Appendix D:

Nanoose Bay Pollution Control Centre Upgrade Study

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Water AECOM

Regional District of Nanaimo

Nanoose Pollution Control Centre Upgrade Study - Report

Prepared by:

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Project Number:

114501

Date:

March 26, 2010

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March 26th, 2010

Project Number: 114501.03

Mr. Sean De Pol
Manager of Wastewater Services
Regional District of Nanaimo
6300 Hammond Bay Road
Nanaimo, BC V9T 6N2

Dear Sean,

Re: Nanoose Pollution Control Center Upgrade Study - Report

In order to support the RDN in developing a strategic upgrade plan for the Nanoose Pollution Control Centre (NPCC), AECOM has reviewed past cost estimates and design reports prepared for the RDN as they relate to the optimization and upgrade of the NPCC to secondary treatment.

AECOM has with the help of the RDN gathered the most up-to-date plant performance, population growth, and future development information to put the upgrade to secondary treatment into the most relevant context. This report provides updated cost estimates for trunk sewers to connect the various service areas to the NPCC, as well as cost estimates to upgrade the NPCC to secondary treatment without increasing flow capacity. Several cost estimates have also been provided to upgrade the NPCC to secondary treatment and increase its service capacity.

Please provide any comments on this report to the undersigned at 604-473-8518, or to Norm Barmeier, Project Engineer, at 604-298-6181.

Sincerely,
AECOM Canada Ltd.

Will F. Wawrychuk, P.Eng.
Program Manager

Encl:

/nb

Executive Summary

Review of past studies, annual monitoring reports, the Official Community Plan, current population numbers, past and current population projections, cost estimates, and service areas has provided the information summarized below:

- The plant currently operates at approximately 42% of its current design capacity.
- The plant encounters little inflow and infiltration.
- Previous population and sewer connection projections have significantly overestimated actual population growth in the area.
- Observed population growth is approximately 0.3% per year.
- The NPCC currently (2009) has approximately 766 sewer connections, of which 596 are being actively billed including 3 commercial properties. These connections are all from the Fairwinds area.
- The Madrona area will connect to the French Creek Pollution Control Centre. This will reduce the NPCC service area to Beach Comber, Delanice Way, Dophin Drive, Shooner Cove, Garry Oak, Red Gap, and Fairwinds.
- The total cost for trunk sewers to connect these areas to the NPCC is approximately **$6,500,000**.
- The cost to upgrade the NPCC to secondary treatment and service 1,500 residents (625 properties) is approximately **$3,500,000**.
- The cost to upgrade the NPCC to secondary treatment and service 3,000 residents (1250 properties) is approximately **$7,500,000**.
- The cost to increase the capacity to 6,000 residents (2500 properties) and upgrade to secondary treatment as well as to provide sludge thickening and dewatering equipment is approximately **$11,000,000**.

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1. NPCC Performance

1.1 Hydraulic Capacity

The Nanoose Pollution Control Centre (NPCC) was originally designed for a population of 3,000 (1250 properties[1]), an average dry weather flow of 530 m^3/d, and a peak wet weather flow of 2,780 m^3/d. During construction only enough pumping capacity was installed to serve a population of 1,500 (625 properties[1]), the existing sedimentation tanks can support primary treatment for a population of 3,000 (1250 properties[1]) with the addition of sludge pumps.

The NPCC currently sees an average flow of approximately 220 m^3/d and a maximum flow of approximately 450 m^3/d. It is of particular note that this plant does not encounter peak hourly flows that approach the rated peak flow capacity of 2,780 m^3/d. The plant currently operates at approximately 42% of its original design capacity.

1. **The NPCC catchment collection system is relatively new and is isolated from wet weather flows; minimal I&I.**
2. **The NPCC average daily flow is currently 220 m^3/d.**
3. **The NPCC has an hydraulic capacity of 2,780 m^3/d.**

Flow data from the annual monitoring reports for NPCC has been summarized and plotted in Figure 1 to illustrate the change in flow through the plant since 1999. The average annual flow has increased from 120 m^3/d to 220 m^3/d over the past 10 years.

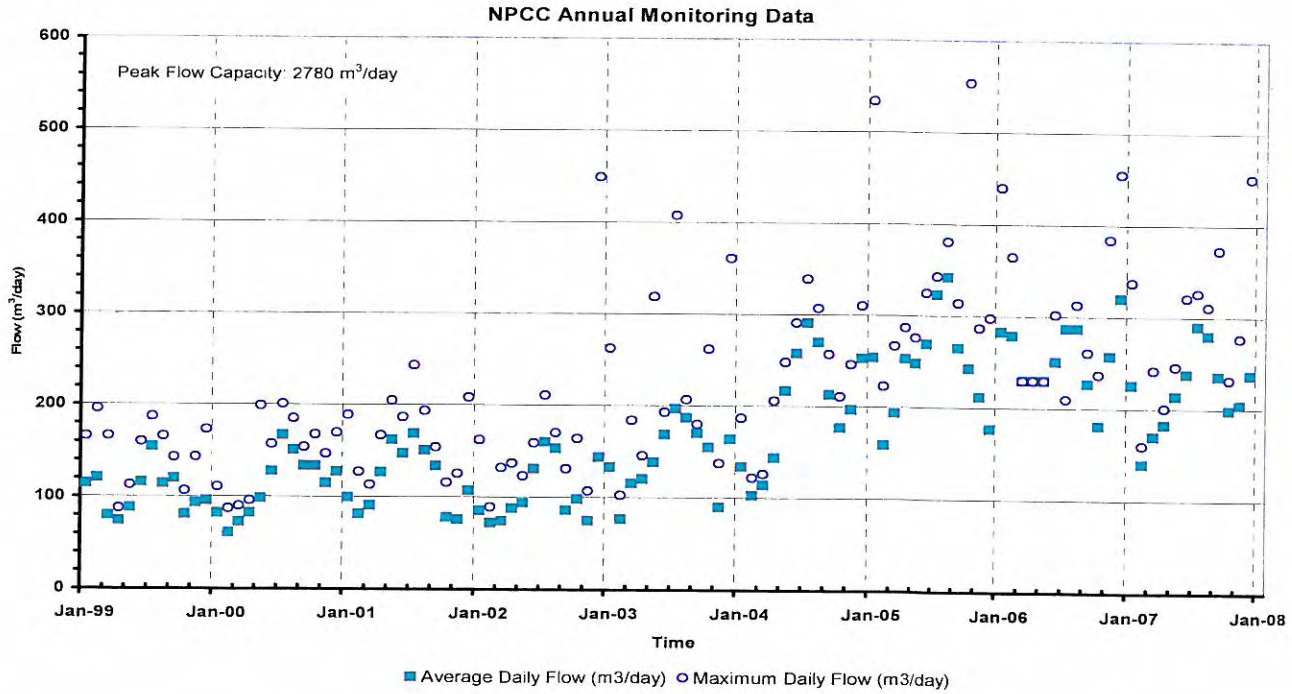

Figure 1 Summary of Annual Monitoring Reports – Average and Maximum Daily Flows

The plant was originally designed to handle approximately five times the average dry weather flow in order to accommodate peak hourly flows associated with wet weather events. However the collection system

[1] assume 2 4 residents per property

connected to the NPCC is strictly a sanitary sewer system which is isolated from storm water inflow. Operations staff has confirmed that the collection system is also relatively new and little infiltration through cracks or poor piping joints has been observed.

1.2 Population Projections for the Area Serviced by the NPCC

Based on the Nanoose Bay Official Community Plan there are nine areas that form part of the NPCC catchment area. These are Madrona, Beach Comber, Delanice Way, Dophin Drive, Shooner Cove, Garry Oak, Red Gap, the Department of National Defence, and Fairwinds. Madrona will be serviced by the French Creek Pollution Control Center. Fairwinds is the only neighbourhood currently physically connected to the NPCC. In addition, there are 129 parcels of land at Gary Oak with the potential to connect immediately, for a total of 846 physical sanitary sewer connections to the plant. The remaining areas use private septic fields.

The Schooner Cove condominium complex was connected this summer and has added an estimated 49 residential connections to be serviced by NPCC bringing current active sewer connections to 766, however according to the latest billing information provided by the RDN only 596 connections are being actively billed.

There have been several population projections made in the past and Table 1 summarizes past lot counts, house counts, and latest population projections. Generally, the actual population growth and sewer connections observed have been significantly less than had been projected in the past. The observed population growth is approximately 0.3%.

Table 1 House Count and Population Projections

Area	2006 lot count	2009 house count*	2009 Population based on house count**	Projected population based on OCP build out**
Madrona	n/a	n/a	n/a	0 - Connecting to FCPCC
Beachcomber	n/a	465	1116	1320
Delanice Way	n/a	27	67	84
Dolphin Drive	366	328	788	1174
Shooner Cover	n/a	49***	118	449
Garry Oak	138	129	310	762
Red Gap	165	252-290	504-580	1000-1100
DND	n/a	n/a	40-74	131
Fairwinds	658	623***	1495	5366
TOTALS			**~3600**	**~10400**

*Notes: * the current house count is based on recent discussions with RDN staff.*
*** Populations are based on a factor of 2.4 people per lot applied to the projected OCP build out lots*
**** denotes houses that are physically connected to the NPCC*

2. Updated Capital Cost Estimates

2.1 Trunk Sewer Projects

Original cost estimates for trunk sewers put forward by Dayton & Knight in 1997 included the following trunk sewers:

1. Madrona pump station and trunk connection to Beachcomber pump station;
2. Delanice Way pump station and trunk connection to Madrona trunk connection;
3. Beachcomber pump station and trunk connection to NPCC;
4. Red Gap pump station and trunk connection to NPCC; and
5. Garry Oak pump station (part of Red Gap trunk connection to NPCC).

In the current context Madrona will no longer require sewage treatment from NPCC as a recent referendum was passed to connect Madrona to the French Creek Pollution Control Center.

The following Table 2 summarizes original and updated cost estimates for Delanice Way, Beachcomber, Red Gap, and Garry Oak, based on the technical details outlined in Dayton & Knight 1997 Sewer System Concept Design report on file at the RDN. Update cost estimates are based on the trunk sewer lengths and diameters put forward by Dayton & Knight. Current labour and material costs have been applied to generate the 2009 estimates.

Table 2 Updated Trunk Sewer Cost Estimates

Area	1997 Estimates	2009 Estimate
Madrona pump station and trunk connection to Beachcomber pump station	$778,000	n/a
Delanice Way pump station and trunk connection to Madrona trunk connection	$338,000	$659,295
Beachcomber pump station and trunk connection to NPCC (option b)	$1,401,000	$2,873,850
Red Gap pump station and trunk connection to NPCC	$1,234,000	$2,502,675
Garry Oak pump station (part of Red Gap trunk connection to NPCC)	$352,000	$527,546
TOTAL	**$4,103,000**	**$6,563,366**

Details of the original and revised cost estimates are attached as Appendix A.

2.2 Upgrade to Secondary Treatment

In 1996 Dayton & Knight provided the RDN cost estimates to take the NPCC to secondary treatment. Several treatment alternatives were screened and compared on a capital cost basis. The total project cost included 10% contingencies, 15% engineering and project management fees, 8% interim financing, and 6% taxes. The technologies and original cost estimates are summarized in Table 3 using 1996 dollars. The total project cost for conversion to sequencing batch reactors in 1996 was $2,910,000.

Table 3 Conceptual Cost Estimates for Various Technologies

Technology	1996 Cost Estimate ($)
Oxidation Ditch	$3,060,000
Sequencing Batch Reactor	$2,910,000
Trickling Filter/Solids Contact	$3,220,000
Ecofluid	$3,890,000
Hydroxyl	$4,110,000
Solar Aquatics	$3,560,000
ZenoGem	$3,710,000

It is important to note that the design basis for the upgrade to secondary treatment put forward in 1996 assumed that the existing primary sedimentation tanks would be converted to SBR basins, and that three additional SBR basins would be required to service an anticipated 6,000 people.

AECOM prepared an independent conceptual level cost estimate to convert the NPCC to secondary treatment using SBR technology based on an ADWF of 530 m^3/d. This cost estimate is summarized in Table 4 below. AECOM estimates it will cost approximately $3,500,000 to convert the NPCC to secondary treatment using SBR technology without making allowances for expansion of the plant for additional flow capacity.

Table 4 Conceptual Cost Estimate – Secondary Upgrade to SBR for more Residents

Item	Description	AECOM Estimate ($)		
		1,500 resident	3,000 residents	6,000 residents
1.0	General	$65,000	$65,000	$65,000
2.0	Structural	$316,000	$602,000	$1,024,000
3.0	Process Mechanical	$1,234,000	$2,911,000	$4,190,000
4.0	Building Mechanical	$85,000	$85,000	$85,000
5.0	Electrical	$250,000	$350,000	$500,000
6.0	Instrumentation	$250,000	$350,000	$600,000
	Subtotal	**$2,200,000**	**$4,363,000**	**$6,464,000**
	Engineering (15%)	$330,000	$654,450	$969,600
	Contractor's Overhead and Profit (10%)	$220,000	$436,300	$646,400
	Subtotal	**$2,750,000**	**$5,453,750**	**$8,080,000**
	Contingency Allowance (25%)	$687,500	$1,908,813	$2,828,000
	TOTAL (not including taxes)	**$3,437,500**	**$7,362,563**	**$10,908,000**

The 1996 Dayton and Knight report also recommends SBR in combination with thickening untreated waste biosolids and trucking the thickened biosolids to the FCPCC for treatment and reuse.

AECOM therefore also prepared an independent conceptual level cost estimate to convert the NPCC to secondary treatment using SBR technology and adding sludge thickening and dewatering capabilities based on a population of 3,000 and 6,000. This cost estimate is summarized in Table 4 above. AECOM estimates it will cost approximately $7,500,000 to treat sewage from 3,000 residents and approximately $11,000,000 for 6,000 residents by converting the NPCC to secondary treatment using SBR technology. The property is large enough to accommodate the additional infrastructure required for this upgrade.

Detailed cost estimates are attached as Appendix B.

3. Conclusions

Based on the review that AECOM has completed of previous information, and updated capital cost estimates, the following can be concluded:

- NPCC is currently running at 42% of full capacity and providing adequate primary treatment.
- An upgrade to secondary treatment for 1,500 residents will cost approximately $ 3,500,000 using SBR technology.
- An upgrade to secondary treatment for 3,000 residents will cost approximately $ 7,500,000 using SBR technology.
- An upgrade to secondary treatment for 6,000 residents will cost approximately $ 11,000,000 based on SBR technology and the inclusion of sludge thickening equipment.
- Trunk sewers to connect the entire catchment area will cost approximately $ 6,500,000.

APPENDIX A
TRUNK SEWER COST ESTIMATE DETAILS

Updated trunk sewer cost estimate – Delanice Way Pump Station

Area	2009 Estimates	1997 Estimate
Pump Station – 2 – 350 m^3/d pumps, ± 5 HP c/w S/B generator	$225,000	$150,000
Forcemain, paved road; 75 mm, 600 m x $200/m	$120,000	$42,000
Forcemain, unpaced easement; 75 mm, 200 m x $150/m	$30,000	$13,000
Forcemain tie-ins	$3,000	n/a
Allowance for rock 450 m^3 x $150/$m^3$	$67,500	$36,000
Clearing, allowance	$3,000	$2,000
Subtotal	**$448,500**	**$243,000**
Engineering & Contingency (30% in 1997, 40% in 2009)	$179,400	$73,000
Subtotal	**$627,900**	**$316,000**
GST (7% in 1997, 5% in 2009)	$31,395	$22,000
TOTAL	**$659,295**	**$338,000**

Updated Trunk Sewer Cost Estimate – Beachcomber Pump Station (Option B*)

Area	2009 Estimates	1997 Estimate
Pump Station – 2 – 1640 m^3/d pumps, ± 25 HP c/w S/B generator	$325,000	$200,000
Forcemain, paved road; 200 mm, 2200 m x $270/m	$594,000	$308,000
Forcemain, unpaced easement;200 mm, 1900 m x $225/m	$427,500	$202,000
Forcemain and sewer tie-ins	$10,000	n/a
Gravity sewer, unpaved easement; 250 mm, 400 m x $360/m	$144,000	$61,000
1050 mm sanitary manholes 4 x $4000 each	$16,000	n/a
Allowance for rock 2550 m^3 x $150/$m^3$	$382,500	$204,000
Allowance for clearing, 2.8 ha x $20,000/ha	$56,000	$34,000
Subtotal	**$1,955,000**	**$1,009,000**
Engineering & Contingency (30% in 1997, 40% in 2009)	$782,000	$301,000
Subtotal	**$2,737,000**	**$1,310,000**
GST (7% in 1997, 5% in 2009)	$136,850	$91,000
TOTAL	**$2,873,850**	**$1,401,000**

* Refer to Dayton and Knight 1996 Pre-Design Report Phase 1 for details

Updated Trunk Sewer Cost Estimate – Red Gap Pump Station

Area	2009 Estimates	1997 Estimate
Pump Station – 2 – 2380 m^3/d pumps, ± 50 HP c/w S/B generator	$350,000	$225,000
Forcemain, paved road; 200 mm, 2100 m x $270/m	$567,000	$294,000
Forcemain, proposed road;200 mm, 2000 m x $225/m	$450,000	$212,000
Forcemain and sewer tie-ins	$10,000	n/a
Gravity sewer, proposed road; 250 mm, 300 m x $360/m	$108,000	$46,000
1050 mm sanitary manholes 3 x $4000 each	$12,000	n/a
Allowance for rock 1370 m^3 x $150/$m^3$	$205,500	$110,000
Subtotal	**$1,702,500**	**$887,000**
Engineering & Contingency (30% in 1997, 40% in 2009)	$681,000	$266,000
Subtotal	**$2,383,500**	**$1,153,000**
GST (7% in 1997, 5% in 2009)	$119,175	$81,000
TOTAL	**$2,502,675**	**$1,234,000**

Updated Trunk Sewer Cost Estimate – Garry Oak Pump Station

Area	2009 Estimates	1997 Estimate
Pump Station – 2 – 2750 m^3/d pumps, ± 35 HP c/w S/B generator	$350,000	$250,000
Forcemain, paved road; 100 mm, 15 m x $225/m	$3,375	$1,500
Forcemain and sewer tie-ins	$4,000	n/a
Allowance for rock	$1,500	$1,500
Subtotal	**$358,875**	**$253,000**
Engineering & Contingency (30% in 1997, 40% in 2009)	$143,550	$76,000
Subtotal	**$502,425**	**$329,000**
GST (7% in 1997, 5% in 2009)	$25,121	$23,000
TOTAL	**$527,546**	**$352,000**

APPENDIX B
SECONDARY UPGRADE COST ESTIMATE DETAILS

Pre-Design Cost Estimate – 1500 People

Rev 0

Item	Description	Quantity	Unit	Unit Price	Total Material	Total Labour	Extension ($)
1.0	**GENERAL**						
1.1	*Mobilization/Demobilization*	1	LS	$40,000			$40,000
1.2	*Start-up and Commissioning*	1	LS	$5,000			$5,000
1.3	*Landscaping*	1	LS	$20,000			$20,000
	TOTAL 1.0 - GENERAL						**$65,000**
2.0	**STRUCTURAL**						
2.1	*Modify Existing Primary Sedimentation Tanks*						
2.1.1	Demolition and modification	1	LS	$50,000			$50,000
2.2	*New SBR Basins*						
2.2.1	Two new basins similar in size to modified sed tanks (12x2.75x3.6)	1	LS	$116,000			$116,000
2.3	*Building and Gallery Modifications*						
2.3.1	Extension to accommodate new equipment	1	LS	$150,000			$150,000
	TOTAL 2.0 - STRUCTURAL						**$316,000**
3.0	**PROCESS MECHANICAL**						
3.1	*Headworks*						
3.1.1	In-Channel Spiral Screen	1	ea	$100,000	$100,000	$35,000	$135,000
3.1.2	Manual Screen (bypass)	1	ea	$15,000	$15,000	$5,000	$20,000
3.2	*SBR*						
3.2.1	Blowers (one per basin + common standby - 7.5 kW each)	5	ea.	$20,000	$100,000	$35,000	$135,000
3.2.2	Fine Bubble Aeration	1	ea.	$40,000	$40,000	$14,000	$54,000
3.2.3	SBR Decanters and Controls	4	ea.	$65,000	$260,000	$90,000	$350,000
3.2.4	Waste Solids Pumps	2	ea.	$7,500	$15,000	$5,000	$20,000
3.2.5	Effluent Pumps	2	ea.	$45,000	$90,000	$30,000	$120,000
3.2.6	Piping, Valves and Gates	1	ea.	$300,000	$300,000	$100,000	$400,000
	TOTAL 3.0 - PROCESS MECHANICAL						**$1,234,000**
4.0	**BUILDING MECHANICAL**						
4.1	*Odour Control*	1	LS	$85,000			$85,000
	TOTAL 4.0 – BUILDING MECHANICAL						**$85,000**
5.0	**ELECTRICAL**						
5.1	*Electrical*	1	LS	$250,000			$250,000
	TOTAL 5.0 - ELECTRICAL						**$250,000**
6.0	**INSTRUMENTATION**						
6.1	*Instrumentation*	1	LS	$250,000			$250,000
	TOTAL 6.0 - INSTRUMENTATION						**$250,000**
	TOTAL						**$2,200,000**

Pre-Design Cost Estimate – 3000 People

Rev 0

Item	Description	Quantity	Unit	Unit Price	Total Material	Total Labour	Extension ($)
1.0	**GENERAL**						
1.1	*Mobilization/Demobilization*	1	LS	$40,000			$40,000
1.2	*Start-up and Commissioning*	1	LS	$5,000			$5,000
1.3	*Landscaping*	1	LS	$20,000			$20,000
	TOTAL 1.0 - GENERAL						**$65,000**
2.0	**STRUCTURAL**						
2.1	*Modify Existing Primary Sedimentation Tanks*						
2.1.1	Demolition and modification	1	LS	$50,000			$50,000
2.2	*New SBR Basins*						
2.2.1	Two new basins similar in size to modified sed tanks (12x2.75x3.6)	1	LS	$116,000			$116,000
2.2.2	Two new, deeper basins (12x3.3x5.6)	1	LS	$136,000			$136,000
2.3	*Building and Gallery Modifications*						
2.3.1	Extension to accommodate new equipment	1	LS	$300,000			$300,000
	TOTAL 2.0 - STRUCTURAL						**602,000**
3.0	**PROCESS MECHANICAL**						
3.1	*Headworks*						
3.1.1	In-Channel Spiral Screen	1	ea	$100,000	$100,000	$35,000	$135,000
3.1.2	Manual Screen (bypass)	1	ea	$15,000	$15,000	$5,000	$20,000
3.2	*SBR*						
3.2.1	Blowers (one per basin pair + common standby – 10 kW each)	4	ea.	$30,000	$120,000	$35,000	$155,000
3.2.2	Fine Bubble Aeration	1	ea.	$110,000	$110,000	$20,000	$130,000
3.2.3	SBR Decanters and Controls	6	ea.	$65,000	$390,000	$120,000	$510,000
3.2.4	Waste Solids Pumps	6	ea.	$7,500	$45,000	$16,000	$61,000
3.2.5	Effluent Pumps	2	ea.	$60,000	$120,000	$30,000	$150,000
3.2.6	Piping, Valves and Gates	1	ea.	$650,000	$650,000	$225,000	$875,000
3.3	*Sludge Thickening and Dewatering*						
3.3.1	Sludge Thickening DAFs	1	ea.	$150,000	$150,000	$60,000	$210,000
3.3.2	Dewatering Centrifuge	1	ea.	$350,000	$350,000	$110,000	$460,000
3.3.3	Piping Valves and Gates	1	ea.	$150,000	$150,000	$55,000	$205,000
	TOTAL 3.0 - PROCESS MECHANICAL						**$2,911,000**
4.0	**BUILDING MECHANICAL**						
4.1	*Odour Control*	1	LS	$85,000			$85,000
	TOTAL 4.0 – BUILDING MECHANICAL						**$85,000**
5.0	**ELECTRICAL**						
5.1	*Electrical*	1	LS	$350,000			$350,000
	TOTAL 5.0 - ELECTRICAL						**$350,000**
6.0	**INSTRUMENTATION**						
6.1	*Instrumentation*	1	LS	$350,000			$350,000
	TOTAL 6.0 - INSTRUMENTATION						**$350,000**
	TOTAL						**$4,363,000**

Pre-Design Cost Estimate – 6000 People

Rev 0

Item	Description	Quantity	Unit	Unit Price	Total Material	Total Labour	Extension ($)
1.0	**GENERAL**						
1.1	*Mobilization/Demobilization*	1	LS	$40,000			$40,000
1.2	*Start-up and Commissioning*	1	LS	$5,000			$5,000
1.3	*Landscaping*	1	LS	$20,000			$20,000
	TOTAL 1.0 – GENERAL						**$65,000**
2.0	**STRUCTURAL**						
2.1	*Modify Existing Primary Sedimentation Tanks*						
2.1.1	Demolition and modification	1	LS	$50,000			$50,000
2.2	*New SBR Basins*						
2.2.1	Two new basins similar in size to modified sed tanks (12x2.75x3.6)	1	LS	$116,000			$116,000
2.2.2	*Six new, deeper basins (12x3x5.6)*	1	LS	$408,000			$408,000
2.3	*Building and Gallery Modifications*						
2.3.1	Extension to accommodate new equipment	1	LS	$450,000			$450,000
	TOTAL 2.0 - STRUCTURAL						**$1,024,000**
3.0	**PROCESS MECHANICAL**						
3.1	*Headworks*						
3.1.1	In-Channel Spiral Screen		1	ea	$100,000	$100,000	$35,000
3.1.2	Manual Screen (bypass)		1	ea	$15,000	$15,000	$5,000
3.2	*SBR*						
3.2.1	Blowers (one per basin + common standby - 15 kW each)	5	ea.	$30,000	$150,000	$35,000	$185,000
3.2.2	Fine Bubble Aeration	1	ea.	$160,000	$600,000	$35,000	$195,000
3.2.3	SBR Decanters and Controls	8	ea.	$65,000	$520,000	$180,000	$700,000
3.2.4	Waste Solids Pumps	8	ea.	$7,500	$60,000	$40,000	$100,000
3.2.5	Effluent Pumps	2	ea.	$75,000	$150,000	$30,000	$180,000
3.2.6	Piping, Valves and Gates	1	ea.	$1,000,000	$1,000,000	$350,000	$1,350,000
3.3	*Sludge Thickening and Dewatering*						
3.3.1	Sludge Thickening DAFs	2	ea	$150,000	$300,000	$100,000	$400,000
3.3.2	Dewatering Centrifuge	1	ea	$350,000	$350,000	$110,000	$460,000
3.3.3	Piping, Valves and Gates	1	ea	$250,000	$250,000	$80,000	$330,000
	TOTAL 3.0 - PROCESS MECHANICAL						**$4,190,000**
4.0	**BUILDING MECHANICAL**						
4.1	*Odour Control*	1	LS	$85,000			$85,000
	TOTAL 4.0 – BUILDING MECHANICAL						**$85,000**
5.0	**ELECTRICAL**						
5.1	*Electrical*	1	LS	$500,000			$500,000
	TOTAL 5.0 - ELECTRICAL						**$500,000**
6.0	**INSTRUMENTATION**						
6.1	*Instrumentation*	1	LS	$600,000			$600,000
	TOTAL 6.0 - INSTRUMENTATION						**$600,000**
	TOTAL						**$6,464,000**

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Technical Memorandum

To	Shelley Norum	Page	1
CC	Sean De Pol		
Subject	Nanoose Pollution Control Center Cost Estimate Update		
From	Susan Spruston, P.Eng.		
Reviewed By	David Lycon, P.Eng.		
Date	July 16, 2012	Project Number	6024625

BACKGROUND

In response to the request from the Regional District of Nanaimo on June 1, 2012, the preliminary cost estimate for the secondary upgrade to the Nanoose Pollution Control Center has been updated for a population of 2,000 PE. This estimate is based on the Nanoose Pollution Control Center Upgrade Study that was completed by AECOM in March 2010.

DESIGN BASIS

A summary of the design parameters are provided in Table 1 below.

Table 1. Design Parameters

Parameter	Value
Population	2,000
ADWF, m^3/d (based on 350L/c/d)	700
Influent BOD_5 Concentration, mg/L	165
Influent BOD_5 Load, kg/d	116

As per the pre-design study that was completed in 2010 it is assumed that the secondary expansion would consist of the following works:

- Conversion of the existing primary sedimentation tanks to SBRs.
- Construction of two additional/larger SBR tanks.
- Supply and installation of a new headworks screens, one mechanical fine screen and one bypass screen.
- Supply and install of new aeration blowers, waste solids pumps, effluent pumps and associated piping, valving and gates.
- Expansion to the existing building and gallery to accommodate the new mechanical equipment.
- Electrical and instrumentation components to complete the works noted above.

COST ESTIMATE

Table 2. presents a cost estimate breakdown, the total project cost is estimated to be **$4,101,000**.

Table 2. Cost Estimate – 2,000 PE

Description	AECOM Estimate
1.0 General	$ 135,000
2.0 Civil	$ 66,000
3.0 Structural	$ 455,000
4.0 Process Mechanical	$ 1,331,000
5.0 Building Mechanical	$ 100,000
6.0 Electrical	$ 280,000
7.0 Instrumentation	$ 280,000
Sub-Total	**$ 2,647,000**
Engineer and Administration (25%)	$ 660,000
Contingency (30%)	$ 794,000
Total	**$ 4,101,000**

The following assumptions were made in development of the estimate above.

- Sludge will continue to be shipped to FCPCC with storage in the existing sludge storage tank. During the design of the secondary expansion it is recommended that an analysis be completed to review the economics of dewatering on site prior to hauling off-site.
- Civil costs exclude ground improvements and dewatering. Further investigation shall be completed during the design. The contingency value allocated above should cover these costs if required.
- Excludes any remedial work on existing tankage or systems that may be recommended to be completed at the time of the upgrade.