



**REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE  
MEETING OF WEDNESDAY 23 FEBRUARY 2011**

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**SUBJECT**      **LIFE CYCLE COSTS – CORE AREA WASTEWATER TREATMENT PROGRAM**

**ISSUE**

To provide a full life cycle cost analysis for the core area wastewater treatment project.

**BACKGROUND**

At its meeting of January 12, 2011, the Core Area Liquid Waste Management Committee approved a motion “that staff provide a full life-cycle cost analysis on the core area wastewater treatment project”.

The attached memo from Stantec provides the following information based on the assumptions detailed in the memo:

1. Summary of annual costs in 2030 (Table 1)
2. Summary of life cycle costs for the period 2017-2030 (Table 2)
3. A breakdown of annual operating and maintenance costs in 2030 and for the period 2017-2030 (Table 3)

**RECOMMENDATION**

That the Core Area Liquid Waste Management Committee receive this report for information.

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Tony Brcic, PEng  
Project Manager, Wastewater Treatment Project

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J.A. (Jack) Hull, MBA, PEng  
General Manager, Integrated Water Services  
Concurrence

TB:hr  
Attachment: 1



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To:	Tony Brcic, P.Eng. Capital Regional District	From:	Gilbert Cote, P.Eng. Victoria BC Office
File:	149009002	Date:	February 9, 2011

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**Reference: Life Cycle Cost Analysis - Wastewater Treatment Program**

A life cycle analysis of the wastewater treatment program was carried out for the period starting in 2017 when the plant will be operational to the year 2030 when the wastewater treatment plant may have reached its design capacity.

The following cost inputs were included in the LCC calculation:

1. **Capital Cost** – The share of the CRD for the capital cost is one third of all costs except for land and interim financing for which there are no subsidies. The share of the CRD is estimated at \$287.6 million. In order to finance its share, the CRD will borrow this amount. The annual debt repayment based on an amortization period of 25 years and an interest rate of 6% is **\$22.4 million**.
2. **Operating and Maintenance Cost** – The O&M cost include power, chemicals, water, labour, repair and maintenance of equipment and disposal of biosolids. When the plant reaches its design capacity of 107.8 ML/d in 2030, the annual O&M cost is estimated at **\$14,571,000**. The cost of some items such as power, chemical and disposal of biosolids will initially be lower since it is estimated that the flow into the plant in 2017 will be approximately 82% of the design flow.
3. **Revenues** – Revenues from the sale of resources from the processing of biosolids include bio-gas, tipping fee for receiving FOG, phosphorus (struvite) and low grade fuel from the dried biosolids. Similarly to the operating expenses, the revenues will increase with time as the sludge production of the liquid plant goes up with increased flow. The estimated revenues in the year 2030 are **\$3,121,000**.

In order to carry out the life-cycle cost calculation for the 2017-2030 period, the net present value of the expenditures for each year for debt servicing, O&M cost and revenues was calculated using a discount rate of 6%.

The results are summarized in Table 1 and Table 2 and the breakdown of the O&M costs is outlined in Table 3.

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Page 2 of 3

**Reference: Life Cycle Cost Analysis – Wastewater Treatment Program**

<b>Table 1 – Summary of Annual Cost in 2030</b>				
	<b>Total O&amp;M Cost</b>	<b>Debt Servicing</b>	<b>Total Annual Cost (O&amp;M + Debt Servicing)</b>	<b>Revenues</b>
Annual Cost in Year 2030 <sup>(1)</sup>	\$14,571,000	\$22,400,000	\$36,971,000	\$3,121,000

*Note: (1) Expressed in year 2010 dollars*

<b>Table 2 – Summary of Life Cycle Cost for 2017-2030</b>				
	<b>Total O&amp;M Cost</b>	<b>Debt Servicing</b>	<b>Total Annual Cost (O&amp;M + Debt Servicing)</b>	<b>Revenues</b>
Life-Cycle Cost 2017-2030	\$90,945,000	\$146,778,000	\$237,723,000	\$17,473,000

<b>Table 3 – Details of Operating and Maintenance Cost</b>		
<b>Item</b>	<b>Annual Cost in Year 2030</b>	<b>Life-Cycle Cost (2017-2030)</b>
Power	\$3,735,000	\$21,930,200
Chemicals	\$2,116,900	\$12,548,500
Water	\$316,000	\$2,070,600
Labour	\$2,440,000	\$15,988,300
Equipment maintenance & repairs	\$5,398,100	\$35,371,600
Disposal of biosolids	\$565,000	\$3,035,800
<b>Totals</b>	<b>\$14,571,000</b>	<b>\$90,945,000</b>

The assumptions used in estimating the operating and maintenance costs and the revenues are as follows:

Operating and Maintenance Cost

- Cost of electricity at \$0.08/kWh
- Power cost includes electricity for digester gas scrubbing equipment

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Page 3 of 3

### **Reference: Life Cycle Cost Analysis – Wastewater Treatment Program**

- Treated effluent will be chlorinated and reused for tank rinsing and cleaning at the McLoughlin Pt plant. Piped municipal water to be used for rinsing at other locations.
- Chemical cost includes alum and polymer for use in the primary clarifiers during wet weather and peak organic loading conditions only
- Disposal cost of biosolids at \$100 per tonne of dry solids
- Annual maintenance and repairs cost estimated at 1.1% of construction cost (excluding contingencies and fees)

### Revenues

- Tipping fee for FOG of \$0.07/litre (based on tipping fee charged by Metro Vancouver in 2009)
- FOG delivered to digester based on 70% diversion rate in 2017 increasing to 77% diversion by 2030
- Purified digester gas sold to Terasen at \$8/GJ
- Dried biosolids sold as low grade fuel at 80% of the value of coal - \$1.68/GJ

### **STANTEC CONSULTING LTD.**



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