal Upgrades Project, please contact Graeme King at extension 4532 or by email at Graeme.King@barrie.ca.