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FLOW CONTROL ON THE YORK DURHAM SEWAGE SYSTEM

The Transportation and Works Committee recommends the following:

- 1. The presentation by Tracey McLean, Program Manager, Water and Wastewater, be received;**
- 2. The recommendations contained in the following report, May 24, 2007, from the General Manager, Water and Wastewater be adopted subject to Recommendation 3 being amended by deleting the words “could be delayed” and replacing them with the words “would take”, so that Recommendation 3 now reads as follows:**
 - 3. Staff report back in the fall of 2007 on results of further work to assess how long the South East Collector Sewer project would take without incurring additional risk beyond the 25 year design storm level of service.**

1. RECOMMENDATIONS

It is recommended that:

1. The Region proceed with implementing flow control on the York Durham Sewage System.
2. The cost of the flow control system be included in the proposed 2008 budget and capital plan.
3. Staff report back in the fall of 2007 on results of further work to assess how long the South East Collector Sewer project could be delayed without incurring additional risk beyond the 25 year design storm level of service.

2. PURPOSE

This report recommends proceeding with flow control systems in the York Durham Sewage System (YDSS) to increase system flexibility in managing wet weather flows. Flow control is being recommended at this time for two main purposes:

1. To mitigate risks of system surcharging as a result of construction delays anticipated in the South East Collector Sewer project.
2. To provide long term flow management capabilities for flexibility in system operation and maintenance activities.

3. BACKGROUND

At its meeting of June 23, 2005, Regional Council approved an overall YDSS wastewater capacity of 970,000 persons for distribution among the local municipalities of Vaughan, Markham, Richmond Hill, Aurora, Newmarket, East Gwillimbury, King and Whitchurch-Stouffville.

Various water and wastewater infrastructure projects were required to service the population of 970,000 which represents the existing wastewater treatment capacity of the Duffin Creek Pollution Control Plant and the current peak flow capacity of the existing South East Collector sewer. The progress of these specific projects and anticipated completion dates is reported on a quarterly basis.

The population of 970,000 serviced by the YDSS is expected to be reached by the year 2010 as growth serviced by the YDSS has continued at a rate of over 30,000 people per year. The capacity assessment also includes an allowance for the inflow and infiltration of wet weather flows into the wastewater system. For design purposes, the Region uses a 25 year design storm in assessing peak wet weather flows.

Many of the required infrastructure projects are complete, with the remaining under construction with completion dates sufficient to meet the demands of the expected growth. The South East Collector Sewer is the only project with a completion date beyond the 2010 requirement. Due to the increased rigor and information requirements of the Individual Environmental Assessment Process currently underway for the South East Collector, the expected completion date is 2012.

The Region retained Earth Tech to investigate the technical feasibility of flow attenuation to better manage peak wet weather conditions in the existing South East Collector sewer. Flow attenuation on the YDSS will reduce the risk of surcharge and overflows on the South East Collector sewer by temporarily holding back the flows within the larger diameter trunk sewers located upstream.

4. ANALYSIS AND OPTIONS

The estimated two year delay in the completion of the new South East Collector sewer requires the Region to investigate short term options to mitigate environmental risk in the existing South East Collector. Sewer. The risk is associated with peak wet weather flows which occur during intense or extended rainfall events. Options considered to mitigate this risk include; a re-evaluation of the existing capacity of the South East Collector sewer and the control of flows entering the South East Collector sewer

Earth Tech was retained to re-evaluate the existing capacity of the South East Collector sewer and to investigate options for flow control. A copy of the Executive Summary from

Earth Tech's May 2007 report entitled Feasibility of the Construction of Flow Control Structures in the YDSS is attached (*see Attachment 1*).

4.1 Evaluation of Existing South East Collector Sewer Capacity

The original capacity analysis, completed in 2005, identified the need for the twinned South East Collector to be in service by 2010. The existing South East Collector sewer was re-evaluated with updated population and infrastructure data to determine if the existing sewer could continue to convey flows from 2010 to 2012 with no additional increased risk of spills to the environment.

The results of the re-evaluation conclude that the existing South East Collector sewers able to continue to convey normal flows, however peak flows experienced during intense or extended rainfall events could cause surcharge or backup of wastewater flows. Risk of surcharge is more likely as the population increases. These results confirm the analysis completed in 2005 and require that an alternate servicing solution be identified prior to the completion of the new South East Collector sewer.

4.2 Flow Control

Flow control structures are intended to be used on large diameter sewers in deep tunnel sections of the YDSS. Various locations for flow control were assessed with the final recommendation being four flow control structures on the Ninth Line Trunk, 16th Avenue Trunk and Lower Leslie Trunk. The locations of the four flow control structures are shown on the attached plan. (*see Attachment 2*).

The basic principle behind flow control is that dry weather flows will not be detained in the sewer but would flow uninterrupted through the sewer. During a large wet weather event, flow control gates will be lowered to restrict flow, but never fully closed. As flow levels increase due to the response from the rainfall event, the flow will begin to back up behind the flow control structure. After the rain event has passed, the flow levels will begin to return to normal over a period of hours. When normal flow rates have fully resumed, the gates can be raised.

It is recommended that four flow control structures be constructed on the YDSS in the locations shown on Attachment 2. Flow control on the YDSS will eliminate surcharge and the backup of wastewater flows in the existing South East Collector. To complete the project prior to 2010, it is recommended that this project proceed immediately. Installation of flow control prior to 2010 will eliminate the surcharge risk sooner.

The environmental approval process for the flow control structures will follow the June 2000 MEA Class EA process. A "Schedule A" activity is anticipated since the proposed works involve only operational aspects of the sewer system that do not change the objective or size of the conveyance system and would be constructed within existing road allowances. Construction of the flow control structures will occur while the sewers are in use with most of the work being done in the access manholes of the sewers.

The flow control gates will be designed to accommodate wet weather flows expected from a 25 year design storm. This level of service is consistent in the design of all other York Durham Sewage System infrastructure and will pose no additional risk to the Region and its residents. Additional analysis will be completed over the summer months to determine if the South East Collector Sewer project can be further delayed through use of the flow control gates. This delay may result in additional benefits in terms of reduced construction costs and increased flexibility for cash flow.

The use of flow control structures such as gates is common in large sewer systems including the YDSS to control flows and reduce peak levels. Currently the YDSS uses a temporary flow control gate structure on the Bathurst Collector sewer to attenuate flows. In addition, the lower sections of the YDSS in Durham Region have been designed to operate under surcharge conditions to permit flow attention at Duffin Creek Water Pollution Control Plant.

Regulatory authorities including the United States Environmental Protection Agency (USEPA) embrace the use of flow control to provide operational flexibility and protect the environment.

Additional benefits of flow control on the YDSS include:

- Minimize impacts of peak wet weather flows at Duffin Creek Water Pollution Control Plant
- Increased operational control for large scale maintenance activities

5. FINANCIAL IMPLICATIONS

The estimated cost to construct four permanent flow control structures on the YDSS is \$6 Million. It is recommended that the cost of constructing the flow control structures be included in the proposed 2008 budget and capital plan, funded 80% from development charges and 20 % from user rates. There is sufficient funding in the 2007 budget to commence design.

6. LOCAL MUNICIPAL IMPACT

Effective distribution of servicing will help maintain an appropriate growth level across the Region and maintain the Region's economic health. The availability of servicing capacity is necessary for the continued build out and completion of our approved planned communities and is also necessary for intensification in both the Regional and local centres and corridors served by the YDSS within the currently designated urban area.

7. CONCLUSION

The two year delay in the completion of the new South East Collector sewer will increase the environmental risk in the existing South East Collector sewer due to surcharge. To eliminate this risk, it is recommended that flow control systems in the YDSS be constructed.

Construction of the flow control facilities recommended in this report may permit additional flexibility of the required in service date for the new Soundest Collector sewer beyond 2012. This could result in overall construction costs and more favourable cash flow. Additional technical work will be required to confirm this potential. Staff will report back in the fall of 2007.

Construction of the flow control structures on the YDSS and completion of the Duffin Creek WPCP will provide sufficient servicing capacity to allow an increase in allocation to accommodate the population expected by 2012.

For more information on this report, contact Ilmar Simanovskis, extension 5027, Manager Technical Support of the Water and Wastewater Branch in the Transportation and Works Department.

The Senior Management Group has reviewed this report.

(The attachments referred to in this clause are attached to this report.)