

The Regional Municipality of York

Committee of the Whole
Environmental Services
January 16, 2020

Report of the Commissioner of Environmental Services

Duffin Creek Plant Incinerator Replacement Direct Purchase

1. Recommendation

1. Council authorize the Commissioner of Environmental Services to negotiate and execute a direct purchase of two incinerators, associated equipment and engineering services for the Duffin Creek Water Pollution Control Plant as described in this report and in Private Attachment 1.

2. Summary

This report seeks Council authorization for the Commissioner of Environmental Services to negotiate and execute a direct purchase of two incinerators, associated equipment and engineering services from Suez Water Technologies and Solutions Canada. The purchase is associated with the Biosolids Treatment Replacement Project for the Duffin Creek Water Pollution Control Plant ("Duffin Creek Plant"). The purchase would be subject to a guaranteed maximum price as set out in Private Attachment 1.

Pursuant to Section 10.1 (a), the Region's Purchasing Bylaw requires Council approval to award a direct purchase contract over \$150,000 in the case where, in the opinion of the Commissioner, the compatibility of a purchase with existing equipment, facilities or service is the paramount consideration. The recommended maximum price in Private Attachment 1 is to be considered in a closed session of Council under Section 239 (2) (k) of the *Municipal Act, 2001* because it relates to a position to be applied to a negotiation conducted on behalf of the Region.

Key Points:

- The biosolids treatment process at Duffin Creek Plant includes four high temperature fluidized bed incinerators. Incinerators 3 and 4 were supplied by Suez Water Technologies and Solutions Canada as part of the Stage 3 Duffin Creek Expansion Project under a contract in 2009 priced at \$67,511,430 and commissioned in 2014. The contract was procured as a pre-purchase contract through a pre-qualification and request for proposal process. Two proponents responded to the request for proposal and only Suez Water Technologies and Solutions Canada submitted a compliant proposal

- Incinerators 1 and 2 have been in service since 1979 and are at the end of the 40-year life cycle typical for incinerators. Incinerators 1 and 2 are scheduled to be replaced as part of the Biosolids Treatment Replacement Project
- Commonality of operational processes and maintenance and compatibility of parts between replacement Incinerators 1 and 2 and existing Incinerators 3 and 4 throughout the life cycle of the incinerator trains supports the rationale that compatibility with existing equipment and services is the paramount consideration in this recommended direct purchase
- In January 2019, as part of the Biosolids Treatment Replacement Project pre-design, a Request for Information was issued to six international high temperature fluidized bed incinerator suppliers to gauge interest within the industry in relation to the Duffin Creek Biosolids Treatment Replacement Project. Only two vendors responded, one of which was Suez Water Technologies and Solutions Canada, the only vendor with experience handling the 105 dry tonnes per day capacity requirement of Duffin Creek Plant
- In addition to compatibility with existing equipment and services being the paramount consideration supporting the recommended direct purchase, recent activity in the high temperature fluidized bed incineration sector indicates that direct negotiation with Suez Water Technologies and Solutions Canada will gain the best value for the Region for supply of the replacement incinerators

3. Background

Duffin Creek Plant operates four biosolids treatment trains

Duffin Creek Plant operates as part of the York Durham Sewage System, which was commissioned in the late 1960s by the Ministry of the Environment and assumed in 1997 by York Region and Durham Region, treating wastewater from both Regions.

Since its inception, the York Durham Sewage System has expanded in stages to service growth within both Regions. The Stage 3 Duffin Creek Plant Expansion Project was commissioned in 2014 and increased the number of biosolids treatment trains from two to four. Each train includes an incinerator that is used to manage biosolids at the plant. The four incinerator trains together with the ash handling and air quality treatment processes constitute the biosolids treatment facility at Duffin Creek Plant. The biosolids treatment facility is critical infrastructure as it provides biosolids treatment for all wastewater treatment plants within York and Durham Regions. The ash generated at the biosolids treatment facility is beneficially used at a nearby cement manufacturing facility as a substitute for raw material (e.g., silica, iron).

Suez Water Technologies and Solutions Canada gained facility experience by supplying Incinerators 3 and 4 at Duffin Creek Plant

Suez Water Technologies and Solutions Canada was awarded the competitive bid for the supply of Incinerators 3 and 4 as part of the Stage 3 Duffin Creek Plant expansion. The

Stage 3 expansion was a large, complex project with multiple contractors and demanding coordination and schedule requirements. Incinerators 3 and 4 were successfully delivered by Suez Water Technologies and Solutions Canada and they gained significant experience working at the Duffin Creek Plant.

Biosolids Treatment Replacement Project at Duffin Creek Plant advancing to secure forecasted growth capacity by 2027

In 2017, the Region initiated the Biosolids Treatment Replacement Project at Duffin Creek Plant in response to a reliability analysis of the incinerator facility, which was done following completion of the Stage 3 Expansion works and commissioning of Incinerators 3 and 4. Reliability analysis identified that Incinerators 1 and 2 were late in their life cycle and had a deteriorating reliability record along with high maintenance costs. Incinerators 1 and 2 maintenance downtime has been approximately 50% of the operational time of these units over the recent period. Detailed inspection has identified significant loss of metal in the incinerator walls and increased risk of catastrophic failure causing an unacceptable loss of capacity over an extended duration.

The current incineration operational strategy at Duffin Creek Plant includes having one incinerator continuously receiving sludge/biosolids, one incinerator kept hot for intermittently receiving sludge/biosolids to manage peak events and high sludge imports, one incinerator on standby, and one offline for maintenance. Therefore, current firm incineration capacity is based on two of four incinerators in operation.

However, based on the 2016 Water and Wastewater Master Plan growth projections and additional analysis performed during the design, three reliable incinerators are required to be in operation in 2027, with a fourth incinerator available on standby to provide firm capacity for maximum sludge production at Duffin Creek Plant. The capacity of incineration was assessed based on the maximum month raw sludge load that can be incinerated, considering the firm incineration capacity and allowing for incineration of all imported sludge.

Factoring in the condition of Incinerators 1 and 2, and the best efficiency usage of new Incinerators 3 and 4, the firm capacity of the solids process is currently 140 dry tonnes per day. The current demand is approximately 130 dry tonnes per day. By 2027, the demand will increase to 160 dry tonnes per day and, by that point in time, refurbishment work will already be required on the 12-year-old Incinerators 3 and 4. It will be necessary to have Incinerators 1 and 2 replaced by that time to raise the firm capacity to 200 dry tonnes per day to accommodate the growing demand.

Replacement strategy relies on pre-purchase of incinerators to meet project timelines

Pursuant to [Clause 10 in Report No. 8 of Committee of the Whole, adopted by Regional Council on May 25, 2017](#), Council authorized the direct purchase of engineering consulting services to complete the design, tender, site supervision and contract administration for the Duffin Creek Plant Biosolids Treatment Replacement Project. The report outlined a phased replacement strategy that was contingent upon pre-purchasing Incinerators 1 and 2 and other major specialized equipment and services. Direct purchase enables the incinerators to

be ordered and manufactured concurrent with the design phase of the project, yielding significant time savings that cannot be realized if the general contractor procures the incinerators after tender award.

4. Analysis

The incinerator market is specialized and the size of installation required at Duffin Creek Plant limits qualified vendors

In January 2019, as part of the Biosolids Treatment Replacement Project pre-design, a Request for Information was issued to six international high temperature fluidized bed incinerator suppliers to gauge interest within the industry in relation to the Duffin Creek Biosolids Treatment Replacement Project and the potential for a North American project. Only two vendors responded, one of which was Suez Water Technologies and Solutions Canada, the only vendor with experience handling the 105 dry tonnes –per-day capacity requirement of Duffin Creek Plant. The other respondent was Hankin Environmental Systems who has not previously delivered an incinerator with a capacity requirement of 105 dry tonnes per day.

Direct negotiation strongly supports compatibility requirement

The incinerators and their ancillary systems are some of the most complicated processes to be designed at Duffin Creek Plant. Numerous process and supporting auxiliary systems must be harmoniously integrated with each other to achieve optimal and reliable operating efficiency and reduce operational risk. For compatibility, it is advantageous for York Region to negotiate directly with Suez Water Technologies and Solutions Canada for the supply of Incinerators 1 and 2.

Sourcing the same Suez Water Technologies and Solutions Canada incinerators as those currently installed at Duffin Creek Plant for replacement of Incinerators 1 and 2 ensures that all four incinerators and their ancillary systems can be relied upon to operate and perform similarly. The following considerations led to many operational benefits including efficiencies and cost savings:

- Consistency of new equipment with existing Incinerators 3 and 4 avoids introducing complexity to the operational logic of an already complex process
- Staff are familiar with existing equipment and can effectively operate the new system with minimal procedural modification
- Inventory of spare parts could be shared among all four treatment trains, eliminating the need for unique spare parts and optimizing overall spare part costs

Suez Water Technologies and Solutions Canada leads the North American market for supply of high temperature fluidized bed incinerators

Table 1 details the seven high temperature fluidized bed incinerator projects of comparable size to those required at Duffin Creek Plant and that have been implemented over the last 20 years. Suez Water Technologies and Solutions Canada installed six of the seven.

Table 1
High Temperature Fluidized Bed Incinerators Installed in North America with Similar Complexity to Duffin Creek Plant

Year(s) of Installation	Location	Capacity (dry tonnes per day)	Vendor
2018	Green Bay, Wisconsin	46	Suez Water Technologies and Solutions Canada
2014	Little Blue Valley, Missouri	55	Suez Water Technologies and Solutions Canada
2008 to 2012	Durham Region, Ontario	105	Suez Water Technologies and Solutions Canada
2010	Cleveland, Ohio	91	Suez Water Technologies and Solutions Canada
2009	Cincinnati, Ohio	87	Suez Water Technologies and Solutions Canada
2002 to 2006	Peel Region, Ontario	100	Suez Water Technologies and Solutions Canada
2000	St. Paul, Minnesota	95	Hitachi Zosen Inova (formerly Van Roll Inova)

Suez Water Technologies and Solutions Canada recently awarded City of Toronto incinerator project

In May 2018, the City of Toronto Infrastructure and Environment Committee adopted the recommendation to award a contract to Suez Water Technologies and Solutions Canada for incinerators, the eighth North American incinerator installation since 2000. The City of Toronto used a competitive procurement process to solicit vendors for their 60 tonnes per day high temperature fluidized bed incinerator installation. Two proponents submitted proposals. Of these two proponents, only Suez Water Technologies and Solutions Canada passed the technical proposal requirements, exemplifying how limited the pool of specialized expertise and experience is for best-in-class high temperature fluidized bed technology. The second bid submitted did not meet the minimum technical requirements.

Although Hitachi Zosen previously supplied an incinerator of similar complexity to Duffin Creek Plant as shown in Table 1, the company did not compete in the recent local opportunity in Toronto and has not installed a fluidized bed incinerator of comparable size within North America since 2000.

Incinerators 1 and 2 replacement aligns with the Duffin Creek Asset Management Plan

The Region's 2016 Water and Wastewater Master Plan Update and an additional capacity assessment performed during detailed design indicated a shortfall in incineration capacity compared to Duffin Creek Plant's design maximum month raw sewage sludge production, and confirmed the need to replace Incinerators 1 and 2. Timely replacement of incinerators at Duffin Creek Plant will ensure effective management of the Region's asset for current and future generations.

5. Financial

The ongoing Biosolids Treatment Replacement Project at Duffin Creek Plant is a large, multi-contract project that will extend through 2027 at an estimated capital cost of approximately \$185,000,000. The project is rate funded and associated costs have been included in the 10 Year Capital Plan. Partial cost recovery of approximately 26% will be realized from Durham Region as part of the existing Duffin Creek Plant joint ownership agreement between York and Durham Regions.

6. Local Impact

The Biosolids Treatment Replacement Project is a critical undertaking, necessary to secure firm capacity required to meet growth projections for both York and Durham Regions. Direct negotiation with Suez Water Technologies and Solutions Canada enhances the Regions ability to ensure capacity upgrades are completed by 2027 when reliable incineration capacity is projected to be required to meet processing demand.

7. Conclusion

Compatibility of incineration equipment within Duffin Creek Plant is of paramount consideration to ensure efficient operation of the biosolids treatment trains, maximize availability of spare parts, streamline operations and maintenance and reduce operational risk. Suez Water Technologies and Solutions Canada supplied existing Incinerators 3 and 4 at Duffin Creek Plant and is a stable multinational company with a strong presence in the North American market and extensive corporate relationships within the North American wastewater industry. The current market for high temperature fluidized bed incinerator vendors within North America who have experience installing the size of incinerators required at Duffin Creek Plant is limited.

It is recommended that the Region negotiate and enter into an agreement with Suez Water Technologies and Solutions Canada for supply of Incinerators 1 and 2 and associated equipment and engineering services for Duffin Creek Plant.

For more information on this report, please contact Mike Rabeau, Director, Capital Planning and Delivery at 1-877-464-9675 ext. 75157. Accessible formats or communication supports are available upon request.

Recommended by: **Erin Mahoney, M. Eng.**
Commissioner of Environmental Services

Approved for Submission: **Bruce Macgregor**
Chief Administrative Officer

December 12, 2019
Private Attachment (1)
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