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### **DUFFIN CREEK WATER POLLUTION CONTROL PLANT PROJECT UPDATE**

**The Transportation and Works Committee recommends the adoption of the recommendations contained in the following report, August 23, 2006, from the Commissioner of Transportation and Works:**

#### **1. RECOMMENDATIONS**

It is recommended that:

1. Regional Council receive this report detailing the recommended strategy to accelerate the contract authorization and contract execution process related to the delivery of the Duffin Creek Water Pollution Control Plant (WPCP) Stage 3 Process Expansion Projects.
2. The Regional Chair and CAO be pre-authorized to award an anticipated 19 critical equipment procurement contracts associated with the Duffin Creek WPCP Stage 3 Process Expansion Projects between September 30, 2006 and December 31, 2009.

#### **2. PURPOSE**

In December of 2005, Council directed staff to investigate methods and strategies to accelerate the delivery of the project. This report provides a project update and addresses opportunities to expedite the project schedule to ensure the project is completed in 2010.

#### **3. BACKGROUND**

The Duffin Creek WPCP is part of the York Durham Sewage System (YDSS); a comprehensive sewage collection system that directs sanitary sewage to the Duffin Creek WPCP through 150 km of trunk sewers. The Duffin Creek WPCP, jointly owned by York and Durham Regions, is managed and governed by the YDSS Primary System Co-owners Agreement, which was executed on November 28, 1997.

The existing facility treats sewage flows from both Regions, with approximately 80 percent of the flows currently originating from York Region.

The Duffin Creek WPCP is located on the north shore of Lake Ontario at the foot of Squires Beach Road in the City of Pickering, Regional Municipality of Durham (*see Attachment 1*). The WPCP is bordered by the Ontario Power Generation - Pickering Nuclear Generating Station - to the west, industrial properties to the north, and Duffin Creek to the east.

When the YDSS and the Duffin Creek WPCP were originally constructed, their common purpose was to replace several small sewage treatment plants located on various rivers in both regions. This system accommodated growth in both regions by taking advantage of the assimilative capacity afforded by Lake Ontario. It also ended the practice of discharging effluent into the regions' tributaries, which have considerably less assimilative capacity, and improved the water quality of the tributaries as a result.

The YDSS and the Duffin Creek WPCP were originally planned in the early 1970s. In 1975, the Duffin Creek WPCP, with an ultimate capacity of 727,376 m<sup>3</sup>/day (727 MLD), was approved by the Province for construction in four stages. Construction of Stage 1 was completed in 1976. Stage 2 followed in 1993, which provided a total treatment capacity of 364 MLD. In 2005, the plant underwent a facility wide optimization and upgrade program, providing the plant with a treatment capacity of 420 MLD.

Stage 3 is currently in the early phase of design. The major detailed design is scheduled to commence in September 2006. In a project of this size and complexity, the designers require a certain amount of engineering information on the process equipment to be selected as early as possible, to enable design of the auxiliary processes and ultimately the building(s) to house the equipment.

#### **4. ANALYSIS AND OPTIONS**

##### **4.1 Class Environmental Assessment Update**

The Region may not proceed into the tender process of any contract for construction associated with the project until the Environmental Study Report is filed. Any delay to the EA filing and approval will directly impact the delivery of the overall project.

The Schedule 'C' Class EA undertaken for this project was started in June of 2004 and is now almost complete. At the time of writing this report, Regional staff anticipated filing the Environmental Study Report mid-September 2006. Included in the Environmental Study Report are technical studies which were subject to independent peer review by recognized specialists in the fields of study. The Region has also allowed the public and all other stakeholders time to review draft copies of the study reports, provide comments and review the responses.

The original project schedule predicted the completion and filing of the Environmental Study Report in early summer of 2006. Objections to the Class EA raised by the Town of Ajax have delayed the project by challenging the details and findings of the EA. The Town of Ajax retained four separate consultants to perform a "gap analysis" on the Environmental Study Report, supporting technical studies and all documentation associated with the EA. They presented their findings to the Region during three workshops conducted on June 27, June 28 and July 4, 2006, as part of a comprehensive

consultation process. Each challenge received was analyzed in depth and an appropriate response prepared for inclusion in the Environmental Study Report.

The Class EA process approved for municipal projects in the Province of Ontario identifies what can and what cannot be performed on a project prior to the filing of the Environmental Study Report.

#### **4.1.1 Specific Issues Raised by the Town of Ajax**

Several issues have been raised by the Town of Ajax during this EA. The following is a list of issues with responses to date from The Regions of York and Durham, and the specific impact to the recommended strategy for acceleration.

It is noted again that any delay to the filing and acceptance of the EA will impact the schedule of the new plant.

- **Air and Odour Emissions**  
Lack of required and appropriate impact assessment to comply with MOE water and air policies.

The study and analysis indicate no adverse impacts and the technical submission details exceed the requirements of a typical Class Environmental Assessment. Subsequent to comments more review and analysis was completed and documented for review by the MOE, the Town and others. This is an ongoing issue with a targeted completion date of September.

- **Lake Water Quality**  
Issue: a) The WPCP, unless properly designed and mitigated, will reduce water quality.

Response:

Lake Impact Modelling was completed and peer reviewed by leading technical experts to ensure compliance with all Ministry (MOE) requirements. The project team is addressing technical comments provided by the MOE and other stakeholders.

Issue: b) Proposal for plant expansion should meet the requirements of the Provincial Water Quality Objectives for a Policy 2 receiver.

Response:

The effluent quality limits are set by the MOE in accordance with their policies. The proposed design will meet or exceed all MOE requirements for effluent quality.

- **Beach Closures**  
Issue: The Town's beaches were closed through October 2005 due to elevated E-coli levels.

Response:

Modelling results demonstrates a contribution of less than five counts of E-coli to a maximum of 30 counts whereas beach samples indicate counts between 200 – 700.

- Issue: Insufficient Detail in ESR.

Response:

Technical submissions for this project are comprehensive and exceed the requirements of the MOE and have been independently peer reviewed by recognized experts.

- Issue: Slow Responsiveness.

Response:

Every effort was made to ensure complete, detailed and comprehensive replies to queries. This sometimes resulted in a slower response time to ensure a proper response was provided.

- Issue: Delay in construction of new outfall.

Response:

Modelling results demonstrate that a new outfall is not required until 2022. Effluent quality and impacts meet or exceed all MOE requirements. Improvements to the outfall will be subject to a separate EA prior to 2022. The team is currently reviewing the modelling results related to this issue with technical staff at the MOE.

- Issue: Request that ESR Filing be deferred.

Response:

The Regions have already deferred the filing of the ESR by several weeks to allow time to respond to Ajax's concerns. Given that Ajax chose to become involved late in the process and given that Ajax has been provided ample opportunity to review all draft documents, any request to defer the filing of the ESR would be unreasonable.

#### **4.1.2 Other Stakeholder Issues**

Other stakeholder agencies, in particular the Ministry of the Environment (MOE) and Toronto and Region Conservation Authority (TRCA), have also provided the Regions with comments on the draft documents issued for review. Their comments have been reviewed by the consultants and responses are being finalized.

The receipt of the issues raised by the stakeholders has created a delay in the intended filing of the Environmental Study Report by approximately ten weeks. Further delays will impact the project schedule since the Regions are not able to commence construction without an approved EA. Outcomes from this issue will not affect related Pre-Purchase Equipment or Construction Contracts.

## **4.2 Strategy to Expedite Procurement Contracts**

To ensure the completion of the project on schedule by 2010, staff have developed a recommended approach to accelerate the process required to purchase major equipment needed for the plant expansion.

The project team is ready to commence with the procurement of some major process equipment that will be included in the construction of the Duffin Creek WPCP Stage 3 Expansion Projects prior to the actual Construction Contracts being awarded. The early pre-purchase procurement, completed in accordance with the York Region's Purchasing By-Law, is to satisfy several necessities:

1. Pre-purchase will reduce the project schedule by the timely acquisition of equipment that has lengthy delivery times. Some of the major pieces of equipment required for the project are complex and specialized in nature. It is custom designed and then custom fabricated. This process can take a significant amount of time and if not acquired prior to the award of the construction contract the construction contract period would be extended significantly. Removing the purchase from the contractor's scope will reduce the length of the overall construction contract period.
2. The consulting engineers performing the design require very specific engineering information from the actual equipment manufacturer to design the facility around the equipment to be supplied. In some cases it would be impossible to lay out the design of the building, piping connections, power supplies and control systems without the prior engineering requirements, drawings, materials of construction and other specifications.
3. To reduce the cost of the project by purchasing equipment directly from the supplier, manufacturer or vendor, eliminating contractor mark-ups on the equipment prices. Typically, the contractor will mark-up the price provided for the equipment during the bid to account for document control, issue of purchase orders and payments. Normally, this is in the order of five to ten percent of the equipment price. The estimates for the proposed pre-purchase equipment provided below is a total of \$98 million, therefore the Regions could see a potential reduction in the overall cost by an estimated \$5 - \$10 million.
4. The Regions can exercise a significant control over the equipment selection. Since this is an expansion of the existing facility, the Regions will wish to procure certain specific types of equipment and a few from certain manufacturers. In the highly competitive construction market, the contractors are under pressure to try to substitute cheaper alternatives under the "or equal" provisions of the contracts. This substitution often results in disputes over the equivalency merit of the submitted products, thereby delaying the project; or installation of less proven alternatives resulting in frequent failures and higher operating and maintenance costs.

5. To reduce the value of the construction contract to allow a greater number of qualified contractors eligible to bid competitively. The wastewater treatment facility construction market in the Greater Toronto Area has a limited number of experienced and qualified contractors for the size of contracts proposed. Eliminating the equipment purchase from the general contractor's scope of supply effectively reduces the value of the anticipated construction contract packages and will allow an acceptable number of qualified contractors to bid.

In assessing the process for award of the pre-purchase equipment, the project team has identified three types of proposal/bid procedures, as follows:

1. The first is the normal York Region Request for Proposal (RFP) procedure. It is intended to pre-qualify acceptable manufacturers and/or suppliers to ensure the Regions allow only experienced, established and financially capable companies to submit final proposals. After pre-qualification of acceptable suppliers/manufacturers, there will be a formal RFP issued with the evaluation process developed specifically for each of the specialized equipment RFPs and it is anticipated that the proponent with the highest ranking score overall will be recommended for the award of contract.
2. The next is the normal tender/bid process with the lowest cost meeting specifications and scope of work being awarded the project. The bidders for this type of selection process may or may not be pre-qualified depending upon the recommendation of the project team. In all likelihood, the majority of the equipment will be deemed to be critical to the process so it will be recommended that the bidders will need to be pre-qualified. In some cases, in conformance with the requirements of the purchasing by-law, some equipment will be procured through a sole-source tender. Otherwise, it will be an open tender.
3. The last process will follow the normal tender/bid process; however, the successful tenderer of contract will be based upon pricing that includes a clear and concise method of calculating an overall life cycle cost. The overall life cycle cost is a total evaluation of various operating and/or maintenance parameters, such as power usage, chemical addition, operator attention, recommended maintenance and replacement part usage over a 20-year lifespan in addition to the initial capital cost. It would then be recommended that the contract be awarded to the lowest overall life cycle cost meeting the specifications and scope of work.

At present, the project team has identified 19 pieces of equipment that fall into at least three and usually four or five of the above reasons for pre-purchase categories, with the recommended method of pre-purchase, shown in the tables below.

**Table 1**  
Pre-Purchase Schedule – Liquids

<b>Equipment Description</b>	<b>Reason*</b>	<b>Bid Type</b>	<b>Tender Date</b>	<b>Estimated Value (\$million)</b>
Electrical equipment for substations – transformers and switchgears	1,2,3	Tender capital cost	6-Sep-06	\$2
Aeration - fine bubble diffusers	1,2,3,4	Tender sole source	10-Oct-06	3
Primary bridge collections and scum cross collectors	1,2,5	Tender capital cost	18-Oct-06	6.8
Final/Secondary sludge collectors and scum cross collectors (may be combined with item 2 above if bridge collectors are used)	1,2,5	Tender capital cost	18-Oct-06	7.5
Aeration Blowers	1,2,4,5	Tender sole source	10-Jul-06	3.5
Influent Screens	1,2,3,5	Tender capital cost	24-Jan-07	1
Influent/Raw sewage pumps (if determined to be required during pre-design)	1,2,3,4,5	Tender life cycle cost	21-Feb-07	1
UV Disinfection	2,3,5	Tender life cycle cost	11-Apr-07	5.2
Standby generator(s)	1,2,3,4,5	Tender capital cost	30-May-07	1.3
<b>Sub-total liquid process equipment</b>				<b>\$31.3</b>

**Table 2**  
Pre-Purchase Schedule - Solids

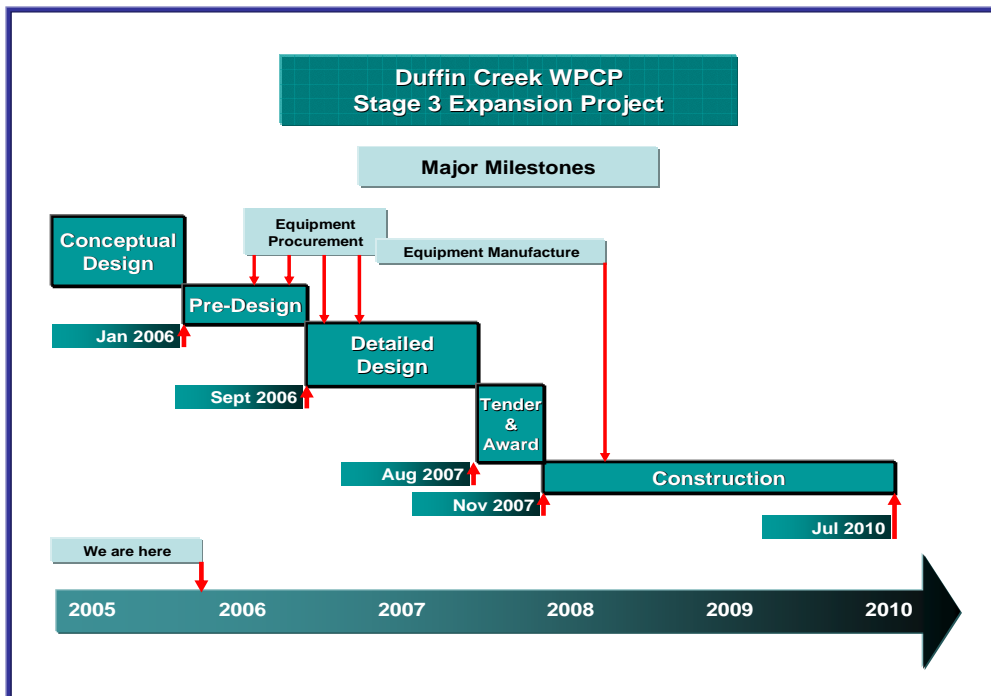
<b>Equipment Description</b>	<b>Reason*</b>	<b>Bid Type</b>	<b>Tender Date</b>	<b>Estimated Value (\$million)</b>
Incinerator package	1,2,3,5	RFPQ RFP	10-May-06 1-Sep-06	\$44
Dewatering Centrifuges	1,2,3,5	Tender – life cycle cost	tba	8
Boilers	1,2,3,5	Tender - capital cost	23-Aug-06	2
Ash Thickener	2,3,4	Tender – life cycle cost	30-Aug-06	0.2
Vacuum filter package	1,2,3,5	Tender – life cycle cost	30-Aug-06	1
Ash conveyors	1,2,3,4,5	Tender – capital cost	30-Aug-06	0.5

Sludge cake pumps including live bottom hoppers	1,2,3,4,5	Tender – life cycle cost	5-Sep-06	2.5
Digester covers including roof mounted draft tube mixers	1,2,3,4,5	Tender – capital cost	6-Sep-06	3.7
Waste/Digester Gas Burners	1,2,3,5	Tender – capital cost	6-Sep-06	0.7
Sludge cake distribution shafted conveyors	1,2,3,4,5	Tender – capital cost	6-Sep-06	2
<b>Sub-total solid process equipment</b>				<b>\$64.6</b>

\*Reasons for pre-purchasing, see page 2 and 3 of this report

The anticipated overall schedule for the project is shown below in Figure 1. The project is currently in the Pre-Design Phase which commenced on schedule, in January 2006. As can be seen in the figure, the equipment procurement is a critical input into completing the project in an accelerated fashion. The impact to the schedule can be clearly seen if the equipment design information were not supplied in an expeditious manner to inform and facilitate the engineering design. Additionally, if the equipment manufacture were delayed until the construction contract award, the overall schedule would be severely impacted.

Figure 1 – Overall Project Schedule



During the Conceptual Design Phase, a construction contract analysis was conducted, resulting in proposing to divide the construction into 10 separate contracts as identified in Tables 3 and 4 below. The primary purpose of this breakdown is to allow the Regions to

obtain several competitive bids for the work by breaking down the contracts into packages which will be within reach of contractors experienced in building wastewater treatment facilities. There are a limited number of large wastewater facilities in southern Ontario, but a reasonable number of small to medium facilities. Therefore, to provide the Regions with the benefit of obtaining a reasonable number of suitable contractors available to bid this work, a larger number of smaller packages are required. Construction of wastewater treatment facilities is a specialized field due to the number of large, watertight concrete structures required, again limiting the number of suitably qualified contractors.

**Table 3**  
Preliminary Construction Contract Schedule - Liquids

<b>Contract Description</b>	<b>Tender Date</b>	<b>Estimated Amount (\$million)*</b>
Site Preparation	Sep-06	\$1.5
Bulk Excavation	Mar-07	3
Electrical Substation and Power Supply	Aug-07	11
Liquid Train Processes	Aug-07	175
Headworks Building	Aug-08	25
Disinfection Building	Feb-08	16
Landscaping and Final Work	Jan-10	0.5
<b>Sub-total liquids projects</b>		<b>\$232</b>

**Table 4**  
Preliminary Construction Contract Schedule - Solids

<b>Contract Description</b>	<b>Tender Date</b>	<b>Estimated Amount (\$million)*</b>
Incineration Building	Apr-08	\$108
Dewatering Replacement and Refurbishing	Dec-07	40
Digester and Blending Tank Modifications	Nov-07	20
<b>Sub-total solids projects</b>		<b>\$168</b>

\*includes the relevant equipment pre-purchases

The chart below identifies the normal procurement procedure time frames from issue of the bid/proposal document to the order to commence.

<b>Process</b>	<b>No. of Weeks/Days</b>
Bid/Proposal Period	4 or 5 weeks
Bid/Proposal Evaluation	1 or 2 weeks
Recommendation	1 or 2 days
Report to Committee and Council Approval (if required)	6 to 8 weeks*
Notice of Award	1 or 2 days
Preparation/Execution of Contract	2 weeks
Order to Commence	1 day

\* This time period allows for report preparation by Regional staff prior to the process of review and revision by senior management prior to signature for inclusion into the Transportation and Works Committee meeting agenda, followed by the review and recommendation by the Transportation and Works Committee, followed by Regional Council ratification.

It is understood that all the procurement/contract awards will not require Council approval; however, it is anticipated that several would be required to follow through this process. As identified above, this process takes time. When taking into consideration a total number of twenty-nine purchasing and construction contracts, the possibility of a significant impact to the overall project delivery clearly exists.

In an effort to streamline the process and eliminate potentially significant authorization process delays to the project delivery time, Regional staff is recommending that Council provide the Regional Chair and CAO with the pre-authorization to review, and if satisfied with the recommendation, authorize them to execute all the pre-purchase contracts and/or purchase orders and construction contracts.

### **4.3 Budget Update**

The budget amounts prepared in 2005 for the construction of the Stage 3 Process Expansion Projects was \$170 million for the liquids and \$150 million for the solids for a total of \$320 million. Budget amounts prepared for this report are \$232 million for the liquids and \$168 million for the solids for a total of \$400 million. The reason for the large (36%) increase in costs for the liquids project is explained below.

The design of the Stage 3 Liquids Process Expansion Project must meet more stringent effluent criteria than the current WPCP operates under, imposed to meet evolving Ministry of the Environment (MOE) approval criteria. Detailed technical calculations show that to operate the existing WPCP to meet the future imposed effluent criteria

means that the treatment capacity has to decrease from the presently rated 420 MLD (Million Litres per Day) down to 320 MLD. Therefore, to obtain an overall treatment capacity of 630 MLD, the Stage 3 Liquids Expansion must process 310 MLD instead of the original 210 MLD. This is an additional 100 MLD of treatment capacity in Stage 3 than allowed in the previous estimated costs. This is the reason for the increase in the estimated costs.

At the end of the Conceptual Design Phase, a Value Engineering exercise was performed. This workshop identified possible areas where refinement to the concepts could provide more cost-effective solutions. The project consultants have completed their reviews and have prepared the following high level construction estimate.

**Table 5**  
Preliminary Construction Contract Schedule - Solids

<b>Contract Description</b>	<b>Total Project</b>		
	<b>Budget (\$million)</b>	<b>York's Share (\$million)</b>	<b>Durham's Share (\$million)</b>
Liquids	\$232	\$232	\$0
Solids	168	104	64
<b>Total</b>	<b>\$400</b>	<b>\$336</b>	<b>\$64</b>

The estimates presented above are also based upon 2006 dollars without any inflation factors, but do contain 20% contingency for scope changes, if necessary.

## **5. FINANCIAL IMPLICATIONS**

York Region's share of the project will be funded by 80% through development charges and the remaining 20% through water and wastewater rate reserves. The provision for this project in the current development charge by-law will be changed to reflect the new cost estimates in the amendment scheduled for March 2007.

## **6. LOCAL MUNICIPAL IMPACT**

Population and the resulting flow projections indicate that the Duffin Creek WPCP Stage 3 Expansion Projects are required to be commissioned and operating by the end of 2010. To ensure that there will be no direct impact to the schedule of providing future wastewater treatment and biosolids disposal capacity, the above described work must be completed in a timely manner. This project is considered critical to the ability to provide wastewater service to the Region until 2035.

By designing and constructing the Duffin Creek WPCP Stage 3 Expansion to meet more stringent effluent requirements and through improved air quality discharge methods, the local natural environment will see a significant improvement. In support of the Region's Sustainability Plan, additional improvements also are included for society through heritage preservation and enhancements to the Lake Ontario Waterfront Trail and for the economy through construction and operational employment and the provision of local area growth. All aimed to provide net gains to the triple bottom line.

The plant was state-of-the-art when first conceived and constructed by the MOE. Many features of the plant are still leading edge: (i) no bypass capability and (ii) full on-site processing of both liquids and solids. Current upgrades will result in the plant retaining its reputation as one of the best performing wastewater facilities in the Great Lakes Basin.

## **7. CONCLUSION**

Regional staff, in conjunction with the consultants, continue to evaluate every design decision process with an emphasis on the impact to the delivery schedule as well as costs. It is possible that many minor efforts to reduce the design period or construction times could provide a reduction that would prove to be beneficial to the Region.

As the project progresses, all estimates of the costs and construction times are also being continually refined with an effort to provide Senior Management and Regional Council with realistic projections.

Regional Council's authorization of the Regional Chair and CAO to award equipment procurement contracts that may require Council approval will expedite the contract authorization and execution process and facilitate completion of the project by 2010. The Senior Management Group has reviewed this report.

*(The attachment referred to in this clause is attached to this report.)*