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DUFFIN CREEK WATER POLLUTION CONTROL PLANT OPTIMIZATION UPGRADES AND EXPANSION PROGRESS UPDATE PROJECT 79870, 73720 AND 79850

The Transportation and Works Committee recommends the adoption of the recommendations contained in the following report, December 16, 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 Council.

2. PURPOSE

This report provides an update on the following projects at the Duffin Creek Water Pollution Control Plant (WPCP):

- Optimization upgrades to increase solids treatment and liquid treatment capacity.
- Remedial work on the incinerators.
- Capital maintenance.
- Plant expansion.

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 Optimization Upgrades

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 provided 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.

3.2 Facilitation and Project Management

In November 2001, Ontario Clean Water Agency (OCWA) was retained under a Facilitation Agreement to provide project management and facilitation services for the design and construction of the optimization upgrades at the Duffin Creek WPCP. OCWA, on behalf of York and Durham Regions, was authorized to contract with an engineering consultant for the Design and Contract Administration Services and to contract with contractors for the Solids Treatment Upgrades and the Liquids Treatment Upgrades.

Clause No. 4 contained in Report No. 9 of the Transportation and Works Committee was received, without amendment, by the Council of The Regional Municipality of York at its meeting on October 16, 2003. This report summarized the status of the contract including the addition of incineration remedial works to the ongoing Optimization Upgrades. The estimated current total value of the Capital upgrades not including the additional work referenced in this report is \$49,418,580 including \$590,000 for OCWA Facilitation and Project Management, \$4,279,000 for engineering, and \$44,549,580 for construction.

3.3 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 and in the fall of 2002. The 2002 report was based on visual and physical inspection from the exterior of the incinerators as they continued to be operated due to treatment capacity requirements. An assessment report was provided to the Duffin Creek YDSS Operating and Management Committees on the condition of the Incineration Facility. These remedial works were included within 2003 Wastewater Capital Budget and the 10 year Capital Plan.

The assessment report recommended remedial works to refurbish the Incineration Facility over the next four years from 2003 to 2006. All refurbishments work proposed in 2003 was added to the agreement with OCWA for the ongoing Optimization Works. Work proposed for 2006, included the roof refractory brick and the windbox floor. Detailed inspection of these facilities were carried out in 2003 during the shutdown of the incinerator for the optimization upgrades. During these inspections, it was determined that these works are required immediately in order to allow for a safe working environment and to help ensure continued reliability of the incinerators.

Further detailed assessments of the condition of the incineration facility is planned when the second unit is taken out of service to undertake the optimization upgrades and remedial works. Results will be available in 2004 to allow for inclusion in the 2005 YDSS Duffin Creek WPCP Operations budget and the York Region 2005 Wastewater Capital Budget and the 10 year Capital Plan.

3.4 Capital Maintenance Work

The 2002 and 2003 YDSS Duffin Creek WPCP Operations Budget included a number of capital maintenance projects. These projects involve equipment and facilities that are part of the Optimization Upgrades of the solids and liquid treatment process. As such, the Duffin Creek YDSS Operating and Management Committees have approved the inclusion of these works within the contracts for the ongoing Optimization Upgrades.

3.5 Plant Expansion

To assess the plant expansion requirements, a facility 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.

A preliminary study report was completed on October 31, 2003 with final completion anticipated in 2004. Work in 2004 will include project requirements to satisfy the Class EA requirements. Based on the work completed to date, preliminary cost estimates and schedules have been developed for the expansion. Preliminary results of this study indicate that the plant expansion may be needed between 2006 and 2008 based on current growth rates within York Region and Durham Region, and a per capita flow of 951GPD. This is earlier than the timing identified in the YDSS Master Plan updated in 2000. Region staff are currently reviewing the timing for the implementation of the expansion in regard to the identified need.

The first stage of the expansion is proposed to a capacity of 520,000 m³/d with the second expansion to the rated capacity of the plant at 728,000 m³/d. The first expansion to 520,000 m³/d will provide treatment capacity to service an additional 231,000 persons within York Region. Preliminary cost estimates are discussed in the subsequent sections.

4. ANALYSIS AND OPTIONS

4.1 Optimization 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 treatment upgrades. All of the liquid treatment upgrades were combined in to a single contract whereas the solids treatment upgrades were divided into three separate contracts due to logistical and operational considerations.

4.1.1 Liquid Treatment 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 15% of the construction activities. The contract is scheduled for completion in November 2004.

4.1.2 Solids Treatment Upgrades

Work on the solids facility is divided into three contracts for 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 at a cost of \$657,164.
- 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 originally scheduled for completion in March 2005 will be extended due to the addition of the refractory roof brick and windbox floor repairs. Completion is anticipated by September 2005. The total estimated cost for this additional work is \$2,816,570. Contract S2 includes works from the optimization program as well as for the remedial incinerator work program.
- Contract S3 with an original estimated value of \$1,300,000 will be tendered by OCWA in 2004. Additional plant maintenance work at a total estimated cost of \$1,253,000 is to be included with this contract.

4.2 Facilitation and Project Management Services

The Facilitation Agreement with OCWA includes a provision for payment of interim financing charges on total expenditures for a one month period. The interim financing charges account for the estimated 30 day time difference between the payment to contractors by OCWA and payment to OCWA by York Region. The current estimate for these charges is \$214,470 based on prevailing interest rates. This cost was not included in the value of the original purchase order to OCWA but has now been added, as an increase to the purchase order value.

Additional services provided by OCWA related to the incineration design and prequalification of contractors have been approved at a cost of \$35,000. The value of the purchase order has been increased to account for these services. There are sufficient funds in the overall project budget to cover these costs.

4.3 Plant Expansion

4.3.1 Schedule Considerations

Based on an assumed per capita flow of 95IGPD, and the current growth rates in York and Durham Regions, the expansion would be required between 2006 and 2008. The assumed per capita flow of 95IGPD is conservative and is appropriate for planning purposes. Historically, the per capita flows have ranged between 85 and 90 IGPD. Using this range, the expansion would be required between 2008 and 2011.

To meet these servicing requirements, the planning and design of the expansion project would have to be initiated in 2004.

4.3.2 Preliminary Cost Estimate

Based on the draft October 31, 2003 study report, preliminary estimates of the total cost of the expansion is estimated at \$235 million. This preliminary cost estimate will be

refined over the next few months as the study is finalized. 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 allocation of the costs between the two Regions will be negotiated on the basis of the York Durham Sewage System (YDSS) Primary System Co-owners Agreement.

The study team is currently evaluating the need for a new outfall. If a new outfall was needed an additional increase of \$35 million may be incurred.

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.

A summary of the Project Costs not including GST are provided in Table 2.

Table 2
Summary of Project Costs

Component	Original CostEstimate	Current Projected Costs	Change
Engineering			
Optimization	\$3,649,000	\$3,649,000	
Remedial Works	630,000	630,000	
Incinerator Remedial Works	-	467,570	\$467,570
Capital Maintenance Work	-	77,000	77,000
Project Facilitation			
Optimization	460,000	495,300	35,300
Remedial Works	130,000	130,000	
Incinerator Remedial Works	-	49,000	49,000
Capital Maintenance Work	-	26,000	26,000
Interim Financing	-	213,860	213,860
Construction			
Liquids L1	28,481,580	28,872,000	390,420
Solids S1	791,000	657,164	-133,836
Solids S2	13,977,000	13,977,000	
Solids S3	1,300,000	2,450,000	1,150,000
Capital Maintenance	-	2,300,000	2,300,000
Total	\$49,418,580	\$53,993,894	\$4,575,314

In accordance with the facilitation agreement, OCWA was authorized to retain the engineering consultant and the construction contractors. To defray the various contracts for engineering services and construction services, purchase orders were issued to OCWA by the Regions. Revisions to the purchase order have been made in accordance with council approved processes.

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

The approved 2003 Wastewater Capital budget for this work is \$24.5 million. However, because of project delays the current forecasted expenditure for 2003 is \$17.2 million. The increase in projects cost as shown in Table 2 will be included in the 2004 draft Capital Budget.

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 will be generated through this project. The cost of these upgrades are estimated at \$45.5 million. The remaining \$8.5 million will be split between Durham Region and York Region. 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 Incinerator Remedial Work and Capital Maintenance

Remedial work on the incineration facility and the capital maintenance work 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 these works is derived from Wastewater User Rates.

6. LOCAL MUNICIPAL IMPACT

The optimization 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, remedial works and capital maintenance work is critical to ensuring that sufficient treatment capacity is available to service growth within York Region.

7. CONCLUSION

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

Incinerator remedial work and other capital maintenance work have been added to the optimization upgrade contracts to undertake these works in an expeditious manner with minimum disruption to plant operations.

The Senior Management Group has reviewed this report.