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PROGRESS UPDATE ON THE OPTIMIZATION UPGRADES AND EXPANSIONS AT THE DUFFIN CREEK WATER POLLUTION CONTROL PLANT

The Transportation and Works Committee recommends the adoption of the recommendation contained in the following report, September 29, 2003, from the Commissioner of Transportation and Works:

1. RECOMMENDATION

It is recommended that:

1. The following report be received for information by Committee and Regional Council.

2. PURPOSE

This report provides an update on the design and construction of the Solids Capacity Upgrades and the Liquids Capacity Upgrades for the Duffin Creek Water Pollution Control Plant (WPCP), and the future expansion of the plant.

3. BACKGROUND

The Duffin Creek WPCP provides treatment for sewage flows from both York Region and Durham Region. Approximately eighty percent of the treated flows at the plant originate from York Region. The Duffin Creek WPCP is jointly owned by the two Regions and the management of the Duffin Creek WPCP is governed by the “York Durham Sewage System” (YDSS) Primary System Co-owners Agreement executed on November 28, 1997.

3.1 Project Scope

An optimization and capacity assessment study was completed for the Duffin Creek Wastewater Treatment plant in October 2000. This study recommended a number of process upgrades that would result in increasing treatment capacity from 364,000 m³/d (80 MIGD) to 420,000 m³/d (92.5 MIGD). The process upgrades were required in a number of plant areas including the aeration basins, secondary clarifiers, solids train processes, chlorine disinfection processes and solids handling processes.

Increasing the treatment capacity through upgrading of the existing facilities provides increased capacity at a lower cost compared with the alternative of adding new treatment units. This additional treatment capacity to 420,000 m³/d will service an additional 129,000 persons within York Region.

In addition to the optimization upgrades, an expansion to the Duffin Creek WPCP is required by 2009 to service growth within York Region. To address this need, a Master

Plan Study was initiated in 2003 to assess the infrastructure requirement to the ultimate time horizon of 2035.

3.1.1 Project Facilitation/Management

In November 2001, Ontario Clean Water Agency (OCWA) was retained under a Facilitation Agreement to provide project management services for the design and construction of the process upgrades at the Duffin Creek WPCP at a cost of \$460,000, excluding GST. OCWA, on behalf of York and Durham Region, was authorized to contract with an engineering consultant for the Design and Contract Administration Services for the Solids Capacity Upgrades and the Liquids Capacity Upgrades.

Clause No. 6 contained in Report No. 4, of the Commissioner of Transportation and Works Committee as adopted, without amendment, by the Council of The Regional Municipality of York at its meeting on April 3, 2002 authorized retention by OCWA of Earth Tech Canada Ltd. for engineering services related to the liquid capacity upgrades and solids capacity upgrades at \$2,700,000 and \$949,000 respectively for a total of \$3,649,000.

Clause No. 6 contained in Report No. 8 of the Commissioner of Transportation and Works Committee as adopted, without amendment, by the Council of The Regional Municipality of York at its meeting on September 4, 2002 authorized OCWA to retain contractors through a public tender process to undertake the liquid and solid capacity upgrades. In accordance with the approved budgets, Regional Council authorized the issuance of a purchase order to OCWA in the amount of \$33,451,000 excluding GST to cover the construction cost of the solid and liquid upgrades.

3.1.2 Incinerator Remedial Work

The Incineration Facility within Duffin Creek WPCP has undergone remediation works since 1999 based on engineering assessments completed in the mid 1990's. In June 2002 the incinerators experienced a serious malfunction necessitating immediate but temporary repairs to the reactor shell. A more detailed investigation including testing and inspection was then undertaken to determine the extent of the problem with the reactor shell and to assess the condition of the Incineration Facility. This assessment was conducted between July 2002 and September 2002 with reports provided to the Duffin Creek YDSS Operating and Management Committees.

The malfunction, a breach in the reactor shell, was caused by deterioration of the shell resulting in a decrease in material thickness of the shell. The evaluation completed in the mid 1990's detected a reduction in the shell material thickness but the amount of reduction was deemed to be normal considering the age of the incinerators. The assessment conducted in 2002 determined that the wear in the shell material thickness that had occurred since the preliminary inspections in the mid 1990's were exponentially greater than had occurred in the first 15 years. Cause and effect of this degradation has been assessed and rectification of deficiencies is included as part of the additional repair work.

York Region staff evaluated the required additional works and included the total costs for the additional works within 2003 Wastewater Capital Budget and the 10 year Capital Plan in the amount of \$9,090,385 comprised of \$8,330,385 for capital and \$630,000 for engineering and \$130,000 for OCWA facilitation.

3.1.3 2009 Plant Expansion

To assess the plant expansion requirements, the Master Plan Study was initiated in January 2003. The study will include a staging plan with preliminary cost estimates to address the long-term sewage servicing needs of York Region and Durham Region. The study considered present and anticipated regulations and the adoption of new technologies.

The Master Plan Study will be completed early in 2004. Based on the work completed to date, preliminary cost estimates have been developed by the study consultant for the expansion required by 2009. This expansion to 520,000 m³/d will provide treatment capacity to service an additional 231,000 persons (i.e. A total increase of 360,000 persons) with York Region. The preliminary cost estimates are discussed in the subsequent sections.

4. ANALYSIS AND OPTIONS

4.1 Project Status

Since 2002, when the detailed design work was initiated, various construction contracts have been tendered and awarded as provided in the following sections. Separate contracts were tendered for the liquid and solids capacity upgrades. All of the liquid capacity upgrades were combined in to a single contract whereas the solids capacity upgrades were divided into three separate contracts due to logistical and operational consideration.

4.1.1 Liquid Capacity Upgrades

Contract L1 for the Liquid Capacity Upgrades was awarded to North America Construction (1993) Ltd. by Ontario Clean Water Agency (OCWA) in March 2003, in the amount of \$28,481,580 excluding GST. The contractor has placed purchase orders for the major pieces of equipment and has completed about 10% of the construction activities. The contract is scheduled for completion in November 2004.

4.1.2 Solids Facility Upgrades

Work on the solids facility is divided into three contracts for scheduling and construction purposes. The status of the three solids contracts S1, S2 and S3 are as follows:

- Contract S1 was awarded in October 2002 to W.A. Stephenson Mechanical Contractors Ltd. by OCWA, in the amount of \$791,000 excluding GST. The contract was completed in February 2003.
- Contract S2 was awarded in July 2003 to Bennett Contracting Millgrove Ltd. by OCWA in the amount of \$13,977,000 excluding GST. The contract has mobilized on site and construction was initiated in September 2003. The contract is scheduled for

completion in March 2005. Contract S2 includes works from the optimization program as well as the \$8,330,385 for the remedial incinerator work program.

- Contract S3 with an estimated value of \$1,300,000 will be tendered in October 2003 by OCWA. The contract is scheduled for completion in 2004.

4.2 2009 Plant Expansion Cost Estimates

The preliminary cost estimates for the next plant expansion are significantly higher than cost estimates used in the 10 year Capital Plan programmed in 2003 and the Development Charge By-law as approved by Regional Council on May 22, 2003. The 10 year Capital Plan for 2003 included an allocation of \$85.4 million for the expansion project with completion scheduled for 2010 based on the YDDS Master Plan Update, March 2002. Based on the preliminary findings of the Duffin Creek WPCP Master Plan Study, York Region's share of the total cost of the expansion is estimated at \$190 million with completion scheduled for 2009. This preliminary cost estimate will be refined over the next few months as more detailed estimates become available. In addition, during the implementation phase the two Regions will consider innovative project delivery options and value engineering opportunities to minimize the total cost of the project.

The main reasons for the increase in the preliminary estimates are as follows:

- Anticipated regulatory changes that will result in more stringent effluent criteria.
- An additional incineration facility to improve reliability and ensure firm capacity to meet the servicing needs of York and Durham Region.
- Additional upgrades to the treatment facility.

Table 1 below provides an estimated breakdown of the increases associated with York Region's share of the total cost of the expansion projects.

Table 1
Explanation of Plant Expansion Cost Increases

Plant Expansion	Preliminary Cost Increase
Regulatory changes	\$28 million
Additional incineration facility	46 million
Additional plant upgrades	31 million
Total	\$105 million

The above estimates are preliminary planning cost estimates based on York Region assuming 100% of the expanded capacity for liquid treatment and 75% of the expanded capacity for solids treatment.

5. FINANCIAL IMPLICATIONS

5.1 Optimization and Remedial Upgrades

Funds have been included in the approved 10 Year Capital Plan for these works. Within the (2003) 10 Year Capital Plan for wastewater projects the funds were included under the following projects:

- 79870 YDSS Duffin Creek WPCP for optimization upgrades.
- 79850 YDSS Duffin Creek maintenance for remedial incineration work.

Table 2
Summary of Project Costs

Component	Original Budget	Tendered Costs	Change
Engineering			
Optimization	\$3,649,000		
Remedial Works	630,000		
Project Facilitation			
Optimization	460,000		
Remedial Works	130,000		
Construction			
Liquids L1	*27,400,000	\$28,481,580	\$1,081,580
Solids S1	*480,000	791,000	311,000
Solids S2			
Optimization	*4,271,000		
Remedial Works	8,330,385		
Total S2	12,601,385	\$13,977,000	1,375,615
Solids S3	*1,300,000		
Total	\$46,650,385		\$2,768,195

Note: * Components making up original solids and liquids capital budget of \$33,451,000.

In accordance with the facilitation agreement, OCWA was authorized to retain the engineering consultant and the construction contractors. To facilitate the funding of the various contracts for engineering services and construction services, a single purchase order was issued to OCWA in September 2002 in the amount of \$33,451,000 excluding GST.

The tendered cost of the L1 and S2 contracts was greater than the original budget estimate but within available contingencies. The purchase order has been amended to account for the difference of \$2,768,195 in the tendered costs.

To cover the costs of the final contract S3, the purchase order will be amended when the tenders are received if necessary.

The budget anticipated cash expenditures in 2003 for this work is \$24.5 million. However, because of project delays the current forecasted expenditure for 2003 is \$17.2 million.

York Region will be funding the entire cost of upgrades to aeration facilities, clarifiers, disinfection system and the solids handling facilities as York Region will receive all the additional capacity that would be generated through this project. This is in accordance with the YDSS Primary System Co-owners Agreement. Funding for the Optimization project is derived from Development Charges (80%) and Wastewater User Rates (20%).

5.2 Remedial Upgrades

Remedial work on the incineration facility is subject to cost sharing with Durham Region. In accordance with the YDSS Primary System Co-owners Agreement, funding for operations and maintenance work is proportional to flow with contributions from Durham and York Region at 20.2% and 79.8% respectively. Funding for the remedial works is derived from Wastewater User Rates.

5.3 2009 Plant Expansion

The increase in the preliminary cost estimates from \$85.4 million to \$190 million for the next plant expansion will have an impact on future development charges. The sharing of the costs between York Region and Durham Region is subject to the final scope of the expansion and of the allocation of the additional capacity that would be generated.

6. LOCAL MUNICIPAL IMPACT

The proposed upgrades represent the most cost-effective approach to increasing the capacity of the Duffin Creek WPCP. The upgrades will benefit both York and Durham Region, and provide additional capacity to service anticipated growth within York Region in the next five years.

The Duffin Creek WPCP is currently at 90% capacity. Implementation of the optimization upgrades is critical to ensuring that sufficient treatment capacity is available to service growth within York Region.

7. CONCLUSION

The works at the Duffin Creek WPCP will be completed within the established dates to allow for growth anticipated within the Region.

The Senior Management Group has reviewed this report.

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