



**BURNSIDE**

[ THE DIFFERENCE IS OUR PEOPLE ]

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## Appendix H

### Preliminary Opinion of Probable Costs

**Conceptual Cost Estimate****Alternative Solution 2 - Renovate Existing Pumping Station at Existing Site**

	Qty	Unit	Unit Price	Total
Sewer From Street to SPS (300 dia)	15	m	\$ 1,000	\$ 15,000
Convert SPS to Partial EQ.	1	LS	\$ 200,000	\$ 200,000
Additional Structure	1	LS	\$ 4,157,100	\$ 4,157,100
Building Mech/Elec/Process	1	LS	\$ 850,000	\$ 850,000
Second Forcemain on John (300 mm)	299	m	\$ 750	\$ 224,250
Overflow Pipe (375 mm) - on street	365	m	\$ 660	\$ 240,900
Overflow Pipe (375 mm) - to river	65	m	\$ 660	\$ 42,900
Outfall	1	LS	\$ 25,000	\$ 25,000
Subtotal				\$ 5,755,150
Engineering and Contingencies	30%			\$ 1,726,545
Total				\$ 7,481,695

**Alternative Solution 3 - Construct New Pumping Station at Existing Site**

	Qty	Unit	Unit Price	Total
Sewer From Street to SPS (dia)	30	m	\$ 1,000	\$ 30,000
New SPS	1	LS	\$ 4,438,100	\$ 4,438,100
Building Mech/Elec/Process	1	LS	\$ 850,000	\$ 850,000
Decommissioning Existing SPS	1	LS	\$ 100,000	\$ 100,000
Second Forcemain on John (300 mm)	299	m	\$ 750	\$ 224,250
Overflow Pipe (375 mm)	365	m	\$ 660	\$ 240,900
Overflow Pipe (375 mm) - to river	65	m	\$ 660	\$ 42,900
Outfall	1	LS	\$ 25,000	\$ 25,000
Subtotal				\$ 5,951,150
Engineering and Contingencies	30%			\$ 1,785,345
Total				\$ 7,736,495

**Alternative Solution 4 - Construct New Pumping Station at New Site**

	Qty	Unit	Unit Price	Total
Sewer From Street to SPS (dia)	15	m	\$ 6,300	\$ 94,500
New SPS	1	LS	\$ 6,760,100	\$ 6,760,100
Building Mech/Elec/Process	1	LS	\$ 850,000	\$ 850,000
Decommission Existing SPS	1	LS	\$ 100,000	\$ 100,000
Gravity Sewer (375 mm John St to Park)	826	m	\$ 5,100	\$ 4,212,600
Twin Forcemain (300 mm Park to John St)	826	m	\$ 1,500	\$ 1,239,000
Second Forcemain on John (300 mm)	299	m	\$ 750	\$ 224,250
Overflow Pipe (375 mm) - on street	257	m	\$ 660	\$ 169,620
Overflow Pipe (375 mm) - to river	65	m	\$ 660	\$ 42,900
Outfall	1	LS	\$ 25,000	\$ 25,000
Subtotal				\$ 13,717,970
Engineering and Contingencies	30%			\$ 4,115,391
Total				\$ 17,833,361

**Conceptual Cost Estimate****Alternative Solution 4B - Construct New Pumping Station at New Site with Lynden Circle**

	Qty	Unit	Unit Price	Total
Sewer From Street to SPS (dia)	15	m	\$ 6,300	\$ 94,500
New SPS	1	LS	\$ 7,313,100	\$ 7,313,100
Building Mech/Elec/Process	1	LS	\$ 850,000	\$ 850,000
Decommission Existing SPS	1	LS	\$ 100,000	\$ 100,000
Decommission Lynden Circle SPS	1	LS	\$ 100,000	\$ 100,000
Gravity Sewer (375 mm John St to Lynden Circle)	691	m	\$ 5,000	\$ 3,455,000
Gravity Sewer (300 mm Lynden Circle SPS to River Drive)	246	m	\$ 6,300	\$ 1,549,800
Gravity Sewer (300 mm Lynden Circle to Park)	135	m	\$ 6,300	\$ 850,500
Twin Forcemain (300 mm Park to John St)	830	m	\$ 1,500	\$ 1,245,000
Second Forcemain on John (300 mm)	299	m	\$ 750	\$ 224,250
Overflow Pipe (375 mm) - on street	257	m	\$ 660	\$ 169,620
Overflow Pipe (375 mm) - to river	65	m	\$ 660	\$ 42,900
Outfall	1	LS	\$ 25,000	\$ 25,000
Subtotal				\$ 16,019,670
Engineering and Contingencies	30%			\$ 4,805,901
Total				\$ 20,825,571

**Alternative Solution 4C - Construction New Pumping Station at New Site with Lynden Circle and Surcharged Inlet Trunk Sewer**

	Qty	Unit	Unit Price	Total
Sewer From Street to SPS (dia)	15	m	\$ 6,300	\$ 94,500
New SPS	1	LS	\$ 6,369,100	\$ 6,369,100
Building Mech/Elec/Process	1	LS	\$ 850,000	\$ 850,000
Decommission Existing SPS	1	LS	\$ 100,000	\$ 100,000
Decommission Lynden Circle SPS	1	LS	\$ 100,000	\$ 100,000
Gravity Sewer (375 mm John St to Lynden Circle)	691	m	\$ 5,000	\$ 3,455,000
Gravity Sewer (300 mm Lynden Circle SPS to River Drive)	246	m	\$ 6,300	\$ 1,549,800
Gravity Sewer (300 mm Lynden Circle to Park)	135	m	\$ 6,300	\$ 850,500
Twin Forcemain (300 mm Park to John St)	830	m	\$ 1,500	\$ 1,245,000
Second Forcemain on John (300 mm)	299	m	\$ 750	\$ 224,250
Overflow Pipe (375 mm) - on street	257	m	\$ 660	\$ 169,620
Overflow Pipe (375 mm) - to river	65	m	\$ 660	\$ 42,900
Outfall	1	LS	\$ 25,000	\$ 25,000
Subtotal				\$ 15,075,670
Engineering and Contingencies	30%			\$ 4,522,701
Total				\$ 19,598,371

**Gravity Sewer Cost Breakdown**

**Alternative 4 - Gravity Sewers - John St. to Barber Mill Park Site**

Street	From	To	Dia	Length	Slope	Start Inv	Fin Inv	Start Gr	Fin Grade	Start Depth	Fin Depth	Max	Avg	Unit Price	Total
John St	SPS	Mountainview	375	160	0.50%	233.90	233.10	236.40	236.30	2.50	3.20	3.20	2.85	\$ 660	\$ 105,600
Mountain View	John	River Drive	375	235	0.50%	233.10	231.93	236.30	246.00	3.20	14.08	14.08	8.64	\$ 6,300	\$ 1,480,500
River Drive	River Drive	Lynden Circle	375	296	0.50%	231.93	230.45	246.00	240.80	14.08	10.36	14.08	12.22	\$ 6,300	\$ 1,864,800
River Drive	Lynden Circle	Front of SPS	375	74	0.50%	230.45	230.08	240.80	238.80	10.36	8.73	10.36	9.54	\$ 6,300	\$ 466,200
SPS Drive	Front of SPS	SPS	375	61	0.50%	230.08	229.77	238.80	242.00	8.73	12.23	12.23	10.48	\$ 6,300	\$ 384,300
<b>Total</b>				<b>826</b>									<b>Avg</b>	<b>\$</b>	<b>5,100</b>

**Alternative 4B & 4C - Gravity Sewers - John St. to Barber Mill Park Site**

Street	From	To	Dia	Length	Slope	Start Inv	Fin Inv	Start Gr	Fin Grade	Start Depth	Fin Depth	Max	Avg	Unit Price	Total
Lynden Circle	West of SPS	East Corner of Lynden	300	97	0.50%	225.09	224.61	228.65	237	3.56	12.40	12.40	7.98	\$ 6,300	\$ 611,100
Lynden Circle	East Corner of Lynden	River Drive	300	149	0.50%	224.61	223.86	237	240.8	12.40	16.94	16.94	14.67	\$ 6,300	\$ 938,700
<b>Total</b>				<b>246</b>									<b>Avg</b>	<b>\$</b>	<b>6,300</b>
John St	SPS	Mountainview	375	160	0.50%	233.90	233.10	236.4	236.3	2.50	3.20	3.20	2.85	\$ 660	\$ 105,600
Mountain View	John	River Drive	375	235	0.50%	233.10	231.93	236.3	246	3.20	14.08	14.08	8.64	\$ 6,300	\$ 1,480,500
River Drive	River Drive	Lynden Circle	375	296	0.50%	231.93	230.45	246	240.8	14.08	10.36	14.08	12.22	\$ 6,300	\$ 1,864,800
<b>Total</b>				<b>691</b>									<b>Avg</b>	<b>\$</b>	<b>5,000</b>
River Drive	Lynden Circle	Front of SPS	375	74	0.50%	223.79	223.42	240.8	238.8	17.02	15.39	17.02	16.20	\$ 6,300	\$ 466,200
SPS Drive	Front of SPS	SPS	375	61	0.50%	223.42	223.11	238.8	242	15.39	18.89	18.89	17.14	\$ 6,300	\$ 384,300
<b>Total</b>				<b>135</b>									<b>Avg</b>	<b>\$</b>	<b>6,300</b>

**Notes:**

Diameters in mm

Lengths, Elevations and Depths in m.

Does not include forcemains or overflow pipe

**Energy Costs And Maintenance Costs for Life Cycle Analysis**

**Additional Energy Costs - New John St. SPS**

	m <sup>3</sup> /h	m			\$/kwh	hours	\$/year
Pump Power	45	3.5		0.429 kW			
Motor Eff			90%	0.477 kW			
Pump Eff			60%	0.795 kW	0.12	8760	\$ 835.49

**Additional Energy Costs - Barber Mill Park - Alternative Solution 4**

	m <sup>3</sup> /h	m			\$/kwh	hours	\$/year
Pump Power	45	7.3		0.895 kW			
Motor Eff			90%	0.995 kW			
Pump Eff			60%	1.658 kW	0.12	8760	\$ 1,742.58

**Additional Energy Costs - Barber Mill Park - Alternative Solution 4B**

	m <sup>3</sup> /h	m			\$/kwh	hours	\$/year
Pump Power	45	13.9		1.704 kW			
Motor Eff			90%	1.894 kW			
Pump Eff			60%	3.156 kW	0.12	8760	\$ 3,318.07

**Additional Energy Costs - Barber Mill Park - Alternative Solution 4C**

	m <sup>3</sup> /h	m			\$/kwh	hours	\$/year
Pump Power	45	12.1		1.484 kW			
Motor Eff			90%	1.649 kW			
Pump Eff			60%	2.748 Kw	0.12	8760	\$ 2,888.39

**Estimated Total Energy Cost for John St. SPS**

	m <sup>3</sup> /h	m			\$/kwh	hours	\$/year
Pump Power	45	27.61		3.386 kW			
Motor Eff			90%	3.762 kw			
Pump Eff			60%	6.270 Kw	0.12	8760	\$ 6,590.78

<b>For Life Cycle Costs</b>	<b>Annual Op Costs</b>	<b>Additional Energy Cost / yr</b>	<b>Additional Maintenance Cost / yr</b>
Lynden (Existing)	\$ 42,156		
John St.(Existing)	\$ 98,099		
Alternative 2	\$ 110,934	\$ 835	\$ 12,000
Alternative 3	\$ 108,934	\$ 835	\$ 10,000
Alternative 4	\$ 119,842	\$ 1,743	\$ 20,000
Alternative 4B	\$ 121,417	\$ 3,318	\$ 20,000
Alternative 4C	\$ 120,987	\$ 2,888	\$ 20,000

**Life Cycle Cost Analysis for Alternative Solutions**

**Life Cycle Cost Assumptions**

Period of Evaluation	100 Years
Engineering & Contingencies	30%
Pipe Replacement	100 Years
Structural Replacement	50 Years
Electrical Mechanical	25 Years
WACC	4%

Summary Without Lynden Circle SPS		
Alt	NPV	Rank
2	\$ 11,625,491	1
3	\$ 11,846,098	2
4	\$ 22,634,997	3

Summary Including Lynden Circle SPS		
Alt	NPV	Rank
2	\$17,385,438	1
3	\$17,606,045	2
4	\$28,394,944	5
4B	\$25,766,973	4
4C	\$24,356,561	3

John St - SPS		Alternate 2			Alternate 3			Alternate 4			Alternate 4B			Alternate 4C		
	Life	Present Value	Before E&C	With E&C	Present Value	Before E&C	With E&C	Present Value	Before E&C	With E&C	Present Value	Before E&C	With E&C	Present Value	Before E&C	With E&C
<b>Capital Costs</b>																
Pipes	100	\$ 712,465	\$ 548,050	\$ 712,465	\$ 861,965	\$ 663,050	\$ 861,965	\$ 7,940,231	\$ 6,107,870	\$ 7,940,231	\$ 10,213,541	\$ 7,856,570	\$ 10,213,541	\$ 10,213,541	\$ 7,856,570	\$ 10,213,541
Additional - Structural	50	\$ 296,585	\$ 200,000	\$ 260,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Building - Structural	50	\$ 6,164,673	\$ 4,157,100	\$ 5,404,230	\$ 6,581,376	\$ 4,438,100	\$ 5,769,530	\$ 10,024,731	\$ 6,760,100	\$ 8,788,130	\$ 10,844,789	\$ 7,313,100	\$ 9,507,030	\$ 9,444,907	\$ 6,369,100	\$ 8,279,830
Building - Elec/Mech	25	\$ 1,733,317	\$ 850,000	\$ 1,105,000	\$ 1,733,317	\$ 850,000	\$ 1,105,000	\$ 1,733,317	\$ 850,000	\$ 1,105,000	\$ 1,733,317	\$ 850,000	\$ 1,105,000	\$ 1,733,317	\$ 850,000	\$ 1,105,000
Subtotal		\$ 8,907,041	\$ 5,755,150	\$ 7,481,695	\$ 9,176,658	\$ 5,951,150	\$ 7,736,495	\$ 19,698,279	\$ 13,717,970	\$ 17,833,361	\$ 22,791,648	\$ 16,019,670	\$ 20,825,571	\$ 21,391,765	\$ 15,075,670	\$ 19,598,371
<b>Operating Costs</b>																
Pumping Station Cost		\$ 110,934			\$ 108,934			\$ 119,842			\$ 121,417			\$ 120,987		
PVA(100, WACC)		\$ 2,718,449			\$ 2,669,439			\$ 2,936,718			\$ 2,975,325			\$ 2,964,796		
Subtotal - John St		\$ 11,625,491			\$ 11,846,098			\$ 22,634,997			\$ 25,766,973			\$ 24,356,561		

Lynden Street SPS		Present Value	Before E&C	With E&C						
Pipes	100	\$ -	\$ -	\$ -						
Additional - Structural	50	\$ -	\$ -	\$ -						
Building - Structural	50	\$ 3,707,316	\$ 2,500,000	\$ 3,250,000						
Building - Elec/Mech	25	\$ 1,019,599	\$ 500,000	\$ 650,000						
Subtotal		\$ 4,726,915	\$ 3,000,000	\$ 3,900,000	\$ 4,726,915		\$ 4,726,915			
Lynden O&M		\$ 42,156			\$ 42,156		\$ 42,156		\$ -	\$ -
PVA(100, WACC)		\$ 1,033,033			\$ 1,033,033		\$ 1,033,033		\$ -	\$ -
PV Lynden Street		\$ 5,759,947			\$ 5,759,947		\$ 5,759,947		\$ -	\$ -
<b>Total PV</b>		\$ 17,385,438			\$ 17,606,045		\$ 28,394,944		\$ 25,766,973	\$ 24,356,561