Summary of Capital Costs – Based on Pricing Estimates for 2010 – All Costs Exclude HST

Sauble Beach Wastewater Project

July 8, 2010 OS-09-143-11-OS

	Sewer Collection System	Pumping Stations	Forcemains	Treatment Plant and Outfall	Engineering	Hydro One Install Cost	Land Costs	Other (Legal, Planning & Geotechnical)	5% Contingency	Total	No. of Lots	Average Cost Per Lot (before $6,240,000 Grant)	Average Cost Per Lot (after $6,240,000 Grant)
Option 1[1]	$3,671,000	$1,500,000	$977,000	$5,034,000 and $85,000	$856,000	$80,000	$450,000	$83,000	---	$12,736,000	303	$42,033/ea	$21,440/ea
Option 2[2]	$10,381,000	$1,800,000	$977,000	$8,000,000 and $100,000	$1,200,000	$80,000	$450,000	$110,000	$1,155,000	$24,253,000	710	$34,200/ea	$25,400/ea
Option 3[3]	$24,100,000	$2,250,000	$1,350,000	$10,300,000 and $880,000	$1,800,000	$80,000	$450,000	$140,000	$2,068,000	$43,418,000	1,505	$28,900/ea	$24,700/ea
Option 4[4]	$37,157,000	$4,700,000	$2,100,000	$13,000,000 and $1,000,000	$2,300,000	$80,000	$450,000	$170,000	$3,048,000	$64,005,000	2,300	$27,800/ea	$25,100/ea
Option 5[5]	$40,700,000	$5,100,000	$2,500,000	$13,700,000 and $1,000,000	$2,500,000	$80,000	$450,000	$190,000	$3,311,000	$69,500,000	2,510	$27,700/ea	$25,200/ea

[1] As tendered in December, 2009 and reported to Council in February, 2010. Treatment plant location at Municipal Road property.

[2] Option 2 as per Option 1 but larger collection area. Major pump station at existing location. Treatment plant location at Municipal Road property. Outfall to existing location.

[3] Treatment plant assumed to be located at Bruce County Forest site approximately 1 km north of Sixth Street North on west side of Sauble Falls Parkway. Effluent discharge to be at boat launch site near mouth of Sauble River. Outfall is 3,600 m of 18" PVC. One major pump station located at Lakeshore and Sixth Street North. Legal/planning costs assumed same for all Options with additional geotechnical added.

[4] Option 4 same as Option 3 but larger plant and 20" outfall pipe. Outfall and main pumping station strategy the same as Option 3. Three (3) additional, smaller pumping stations and forcemains required for Fedy/Winburk and Clarence Ave/Graham Crescent areas. Additional remote pumping stations may be required. Confirmation required. Additional $2,200,000 assumed for four (4) extra pumping stations and $750,000 required for extra forcemains.

[5] Option 5 same as Option 4 though additional pumping station and forcemains assumed. Add $800,000 total. Add $700,000 extra for larger plant.

General Notes
- Sewer collection system costs based on Harold Sutherland Construction unit prices of January 2010 tender for Option 1 plus 20% safety factor. Same for forcemain costs.
- Treatment plant costs and pumping station costs based on Allen-Hastings prices received for January 2010 tender for Option 1 plus 10% safety factor.
- Costs above do not include cost to install sewer lateral (or grinder pump system) on private property.
- Number of lots above include trailer parks but only one lot per trailer park.

Summary of Estimated Annual Operating Costs – 2010 Unit Costs

Sauble Beach Wastewater Project

July 8, 2010 OS-09-143-11-OS

	Number of Lots*	Manpower	Management	Chemical	Energy	Sludge	Equipment, Sampling, Insurance, Etc.	Subtotal	Average Subtotal Cost per Lot	Reserve Fund @ 1.5% of Capital Cost	Total Annual Cost	Average Total Annual Cost Per Lot	20 Year Average Total Cost Capital Plus Operations (No Interest)	Comments
Option 1	303	1.0 person at $70,000 per year or $70,000 per year	0.25 persons per year at $100,000 per year or $25,000 per year	$7,000	$70,000	$8,000	$20,000	$200,000	$660/yr	$174,000/yr	$374,000/yr	$1,230/yr	$46,000	
Option 2	710	1.2 persons at $70,000 per year or $84,000 per year	0.35 persons per year at $100,000 per year or $35,000 per year	$16,000	$150,000	$17,000	$25,000	$327,000	$460/yr	$319,000/yr	$646,000	$910/yr	$43,600	
Option 3	2,302	1.6 persons at $70,000 per year or $112,000	0.6 persons per year at $100,000 per year, or $60,000 per year	$43,000	$410,000	$50,000	$35,000	$710,000	$310/yr	$583,000/yr	$1,293,000	$560/yr	$35,900	
Option 4	2,950	2.2 persons at $70,000 per year or $154,000 per year	0.75 persons per year at $100,000 per year, or $75,000 per year	$68,000	$630,000	$71,000	$40,000	$1,038,000	$350/yr	$869,000/yr	$1,907,000	$650/yr	$38,100	
Option 5	3,160	2.4 persons at $70,000 per year or $170,000 per year	0.8 persons per year at $100,000 per year, or $80,000 per year	$73,000	$690,000	$78,000	$43,000	$1,134,000	$360/yr	$945,000/yr	$2,079,000	$660/yr	$38,400	

Notes: Manpower and management costs as above based on additional manpower requirements given operating authority staff already in Sauble area running municipal water systems. As such, some cost efficiency for manpower assumed.

Option 3 – includes 1,505 severed lots plus 527 equivalent trailer sites (1,580 trailer sites total – 3:1 ratio proposed – to be confirmed)

Option 4 – includes 2,300 severed lots plus 650 equivalent trailer sites (1,950 trailer sites total – 3:1 ratio proposed – to be confirmed)

Option 5 – includes 2,510 severed lots plus 650 equivalent trailer sites (1,950 trailer sites total – 3:1 ratio proposed – to be confirmed)

Additional commercial/institutional equivalent connections not included in Number of Lots above and need to be confirmed.

Sewage Flow Estimates

Servicing Conditions Based on Genivar Design of October 2009 for Option 1 and Grand Bend and Wasaga Beach Sewage Flows

July 8, 2010 OS-05-142-11-OS

	Option 1	Option 2	Option 3	Option 4	Option 5
Number of Lots	303	710	1,505	2,300	2,510
No. of Equivalent Residential Connections	312	850	2,333	3,640	3,913
Average Flow per Equivalent Connection	0.875 m^3/d	0.75 m^3/d	0.75 m^3/d	0.75 m^3/d	0.75 m^3/d
Average Day Flow	273 m^3/d	640 m^3/d	1,750 m^3/d	2,730 m^3/d	2,940 m^3/d
Maximum Average Day Flow During Busy Summer Period	587 m^3/d (2.15 times annual average)	1,220 m^3/d (1.9 times annual average)	2,630 m^3/d (1.5 times annual average)	3,550 m^3/d (1.3 times annual average)	3,820 m^3/d (1.3 times annual average)
Peak Flow Factor for Average Flow During Summer	11.0 times	6.0 times	4.5 times	4.0 times	4.0 times
Peak Flow On Long Summer Week	75 L/s	85 L/s	140 L/s	165 L/s	180 L/s

Notes Option 1 sewage flows unchanged from original 2009 design. Average summer flow and peak flow likely conservative (overestimated) based on analysis of Grand Bend and Wasaga Beach sewage flows.

Number of lots above approximate only based on current Bruce County lot fabric detail. For options 2 and 3, equivalent residential units based on 10% increase for additional commercial/institutional equivalent connections and 10% future growth factor (total of 20% extra). For Options 4 and 5, equivalent residential units based on 10% increase for additional commercial/institutional equivalent connections and 20% future growth factor (30% extra).

Grand Bend average day sewage flows in summer 1.2 to 1.9 times the annual average day flow for 2006, 2007 and 2008. No instantaneous peak flow data available. Number of connections not available. Annual flow is 750 to 850 m^3/day.

Wasaga Beach average day sewage flows in summer 1.1 to 1.25 times the annual average day flow. Peak daily flow 1.3 to 2.5 times maximum, summer average day flow. Annual average day flow is 5,000 to 6,000 m^3/day for 2007, 2008 and 2009. Number of connections is approximately 10,300. Average day flow per connection is approximately 0.53 m^3/day.

Proposed Sauble Beach Wastewater Treatment Plant – Extended Aeration With Aeration Tanks and Nitrate Removal in Deep Bed Sand Filtration With Additional Alum

Phosphorus Concentrations After Dilution in Sauble River

July 8, 2010 OS-05-142-11-OS

Servicing Option	Summer Time Average Sewage Flow	Phosphorus Level in Effluent	Phosphorus Concentration in River	Low Flow in Sauble River Above Rankin River (Above Sauble Falls)	Dilution Ratio for Above Rankin River	Phosphorus Concentration After Dilution Above Rankin River	Low Flow in Sauble River Below Rankin River (Below Sauble Falls)	Dilution Ratio for Below Rankin River (Below Sauble Falls)	Phosphorus Concentration After Dilution Below Rankin River (Below Sauble Falls)	Comments
1	587 m^3/d	0.15 mg/L	0.02 mg/L	24,797 m^3/d	42:1	0.023 mg/L	33,091 m^3/d	56:1	0.022 mg/L	Satisfactory phosphorus levels after dilution for both cases (upstream and downstream of falls).
2	1,220 m^3/d	0.15 mg/L	0.02 mg/L	24,797 m^3/d	20:1	0.026 mg/L	33,091 m^3/d	27:1	0.025 mg/L	Satisfactory phosphorus levels after dilution for both cases (upstream and downstream of falls).
3	2,630 m^3/d	0.15 mg/L	0.02 mg/L	24,797 m^3/d	9.4:1	0.032 mg/L*	33,091 m^3/d	12.6:1	0.030 mg/L*	Consider two pass sand filtration to lower final effluent phosphorus to 0.05 mg/L if above Sauble Falls.
4	3,550 m^3/d	0.15 mg/L	0.02 mg/L	24,797 m^3/d	7.0:1	0.034 mg/L*	33,091 m^3/d	9.3:1	0.033 mg/L*	Consider two pass sand filtration to lower final effluent phosphorus to 0.05 mg/L if above Sauble Falls.
5	3,820 m^3/d	0.15 mg/L	0.02 mg/L	24,797 m^3/d	6.5:1	0.037 mg/L*	33,091 m^3/d	8.7:1	0.033 mg/L*	Consider two pass sand filtration to lower final effluent phosphorus to 0.05 mg/L if above Sauble Falls.

* Values after dilution would range from 0.021 mg/L to 0.026 mg/L if 0.10 mg/L effluent phosphorus and background phosphorus of 0.015 mg/L used in calculation.

Nitrate Concentrations After Dilution in Sauble River If Biological Nutrient Removal Proposed in Aeration Tanks

July 8, 2010 OS-05-142-11-OS

Servicing Option	Summer Time Average Sewage Flow	Nitrate Level in Effluent	Nitrate Concentration in River	Low Flow in Sauble River Above Rankin River (Above Sauble Falls)	Dilution Ratio for Above Rankin River	Nitrate Concentration After Dilution Above Rankin River	Low Flow in Sauble River Below Rankin River (Below Sauble Falls)	Dilution Ratio for Below Rankin River (Below Sauble Falls)	Nitrate Concentration After Dilution Below Rankin River (Below Sauble Falls)	Comments
1	587 m^3/d	10 mg/L	1.7 mg/L	24,797 m^3/d	42:1	1.9 mg/L	33,091 m^3/d	56:1	1.9 mg/L	Concentrations of nitrate in river after dilution acceptable as precautionary step. Note – No MOE criteria for nitrate.
2	1,220 m^3/d	10 mg/L	1.7 mg/L	24,797 m^3/d	20:1	2.1 mg/L	33,091 m^3/d	27:1	2.0 mg/L	Concentrations of nitrate in river after dilution acceptable as precautionary step. Note – No MOE criteria for nitrate.
3	2,630 m^3/d	10 mg/L	1.7 mg/L	24,797 m^3/d	9.4:1	2.5 mg/L	33,091 m^3/d	12.6:1	2.3 mg/L	Concentrations of nitrate in river after dilution acceptable as precautionary step. Note – No MOE criteria for nitrate.
4	3,550 m^3/d	10 mg/L	1.7 mg/L	24,797 m^3/d	7.0:1	2.7 mg/L	33,091 m^3/d	9.3:1	2.5 mg/L	Concentrations of nitrate in river after dilution acceptable as precautionary step. Note – No MOE criteria for nitrate.
5	3,820 m^3/d	10 mg/L	1.7 mg/L	24,797 m^3/d	6.5:1	2.8 mg/L	33,091 m^3/d	8.7:1	2.5 mg/L	Concentrations of nitrate in river after dilution acceptable as precautionary step. Note – No MOE criteria for nitrate.

Notes: Previous Assimilative Capacity Report assumed 0.3 mg/L for effluent phosphorus using shallow bed sand filtration. Parkson Corp. guarantees 0.1 mg/L effluent phosphorus with deep bed filtration and final alum treatment. 0.15 mg/L used as above for effluent phosphorus concentration as 50% safety factor. 0.030 mg/L Provincial Water Quality Objective.

Nitrate concentration in river (1.7 mg/L) higher than assumed in September 2008 Assimilative Capacity Study (0.4 mg/L). Higher value of 1.7 mg/L based on 3 recent samples of Sauble River in June, 2010. No Provincial Water Quality Objective for nitrate in surface water. Limit in groundwater is 10 mg/L for drinking water standards.

Secondary Treatment Plant Effluent Expectations and Relative Capital Cost Evaluation of Treatment Alternatives Based on Option 1 Service Area Only

July 8, 2010 OS-05-142-11-OS

No.	Type	Effluent Quality					Comments	Cost Estimate
		BOD (mg/L)	TP (mg/L)	Ammonia	NO_3 (mg/L)	E.Coli (counts)		
1.	Primary treatment with no filtration. UV disinfection or chlorination	30	1.0	20	15	10-50	This relatively poor level of treatment would not be permitted by MOE. UV disinfection may not be effective on relatively poor quality effluent with high suspended solids, etc. This option not recommended for further evaluation.	No Costing done for this alternative
2.	Secondary treatment* with no filtration. UV disinfection	15	0.5	1.0	35	5-10	Most common treatment approach in Grey-Bruce area. Secondary treatment with no filtration used in many local communities such as Hanover, Walkerton, Port Elgin, Durham, Meaford, Paisley. Converts great majority of ammonia in raw wastewater to nitrate. Effluent phosphorus concentrations, residual BOD, suspended solids, etc., higher than if filtration provided.	$4,500,000
3	Secondary treatment* with deep bed sand filtration. UV disinfection	<5	0.15	1.0	35	5	As per Option 2 but deep bed sand filtration provided. With careful alum dosing before filters, very low phosphorus in effluent (0.15 mg/L or less) achievable. Very low concentrations of other parameters including BOD, suspended solids (< 5.0 mg/L). Tertiary quality effluent. **Consider for Class EA Addendum No. 3.**	$5,500,000**
4	Secondary treatment* with biological nutrient removal in aeration tanks. Deep bed sand filtration. UV disinfection	<5	0.15	1.0	10	<5	As per Option 3, but biological nutrient removal provided in aeration tanks. In this process, aeration tanks allowed to go anoxic (oxygen starved) for relatively short period of overall treatment cycle. This forces bacteria to strip oxygen from nitrate and use it for cell respiration. Releases nitrogen gas to atmosphere. Reduces effluent nitrate from approximately 35 mg/L down to 10 mg/L. **Consider for Class EA Addendum No. 3.**	$6,000,000
5.	Secondary treatment* with double pass, deep bed/shallow bed sand filtration. UV disinfection	<5	0.03	1.0	35	<5	As per Option No. 3, but double filter all effluent to remove additional phosphorus. Second filtration step reduces phosphorus from 0.15 mg/L down to 0.03 mg/L. This level of phosphorus removal (ultra low) is being considered for Lake Simcoe watershed on a case by case basis, but has not been utilized as yet in Ontario. Adds capital cost and also doubles filter backwash flow which needs to be re-treated in plant.	$6,500,000

Proposed alternatives for Sauble Beach wastewater treatment plant (Addendum 3)

* Assumes extended aeration secondary treatment with sludge age >15 days residence time to ensure nitrification (conversion of ammonia to nitrate) and ensure 80% removal of most micro constituents (personal care products and endocrine disrupting products). Minimum 5 day SRT recommended for 80% removal of 50% of micro-constituents.

** $5,500,000 for No. 3 based on Allen-Hastings bid price of January 2010. Excludes engineering, land costs, Hydro One three phase power supply

Summary of Sauble River Sampling - Key Parameters

Sauble River Sampling Results

July 8, 2010 105142

Parameter	Units	M.D.L	County Road 8				Jewels Bridge				Sauble Falls				Municipal Road			
			20/6/06	23/8/06	17/6/10	28/06/10	20/6/06	23/8/06	17/6/10	28/06/10	20/6/06	23/8/06	17/6/10	28/6/10	17/8/09	11/9/09	15/9/09	23/9/09
Phosphorus-Total	mg/L	0.01	0.02	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.02
Nitrate (N)	mg/L	0.1	0.2	8.1	2.0	0.6	0.3	0.2	2.0	0.5	0.2	0.1	1.7	0.3	0.2	0.1	0.15	0.2
E coli	cts/100mL	1	77	50	82	52	65	22	193	105	24	10	94	62	40	80	70	100

Note - Extra sample taken near river mouth on June 28, 2010. Results were 0.01 mg/L for phosphorus, 0.3 mg/L for nitrate and 38 cts/100 mL for E.Coli