
**REPORT TO CORE AREA LIQUID WASTE MANAGEMENT COMMITTEE
MEETING OF WEDNESDAY, 28 NOVEMBER 2007**

SUBJECT **CORE AREA AND WEST SHORE SEWAGE TREATMENT – SITE IDENTIFICATION AND EVALUATION UPDATE**

PURPOSE

To provide the Core Area Liquid Waste Management committee (CALWMC) with an update on the treatment plant site identification and evaluation project and seek approval of the site selection criteria.

BACKGROUND

At its meeting of 11 July 2007, the Board awarded Contract 17-1581 to the firm of Westland Resource Group Inc. for the provision of consulting services for the Core Area and West Shore sewage treatment site identification and evaluation study.

Attachments A and B provide the general work schedule for the study and a brief summary of Westland's progress to date.

Attachment C includes the draft sewage treatment facility descriptions and an updated version of Table 1, Potential Selection Criteria for Core Area Treatment Facilities. The first draft of Table 1 was provided to the CALWMC as part of the 10 October 2007 project update report.

Attachment D provides the results of the workshop held on 29 August with the Technical and Community Advisory committee and Capital Regional District staff to develop a preliminary list of siting criteria to be brought forward to the CALWMC for consideration.

An updated version of the site selection criteria Table 1, incorporating additional public input, will be presented to the committee by David Harper of Westland Resource Group Inc. as part of this agenda item.

SUMMARY/CONCLUSIONS

The sewage treatment plant site identification and evaluation study is making good progress.

RECOMMENDATIONS

That the Core Area Liquid Waste Management committee:

1. receive this report for information; and
2. approve the list of sewage treatment plant site selection criteria as outlined in the updated Table 1.

Core Area Liquid Waste Management Committee – 28 November 2007
Re: Core Area and West Shore Sewage Treatment – Site Identification and Evaluation Update
Page 2

Dan Telford, PEng
Manager, Engineering and Construction Services

Dwayne Kalynchuk, PEng
General Manager, Environmental Services
Concurrence

COMMENTS

DT:cl
Attachments: 4

TO: Dan Telford and Seamus McDonnell

FROM: David Harper

DATE: 15 November 2007

REGARDING: Progress on Sewage Treatment Siting Study and Environmental and Social Review

The Sewage Treatment Facility Siting Study and Environmental and Social Review Project has been making good progress. This memo describes some of the highlights of the project so far.

- Working with Dayton & Knight and Associated Engineering, we have developed descriptions of the facilities and desirable site characteristics. These descriptions will be used to support the selection of optimum sites and the subsequent analysis of environmental and social effects of facility construction and operation.
- Draft site selection criteria have been prepared and reviewed by the Technical and Community Advisory Committee, municipal planning staff, managers of major institutions in the study area (University of Victoria, Royal Roads University, and Department of National Defence), and First Nations.
- Data collection has proceeded efficiently. Field investigations have been completed to document environmental and land use conditions. The archaeological field work is being conducted with the support of local First Nations members. Traffic information has been collected.
- Base mapping has been prepared for the study areas, showing contours, cadastral information, roads, and land ownership. The CRD provided a high-resolution orthophoto that has been used with the other thematic layers.
- Meetings have been held with staff of all potentially affected municipalities (Saanich, Oak Bay, Colwood, and View Royal) and with owners of major blocks of land that could accommodate a treatment facility. The Songhees and Beecher Bay First Nations provided information about their interest in land that could be used for the treatment plants.
- We have provided input to the Business Case team for their risk analysis of the project, and collaborated with the CRD in preparing the public survey for the siting study.

Once we meet with the Core Area Liquid Waste Management Committee (CALWMC) to discuss the siting criteria, we will be in a position to complete the data collection and initiate analysis of site suitability. The delay in meeting with the CALWMC and the decision to engage the public and First Nations in vetting the siting criteria will delay completion of the Phase 1 work. We anticipate delivering the draft Phase 1 report to the CALWMC in early 2008. Following the meeting, we will prepare a revised draft for public and First Nations review.

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TO: Core Area Liquid Waste Management Committee

FROM: David Harper

DATE: 4 October 2007

REGARDING: Sewage treatment facility descriptions and site selection criteria

At the October 10, 2007 Core Area Liquid Waste Management Committee (CALWMC) workshop, we will be discussing the criteria to be applied to selecting optimum sites in the West Shore and Saanich East-North Oak Bay areas. The attached materials have been provided to support the workshop discussions.

1. Facility Descriptions and Land Requirements. To select sites for sewage treatment facilities and to conduct the Environmental and Social Reviews, we need to have clear descriptions of the kinds of structures and activities that are likely to occur, and associated land area requirements. The attached tables summarize this information for the four study areas (Clover Point, Macaulay Point, Saanich East-North Oak Bay, and West Shore). The information is based on the work previously conducted in the *Path Forward* report, and is organized to allow comparisons among the areas.

2. Potential Selection Criteria for Core Area Treatment Facilities. At the October 10 workshop, most of our time will be spent discussing the site selection criteria. Table 1 describes the hierarchy of selection criteria. This table is the product of considerable deliberation by members of the consulting team, CRD staff, and the Technical and Community Advisory Committee. Responses from the recently-completed IPSOS-Reid telephone survey will also be considered in refining the criteria and weights. The topics, criteria, indicators, ratings, and weights on the table have been organized in ways that allow the site selection data to be mapped and analyzed.

Please review the information in Table 1 to determine its clarity and completeness. Are there other criteria or indicators that should be applied to site selection? Can any of the suggested indicators be dropped?

We look forward to meeting with you to discuss these materials and to advance the Capital Region's liquid waste management initiative.

CRD SEWAGE TREATMENT FACILITY
DRAFT FACILITY DESCRIPTION INFORMATION AND LAND REQUIREMENTS
CLOVER POINT FACILITY
4 October 2007

Technology and Purpose	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none"> • Liquids 	<ul style="list-style-type: none"> • Pump station and forcemain for pumping dry weather flows to Macaulay Point WWTP • Influent pump station for wet weather flows • Screening for wet weather flows • High rate enhanced primary treatment for wet weather flows • Effluent pumping of wet weather flows to Clover Point outfall • 633,000 litres per year of aluminum sulfate required for chemically-enhanced primary treatment 	<ul style="list-style-type: none"> • Ultimate average dry weather flow (ADWF) = 48.5 mega litres (ML) per day • Flows up to 97 ML per day (2 times ADWF) pumped to Macaulay Point WWTP for treatment • Primary treatment standards met and discharge to Clover Point outfall for flows in excess of 97 ML per day up to 194 ML per day (i.e. flows not routed to Macaulay Point WWTP) • Screening and discharge to Clover Point outfall for flows not routed to Macaulay Point WWTP or through chemically-enhanced primary treatment • Facilities to be constructed underground • Chemical delivery (aluminum sulfate), 46 trucks per year, mainly during winter (rainy) season (13.65 m³ trucks)
<ul style="list-style-type: none"> • Solids 	<ul style="list-style-type: none"> • Screenings to landfill for incineration • 6 mm screen assumed, generating 10 m³ of screenings per 100ML treated, 13 m³ of screenings per day • Primary waste solids discharged to dry weather pump station for transport to Macaulay Point WWTP 	<ul style="list-style-type: none"> • Screenings and grit: up to 1 truck per day (13 m³ trucks) • Waste primary sludge: 0 trucks per day

	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none"> Outfalls 	<ul style="list-style-type: none"> Existing outfall will be retained 	<ul style="list-style-type: none"> No change is anticipated
<ul style="list-style-type: none"> Odour and Noise 	<ul style="list-style-type: none"> Noise at property line not to exceed 45 decibels (evening) and 55 decibels (daytime), must also comply with local zoning regulations Odour at property line not to exceed 5 odour units (OU) per m³, as an hourly average 98 percentile based on 15 minute rolling average 	<ul style="list-style-type: none"> Noise-generating equipment located indoors Foul air sources enclosed with foul air treated prior to release Trucking scheduled during daytime Solids will be transported in enclosed bins or covered trucks.
Land Requirements		
<ul style="list-style-type: none"> Area 	<ul style="list-style-type: none"> Available land 1.5 ha 	<ul style="list-style-type: none"> 0.3 ha to 0.5 ha plus buffer
<ul style="list-style-type: none"> Shape (Aspect Ratio) 	<ul style="list-style-type: none"> Site layout per AE/CH2M HILL /KWL study, Option 2-1 	<ul style="list-style-type: none"> Length to width ratio approximately 3:1
Construction		
<ul style="list-style-type: none"> Staging 	<ul style="list-style-type: none"> Per AE/CH2M HILL/KWL study, Option 2-1 	<ul style="list-style-type: none"> Stage 1 (2016) to 100% of ultimate capacity
Resource Use and Recovery		
<ul style="list-style-type: none"> Greenhouse Gas (GHG) Emission Potential 	<ul style="list-style-type: none"> GHG generation and emission potential directly related to energy demand and truck traffic associated with facility and its transmission systems 	<ul style="list-style-type: none"> Emission levels to be estimated later in site selection study.
<ul style="list-style-type: none"> Energy 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential users mainly associated with new development 	<ul style="list-style-type: none"> Heat recovery from wastewater unlikely to be practical due to intermittent nature of discharge

CRD SEWAGE TREATMENT FACILITY
DRAFT FACILITY DESCRIPTION INFORMATION AND LAND REQUIREMENTS
MACAULAY POINT FACILITY
4 October 2007

Technology and Purpose	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none"> • Liquids 	<ul style="list-style-type: none"> • Influent pumping • Screening and grit removal • Primary treatment for flows routed to secondary treatment, with chemically-enhanced primary treatment using aluminum sulfate for flows bypassing secondary treatment • Biological Aerated Filter (BAF) secondary treatment, • Effluent pumping to outfall • Space allowed for inclusion of UV disinfection 	<ul style="list-style-type: none"> • Ultimate average dry weather flow (ADWF) = 110 mega litres (ML) per day, including dry weather flows from Clover Point WWTP • Secondary treatment standards met for flows up to 220 ML per day (2 times ADWF) • Primary treatment standards met for flows in excess of 220 ML per day up to 364 ML per day (i.e., flows bypassing secondary treatment) • Facilities to be low profile and attractively landscaped. Design to be determined once facility requirements are better known • Chemical delivery (aluminum sulfate), 23 trucks per year, mainly during winter (rainy) season (13.65 m³ per truck)
<ul style="list-style-type: none"> • Solids 	<ul style="list-style-type: none"> • Screenings and grit to landfill or incineration • 6 mm screen assumed, generating 9 m³ screenings per 100ML treated, 14.4 m³ of screenings per day • Grit: 1.5m³ of grit per 100ML treated, 2.4 m³ of grit per day • Gravity thickening of waste primary sludge and Dissolved Air Flootation (DAF) thickening of waste biological (secondary) sludge 	<ul style="list-style-type: none"> • Screenings and grit: 1-1.5 trucks per day (13 m³ trucks) • Dewatered waste sludge: 6 trucks per day (27 m³ trucks) • Chemical (polymer) delivery, 2 trucks per month (3,000 kg per truck)

	Siting Assumptions	Facility Attributes
	<ul style="list-style-type: none"> Centrifuge dewatering of thickened primary and secondary sludge to 30% total solids Transport of dewatered sludge off-site for treatment at Hartland Landfill Assumed Sludge Production 1kg sludge per kg BOD (average day BOD load = 45.8 tonnes per day, typical variation 30 tonnes per day to 60 tonnes per day) 71,000 kg per year of polymer required for dewatering waste sludge 	
<ul style="list-style-type: none"> Outfall 	<ul style="list-style-type: none"> Macaulay Point outfall is assumed to be twinned. 	<ul style="list-style-type: none"> Some foreshore investigation will be needed before design completed. Outfall would likely be constructed in whole or in sections in a remote area and floated into alignment before sinking and installation. Dredging will likely be needed in nearshore areas
<ul style="list-style-type: none"> Odour and Noise 	<ul style="list-style-type: none"> Noise at property line not to exceed 45 decibels (evening) and 55 decibels (daytime), must also comply with local zoning regulations Odour at property line not to exceed 5 odour units (OU) per m³, as an hourly average 98 percentile based on 15 minute rolling average 	<ul style="list-style-type: none"> Noise-generating equipment located indoors Potential odour sources include the solids thickening and dewatering facilities, as well as the trucks transporting the solids offsite. Foul air sources enclosed and foul air treated prior to release Trucks normally will be enclosed for odour management and materials handling security Trucking scheduled during daytime

	Siting Assumptions	Facility Attributes
Land Requirements		
<ul style="list-style-type: none"> Area 	<ul style="list-style-type: none"> Small footprint (BAF) liquid treatment technology with onsite thickening and dewatering of waste sludge but no sludge stabilization onsite. will require intensive space saving design solutions 0.03 to 0.05 ha per ML treated per day 	<ul style="list-style-type: none"> 3.5 ha to 5.5 ha required plus buffer
<ul style="list-style-type: none"> Shape (Aspect Ratio) 	<ul style="list-style-type: none"> Site layout to be determined 	<ul style="list-style-type: none"> To be determined
Construction		
<ul style="list-style-type: none"> Staging 	<ul style="list-style-type: none"> Per AE/CH2M HILL/KWL study, Option 2-1. See Facility Attributes column. 	<ul style="list-style-type: none"> Stage 1 construction (2016) primary and secondary treatment to 90% of ultimate capacity Stage 2 (2035)- primary and secondary treatment to 100% of ultimate capacity
Resource Use and Recovery		
<ul style="list-style-type: none"> Greenhouse Gas (GHG) Emission Potential 	<ul style="list-style-type: none"> GHG generation and emission potential directly related to energy demand and truck traffic associated with facility and its transmission systems 	<ul style="list-style-type: none"> Emission levels to be estimated later in site selection study.
<ul style="list-style-type: none"> Energy 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential users mainly associated with new development Existing facilities may also be potential users – will require site-specific study to determine if cost effective 	<ul style="list-style-type: none"> Potential heat recovery from wastewater Potential energy recovery from off-site sludge stabilization at Hartland Landfill

	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none">Biosolids	<ul style="list-style-type: none">Close proximity to potential users preferred	<ul style="list-style-type: none">Potential for biosolids soil amendment for fertilizationPotential for using biosolids to manufacture value-added products such as compost, construction products, etc.
<ul style="list-style-type: none">Treated Effluent	<ul style="list-style-type: none">Not applicable	<ul style="list-style-type: none">Potential for onsite use at the WWTP for non-potable applications (requires advanced treatment for reclaimed water)

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CRD SEWAGE TREATMENT FACILITY
DRAFT FACILITY DESCRIPTION INFORMATION AND LAND REQUIREMENTS
SAANICH EAST-NORTH OAK BAY FACILITY
4 October 2007

Technology and Purpose	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none"> • Liquids 	<ul style="list-style-type: none"> • Influent Pumping • Screening and grit removal • Primary treatment for flows routed to advanced membrane treatment Chemically-enhanced primary treatment using aluminum sulfate will be used to treat flows exceeding 2 x Average Dry Weather Flow (ADWF) that bypasses the advanced treatment • Membrane Bioreactor (MBR) Advanced Treatment • UV Disinfection of effluent that is reclaimed and reused 	<ul style="list-style-type: none"> • Ultimate Average Dry Weather Flow (ADWF) = 19 mega litres (ML) per day • Secondary treatment standards met for flows up to 38 ML per day (2 times ADWF) by blending MBR effluent with effluent from chemically-enhanced primary treatment • Primary treatment standards met for flows in excess of 38 ML per day up to 63 ML per day (i.e., flows bypassing the MBR) • Seasonal water reclamation and reuse of MBR disinfected effluent (volume unknown) with primary effluent and excess MBR effluent discharged to outfall • Facilities to be low profile and blended into surrounding neighborhood • Chemical delivery (aluminum sulfate), 11 trucks per year, mainly during winter (rainy) season (4,500 L per truck)
<ul style="list-style-type: none"> • Solids 	<ul style="list-style-type: none"> • Screenings and grit to landfill or incineration • 2 mm screen assumed, 10.5 m³ screenings per 100 ML treated, 2 m³ of screenings per day • Grit 1.5m³ of grit per 100ML treated, 0.3 m³ of grit per day 	<ul style="list-style-type: none"> • Screenings and grit: 1 truck per 5.5 days (13 m³ trucks) • Waste sludge: 0 trucks per day (discharged to Clover Point WWTP interceptor)

	Siting Assumptions	Facility Attributes
	<ul style="list-style-type: none"> • 1 kg waste (primary and secondary) sludge produced per kg BOD removed (average day BOD load = 5.2 tonnes per day, typical variation 3.5 tonnes per day to 6.8 tonnes per day) • Waste primary and secondary sludge discharged to Clover Point WWTP interceptor 	
<ul style="list-style-type: none"> • Outfall 	<ul style="list-style-type: none"> • Improvements to Finnerty Cove Outfall (length to be determined) 	<ul style="list-style-type: none"> • Foreshore investigations and water studies will be required to determine environmental protection specifications • Outfall extension would likely be constructed in whole or in sections in a remote area and floated into alignment before sinking and installation. • Dredging may be needed in nearshore areas
<ul style="list-style-type: none"> • Odour and Noise 	<ul style="list-style-type: none"> • Noise at property line not to exceed 45 decibels (evening) and 55 decibels (daytime), must also comply with local zoning regulations • Odour at property line not to exceed 5 odour units (OU) per m³, as an hourly average 98 percentile based on 15 minute rolling average 	<ul style="list-style-type: none"> • Noise-generating equipment located indoors • Minimal solids handling onsite reduces odour potential. Screenings and grit become the only solids associated with odour. Liquid treatment will also require odour collection and treatment. • Foul air sources enclosed and foul air treated prior to release • Trucking scheduled during daytime • Waste material will be transported in enclosed bins or covered trucks

	Siting Assumptions	Facility Attributes
Land Requirements		
<ul style="list-style-type: none"> Area 	<ul style="list-style-type: none"> Small footprint liquid treatment technology and no sludge treatment Assume .03-05 ha land required per ML treated per day 	<ul style="list-style-type: none"> 0.5 ha to 1 ha required plus buffer Minimum 30 m buffer around facilities preferred
<ul style="list-style-type: none"> Shape (Aspect Ratio) 	<ul style="list-style-type: none"> Site layout per AE/CH2M HILL/KWL study, Option 2-1 	<ul style="list-style-type: none"> Square to moderately rectangular site preferred
Construction		
<ul style="list-style-type: none"> Staging 	<ul style="list-style-type: none"> Per AE/CH2M HILL/KWL study, Option 2-1 	<ul style="list-style-type: none"> Stage 1 construction (2013) to 75% of ultimate capacity Stage 2 (2030) to 100% of ultimate capacity
Resource Use and Recovery		
<ul style="list-style-type: none"> Greenhouse Gas (GHG) Emission Potential 	<ul style="list-style-type: none"> GHG generation and emission potential directly related to energy demand and truck traffic associated with facility and its transmission systems 	<ul style="list-style-type: none"> Energy demand will depend in part on elevation of WWTP relative to East Coast Interceptor
<ul style="list-style-type: none"> Energy Recovery 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential users mainly associated with new development 	<ul style="list-style-type: none"> Potential heat recovery from wastewater
<ul style="list-style-type: none"> Reclamation of Treated Effluent 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential users mainly associated with new development 	<ul style="list-style-type: none"> Potential reuse for non-potable applications onsite at the WWTP Potential reuse for non-potable applications offsite for irrigation, toilet flushing, industrial processes

CRD SEWAGE TREATMENT FACILITY
DRAFT FACILITY DESCRIPTION INFORMATION AND LAND REQUIREMENTS
WEST SHORE B FACILITY
4 October 2007

Technology and Purpose	Siting Assumptions	Facility Attributes
<ul style="list-style-type: none"> • Liquids 	<ul style="list-style-type: none"> • Influent pumping • Screening and grit removal • Primary treatment for flows routed to advanced treatment, with chemically-enhanced primary treatment using aluminum sulfate for flows bypassing advanced treatment • Membrane Bioreactor (MBR) Advanced treatment • UV disinfection of effluent that is reclaimed and reused 	<ul style="list-style-type: none"> • Ultimate average dry weather flow (ADWF) = 31 mega litres (ML) per day • Secondary treatment standards met for flows up to 62 ML per day (2 times ADWF) by blending MBR effluent with effluent from chemically-enhanced primary treatment • Primary treatment standards met for flows in excess of 62 ML per day up to 88 ML per day (i.e., flows bypassing the MBR) • Seasonal water reclamation and reuse of MBR disinfected effluent (volume unknown) with primary effluent and excess MBR effluent discharged to outfall • Facilities to be low profile and blended into surrounding neighborhood • Chemical delivery (aluminum sulfate), 8 trucks per year (4,500 L per truck), mainly during winter (rainy) season
<ul style="list-style-type: none"> • Solids 	<ul style="list-style-type: none"> • Screenings and grit to landfill or incineration • 2 mm screen assumed as a pre-treatment requirement for the membrane treatment, generating 10.5 m³ screenings per 100 ML treated, 3.2 m³ of screenings per day 	<ul style="list-style-type: none"> • Screenings and grit: 1 truck per 3.5 days (13 m³ trucks) • Waste sludge: 0 trucks per day, because sludge will be discharged in the sewer to Macaulay Point WWTP

	Siting Assumptions	Facility Attributes
	<ul style="list-style-type: none"> Grit 1.5m³ of grit per 100ML treated, 0.5 m³ of grit per day 1 kg waste (primary and secondary) sludge produced per kg BOD removed (average day BOD load = 7.7 tonnes per day, typical variation 5.4 tonnes per day to 10 tonnes per day) Waste primary and secondary sludge discharged to Macaulay Point WWTP interceptor New pipes would be constructed to convey wastewater to the facility and solids back to the interceptor 	
<ul style="list-style-type: none"> Outfalls 	<ul style="list-style-type: none"> New outfall to Juan de Fuca Strait 	<ul style="list-style-type: none"> Foreshore investigations and water studies will be required to determine environmental protection specifications Outfall would likely be constructed in whole or in sections in a remote area and floated into alignment before sinking and installation. Dredging will likely be needed in nearshore areas
<ul style="list-style-type: none"> Odour and Noise 	<ul style="list-style-type: none"> Noise at property line not to exceed 45 decibels (evening) and 55 decibels (daytime), must also comply with local zoning regulations Odour at property line not to exceed 5 odour units (OU) per m³, as an hourly average 98 percentile based on 15 minute rolling average 	<ul style="list-style-type: none"> Noise-generating equipment located indoors Minimal solids handling onsite reduces odour potential Foul air sources enclosed with foul air treated prior to release Trucking scheduled during daytime
Land Requirements		
<ul style="list-style-type: none"> Area 	<ul style="list-style-type: none"> Small footprint technology liquid treatment technology (MBR) with no onsite treatment of waste biological solids 	<ul style="list-style-type: none"> 1 ha to 1.5 ha required plus buffer Minimum 30 m buffer around facilities preferred

	Siting Assumptions	Facility Attributes
	<ul style="list-style-type: none"> 0.03 to 0.05 ha land required per ML of flow per day 	<ul style="list-style-type: none"> Potential for public amenities to be investigated
<ul style="list-style-type: none"> Shape (Aspect Ratio) 	<ul style="list-style-type: none"> Site layout per AE/CH2M HILL /KWL study, Option 2-1 	<ul style="list-style-type: none"> Square to moderately rectangular site preferred
Construction		
<ul style="list-style-type: none"> Staging 	<ul style="list-style-type: none"> Per AE/CH2M HILL/KWL study, Option 2-1 	<ul style="list-style-type: none"> Stage 1 construction (2013) to 50% of ultimate capacity Stage 2 (2030) to 75% of ultimate capacity Stage 3 (2050) to 100% of ultimate capacity
Resource Use and Recovery		
<ul style="list-style-type: none"> Greenhouse Gas (GHG) Emission Potential 	<ul style="list-style-type: none"> GHG generation and emission potential directly related to energy demand and truck traffic associated with facility and its transmission systems 	<ul style="list-style-type: none"> Energy demand will depend in part on elevation of WWTP relative to Macaulay Point WWTP Interceptor
<ul style="list-style-type: none"> Energy Recovery 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential users mainly associated with new development 	<ul style="list-style-type: none"> Potential heat recovery from wastewater
<ul style="list-style-type: none"> Reclamation of Treated Effluent 	<ul style="list-style-type: none"> Close proximity to potential users preferred (may conflict with odour and noise requirements) Potential offsite users mainly associated with new development 	<ul style="list-style-type: none"> Potential reuse for non-potable applications onsite at the WWTP Potential reuse for non-potable applications offsite (irrigation, toilet flushing, industrial process water)

Table 1

Potential selection criteria for Core Area Treatment Facilities **DRAFT – October 30, 2007**

Topic	Criteria	Indicators	Ratings	Scores	Weight
Biological Features	Ecological disturbance	Extent of environmental disturbance caused by development and/or invasive species	Low	1	High
			Moderate	2	
			High	3	
		Registered contaminated sites	Registered contaminated site	1	Low
			Unknown or potential contamination	2	
			Free of contamination	3	
	Ecological features	Extent of sensitive ecosystems	Extensive sensitive ecosystems	1	High
			Some sensitive ecosystems	2	
			No sensitive ecosystems	3	
		Extent of important wildlife habitats	Extensive important wildlife habitats	1	High
			Some important wildlife habitats	2	
			No important wildlife habitats	3	
		Species at Risk	Site provides habitat for rare species or ecosystems	1	High
			Part of site provides habitat for rare species or ecosystems	2	
			Site does not provide habitat for rare species or ecosystems	3	
	Watercourses	Proximity to important watercourses (fish-bearing, restored streams, etc.)	Watercourses within 30 m	1	Moderate
			Watercourses within 50 m	2	
			Watercourses greater than 50 m from site	3	
Community	Odour	Potential for nuisance odour	High	1	High
			Medium	2	
			Low	3	
	Land use	Proximity to existing residential areas	0-100 m	1	High
			100-200 m	2	
			200 m +	3	
		Proximity to existing commercial, light industrial, and institutional areas	0-100 m	1	Moderate
			100-200 m	2	
			200 m +	3	
		Consistency with community plans and bylaws	Considerable inconsistency	1	Low
			Some inconsistency	2	
			No inconsistency	3	
	Proximity to industrial areas or potential users of resources from wastewater	100 m +	1	High	
		50-100 m	2		
		0-50 m	3		
Local use	Level of community use	High	1	Moderate	
		Moderate	2		
		Low	3		

Topic	Criteria	Indicators	Ratings	Scores	Weight
Archaeology & Heritage	Archaeology	Density of registered sites	High	1	Moderate
			Moderate	2	
			Low	3	
		Archaeological potential	High	1	Moderate
			Moderate	2	
			Low	3	
	Traditional use	Level and importance of traditional use reported by First Nations	High	1	High
			Moderate	2	
			Low	3	
	Heritage structures	Presence of registered heritage structures	Within 20 m	1	Moderate
			20 - 50 m	2	
			More than 50 m	3	
Geotechnical	Foundation support conditions	Surficial material	Challenging	1	Low
			Good	2	
			Excellent	3	
		Site drainage	Poorly drained	1	Low
			Fair to moderately drained	2	
			Well drained	3	
	Site stability	Slope stability	Of concern	1	Moderate
			Of limited concern	2	
			Of no concern	3	
		Seismic amplification (site classes)	High (class D or E)	1	Moderate
			Moderate (class C)	2	
			Low (class A or B)	3	
	Liquefaction and settlement risk	High risk	1	High	
		Moderate risk	2		
		Low risk	3		
	Water	Ground water vulnerability	Highly pervious	1	Low
			Moderately pervious	2	
			Impervious	3	
Engineering	Slope	Site steepness	More than 8%	1	High
			4 - 8 %	2	
			Less than 4 %	3	
	Elevation	Elevation above sewer trunk	More than 20 m	1	Moderate
			10 - 20 m	2	
			Less than 10 m	3	
		Elevation above discharge point (sea level)	Less than 5 m	1	Moderate
			5 - 10 m	2	
			More than 10 m	3	
	Trunk Sewers	Proximity to existing sewer trunks	More than 1 km	1	Low
			500-1,000 m	2	
			Less than 500 m	3	
Transportation	Road adequacy	Proximity to arterial roads or truck routes	More than 250 m	1	Low
			100 - 250 m	2	
			Less than 100 m	3	
Location refinement criteria	Connection Routes to Trunk Sewers	Land use issues and property ownership for rights-of-way	Of concern	1	High
			Of limited concern	2	
			Of no concern	3	
	Outfall location	Proximity to potentially suitable marine outfall location	More than 250 m	1	Moderate
			100-250 m	2	
			Less than 100 m	3	

**CORE AREA SEWAGE TREATMENT
TECHNICAL AND COMMUNITY ADVISORY COMMITTEE (TCAC)
WORKSHOP RESULTS**

August 29, 2007

Prepared for: The Capital Regional District



Prepared by: Westland Resource Group Inc.



Agenda

Wednesday, August 29, 2007 from 11 a.m. – 2 p.m.

- | | | |
|-------|--|--|
| 11:00 | Introduction to the Project and Public Involvement | Dwayne Kalynchuk
CRD |
| 11:15 | Introduction to the Site Selection and Environmental and Social Review (ESR) Processes | David Harper
Westland Resource Group Inc. |
| 11:40 | Explanation of Working Sessions | |
| 11:45 | Lunch | |
| 12:15 | Small Group Session #1 to:

1) Review and discuss site selection criteria (45 min.)
2) Report back to larger group (15 min.) | |
| 1:15 | Small Group Session #2 to:

1) Review and discuss topics to be included in the Screening ESR (20 min.)
2) Report back to larger group (10 min.) | |
| 1:50 | Next Steps | |
| 2:00 | Adjourn | |

Attendance

- Committee Members:** Chair Clement (arrived late), Michael Baxter, Charlotte Bell, Tony Boydell, Gilbert Coté, Colin Doyle, Richard Gordon, Peter Justo, John Manson, John McInerney, John Newcomb, Justin Schmid, Dave Tabernor, Dick Taylor, Paul West, Christianne Wilhelmson
- Absent:** Michael Baxter, Magnus Bein, Jim McIsaac, Peter Sparanese, Lorne Whyte
- External Resources:** Blake Medlar and Randy Alexander (MOE)
- CRD Staff Resources:** Dwayne Kalynchuk, Seamus McDonnell, Dan Telford, Susan Norrington, Simon Joslin, Jody Watson, Tara Mills (attended until lunch)
- Consultants:** David Harper, Wayne Biggs, Rahul Ray

Small Group Session #1 Results

Table 1: Comments on Site Selection Criteria

Topic	Criteria	Indicators	Ratings	Scores	TCAC Comments	
Biological Features	Ecological integrity	Extent of site disturbance	Low—0 to 25%	1	• Need to define ‘ecological integrity’	
			Moderate—25-50%	2		
			High—50-100%	3		
	Ecological features	Extent of sensitive ecosystems (source: CRD SEI data and site inspections)	Extensive sensitive ecosystems	1		
			Some sensitive ecosystems	2		
			No sensitive ecosystems	3		
		Presence of important habitat (source: VNHS and site inspections)	Extensive important habitat	1		• Need to define ‘important habitats’
			Some important habitat	2		
			No important habitat	3		
	Rare species (source: BC CDC database)	Site provides habitat for rare species or habitats	1	• Need to include SARA and critical habitat requirements if federal lands are considered. • Include federal SARA database • Consider effects of SARA species on site selection		
		Part of site provides habitat for rare species or habitats	2			
		Site does not provide habitat for rare species or habitats	3			
	Watercourse sensitivity	Presence of important watercourses (fish-bearing, restored streams, etc.)	Watercourses within 10 m	1		
			Watercourses within 30 m	2		
			Watercourses within 50 m	3		
Community	Land use	Proximity to residential areas	0-50 m	1	• Need to clarify where 50 – 100 m is measured from. Is it from the centre of the plant, or the edge of the building? Property line? • Land use proximity does not include visual and smell • Impact of surrounding property values • Buffer zone depends on method used • Odour visibility	
			50-100 m	2		
			100 m +	3		
		Proximity to commercial, light industrial, institutional areas	0-50 m	1		
			50-100 m	2		
			100 m +	3		
	Consistency with community plans and bylaws	Considerable inconsistency	1	• Need to identify conflict with bylaws and regulations that are being developed. An example was given around the prohibition of truck traffic in some Esquimalt neighborhoods that would limit the construction of a sewage treatment plant.		
		Some inconsistency	2			
		No inconsistency	3			
	Local use	Level of informal community use	High	1	• Discussion that buffers may provide for community use. Parcel sizes should be large enough to provide community amenities. • Capture site for public use • Include opportunities for local amenities as a	
			Moderate	2		
			Low	3		
Level of organized community use (primarily recreation)		High	1			
		Moderate	2			

Topic	Criteria	Indicators	Ratings	Scores	TCAC Comments	
			Low	3	residential mitigation • Local use potential	
Archaeology & Heritage	Archaeology	Density of registered sites	High	1		
			Moderate	2		
			Low	3		
		Archaeological potential	High	1		
			Moderate	2		
			Low	3		
	Traditional use	Level and importance of traditional use reported by First Nations	High	1		
			Moderate	2		
			Low	3		
	Heritage structures	Presence of registered heritage structures	Within 20 m	1		
			20 - 50 m	2		
			More than 50 m	3		
Geotechnical	Foundation support conditions	Presence of fill	More than 3 m deep	1	<ul style="list-style-type: none"> Is the presence of fill positive or negative? Filled areas may be suitable for tankage Change "surface" to Surficial geology Most foundation support conditions can be engineered 	
			1-3 m deep	2		
			0-1 m deep	3		
		Surface geology	Poor	1		
			Good	2		
			Excellent	3		
		Site drainage	Poor	1		
			Good	2		
			Excellent	3		
	Site stability	Slope stability	Poor	1	<ul style="list-style-type: none"> Include depth of groundwater and perviousness and recharge areas Flood issues include low lying areas Go-no go criteria Prediction of sea level need to be considered 	
			Good	2		
			Excellent	3		
		Seismic risk	High	1		
			Moderate	2		
			Low	3		
		Flood hazard	In floodplain	1		
			Near floodplain	2		
			Outside floodplain	3		
	Engineering	Slope	Site steepness	8 – 15%	1	• Relates to buffering
				2 – 8 %	2	
				Less than 2%	3	
Elevation		Elevation above sewer trunk	More than 20 m	1		
			10 - 20 m	2		
			Less than 10 m	3		
		Elevation above discharge point (sea level)	Less than 5 m	1		• Climate change effects on sea level – NRCA data (October) – David Maite (Vancouver)
			5 - 10 m	2		

Topic	Criteria	Indicators	Ratings	Scores	TCAC Comments	
			More than 10 m	3		
	Trunks	Proximity to existing sewer trunks	More than 1 km	1	<ul style="list-style-type: none"> Concern about the capacity of trunks on the West Shore. Clarification that 10-15 years growth is thought to exist on the West Shore. 	
			500-1,000 m	2		
			Less than 500 m	3		
	Outfall location	Proximity to potentially suitable marine outfall location	More than 250 m	1	<ul style="list-style-type: none"> What about wetlands effluent 	
			100-250 m	2		
			Less than 100 m	3		
Existing contamination	Known contamination	Registered contaminated sites	Registered contaminated site	1	<ul style="list-style-type: none"> Comment that the presence or absence of contamination is a simplistic view. Need to consider what the contamination is. Are contaminated sites favorable or unfavorable, and is there an opportunity to rehabilitate a site. Drop contaminants – difficult to interpret Contaminated sites – ok – opportunity to clean up Brownfield sites Potential to clean up site This should not be used to evaluate potential sites Reverse order – contaminated sites are good sites to build 	
			Unknown or potential contamination	2		
			Free of contamination	3		
Transportation	Road adequacy	Distance to arterial roads	More than 250 m	1		<ul style="list-style-type: none"> Bylaws being developed to restrict truck traffic (e.g. Esquimalt)
			100 - 250 m	2		
			Less than 100 m	3		
		Adequacy of local roads for facility traffic	Poor	1		
			Adequate	2		
			Good	3		

New Siting Criteria Proposed

1. Odour or chemical air emissions
 - Design for no detectable odours at property line
 - Criteria needed
 - Odour effects need to be considered in siting
 - Missing air emissions – odour, chemical air emissions. So, air or wind direction and speed normals
2. Land costs
 - Land costs need to be reflected in siting criteria –
 - Different costs would be incurred by isolating the plant versus locating the plant near communities and spending money on technology/mitigation.
 - Consider land acquisition and land costs
 - Budget cost. Better solutions may be more but worth it
 - Expropriation or compensation
3. Noise
 - Noise effects need to be considered in siting.
4. Resource Recovery
 - Ensure sites are adequate for technology, resource recovery
 - May need to alter scores if resource recovery part of design
 - Opportunities for resource recovery, reuse and education (new criteria)
 - Proximity to markets for reuse products
 - Need to be able to respond to technologies for each location
5. Distance to Hartland
6. Potential for site mitigation e.g. Haro woods
7. Sea level rise predictions
 - Do not want the plant to be underwater in 20 years if built too close to the shoreline
 - I.e. will Macaulay and Clover be above sea level in 20 years?
8. Flexibility of new sites for potential innovation and treatment technologies
 - Absolutely essential that the criteria include flexibility to accommodate technological advances, particularly recycling, re-use
 - Educational opportunities (social). Can the site demonstrate state of the art sustainability principles?
9. Size and shape of facility
 - Minimum area and shape needed for treatment facilities
10. GHG emissions
 - Examine cost of conversion of natural areas (loss of GHG absorptive capacity)
11. Integration potential: i.e. can the facility itself become part of a community amenity?

General Comments on Site Selection

- Expansion of scores to reflect difference between really bad, and really good
- Include zeros in ranking to identify completely unsuitable sites
- “Show-stoppers” not accounted for
- Some criteria have to be pass/fail
- Two sites needed for West Shore site due to Colwood and Langford issues.
- Explain how secondary effects, construction impacts are assessed
- Landforms, geology, soils and contaminated site
- Set out regulatory framework – fed or provincial or municipal
- Problem description
- Process model such as level of treatment
- What about Millstream Meadows? Already contaminated site
- Must include “base case”, present scenario of sewage treatment
- Replace land use, proximity criteria with visual and smell. A highly attractive site may not be an issue visually, and close proximity isn’t relevant if smell is addressed
- Weights should be dependent on technology chosen at each site
- Change Table 1 title to “Potential Selection Criteria for Saanich East/Colwood Treatment Site Options”
- Ecosystems are difficult or impossible to replace while ‘manmade’ structures including ‘heritage’ sites can be replaced

Table 2: Site Selection Criteria Weighting Recommendations

Topic	Criteria	Weight	Weight	Weight	Weight	Weight	Weight	Average
Biological Features	Ecological integrity	4	3	5	3	3	5	3.83
	Ecological features	4	5	5	4	4	5	4.50
	Watercourse sensitivity	3	4	5	5	4	5	4.33
Community	Land use	3	3	4	3	5	4	3.67
	Local use	3	3	4	1	3	4	3.00
Archaeology & Heritage	Archaeology	2	4	3	3	3	3	3.00
	Traditional use	3	3	4	3	3	4	3.33
	Heritage structures	4	4	3	3	3	2	3.17
Geotechnical	Foundation support conditions	2	2	5	4	4	5	3.67
	Site stability	5	5	5	5	5	5	5.00
Engineering	Slope	4	4	5	5	3	5	4.33
	Elevation	4	4	4	4	3	4	3.83
	Trunks	4	3	4	3	2	4	3.33
	Outfall location	4	4	3	3	2	3	3.17
Existing contamination	Known contamination	2	2	3	1	3	2	2.17
Transportation	Road adequacy	4	3	4	3	5	4	3.83

Note: Weights range from 1 (unimportant) to 5 (critically important) for facility site selection decisions.

Small Group Session #2 Results

Comments on the ESR Report Topics

Methodology

- 10 to 5 to 1: Comment that an interim step is need in the siting assessment. The broad assessment completed through the application of siting criteria in Table 1 will isolate numerous sites, perhaps on the order of 3-4 for the West Shore and Saanich East. The current work plan moves to an assessment of 1 site in the ESR. There is a need for a detailed assessment of the 3 to 4 sites in each area, with a public consultation phase as an interim step.
- Describe a short list of sites – allow public comment
- Prepare public-focused summary
- Triple Bottom Line – not used (outline missing ‘environ. economics’)
- Cumulative effects not applicable at the site scale
- Recommendations and next steps: preferred sites within each of the 2 areas – must be clearly identified (with maps) and easy to find in the document – at the end of the day that is what people are going to want to know
- Visual and odour, not land use (the drivers)
- Make sure individual sites are evaluated separately for each technology option

Report Contents

- Add a descriptive section on reuse or recovery
- Revise 5.2.1 heading from landforms, geology, soils to landforms, geology, soils, and contaminated sites
- Define the regulatory context for each element of Section 5.2 in a new subsection 5.2.1.1: Regulatory context. Include federal, provincial, municipal legislation or guidelines from each element.
- Include a problem description. Why are we building a plant and why are we undertaking a siting study?
- Need recommendations
- Outline ok for technical audience
- Call the first phase “initial”, not screening
- Section 4 – include rationale for optimum site and short list of rejected sites
- “Plant and ecosystems” instead of plant life
- “Animals and habitat” instead of animal life
- Include First Nations

- Create a single Cumulative Effects section
- Move cumulative effects to separate section
- Change heading 3.0 to 'Description of the Treatment Alternatives' (not facility)
- The topics should be the same as the site selection criteria
- Simplify design – move technical info to appendices
- Phase 1 – is high level screening
- Connection to Local Area Plans and to total opportunity costs (how much public land is being used)
- Phase 1 words such as 'site selection' should not be used because we are eliminating sites

General

- Problem of not being able to do a proper ESR without knowledge of project description (land area) (treatment methods)
- How will community input be presented in the ESR?
- It would have been nice to have these outlines in advance of the meeting – pretty high expectations of TCAC members to get all this info and make their recommendations within a 3 hour timeframe
- Is the use of the land for sewage treatment highest and best use?

Workshop Handouts

TCAC Workshop August 29, 2007

WORKBOOK FOR SMALL GROUP SESSIONS

SESSION #1: REVIEWING SITING CRITERIA

1. After reviewing the Table 1 draft siting criteria, are there any other important considerations in siting a sewage treatment facility that you think are missing from this list?

2. Are there criteria on the list that should **not** be applied to evaluating potential sites for sewage treatment plants in the CRD?

3. We need to determine whether some criteria deserve more “weight” in selecting potential sites. In the “weight” column of Table 1 (the list of criteria), please enter one of the following numbers:

5 = Critically important (e.g., a poor rating should disqualify a site from consideration)

4 = Very important

3 = Moderately important (e.g., this criterion is useful, but not critical, in site selection)

2 = Not very important

1 = Unimportant (e.g., this criterion should have little effect on site selection)

If you wish to provide your thoughts on weighting, or to explain your ratings, please use the space below.

4. Are there any additional comments you would like to make about the siting criteria or the siting process?

TCAC Workshop August 29, 2007

WORKBOOK FOR SMALL GROUP SESSIONS

SESSION #2: REVIEWING ESR TOPICS

1. Please review the ESR Contents. Are there any topics that should be considered that are missing from this list? Is so, why should they be included?

2. Are there any topics that are **not** necessary to include in the ESR? If so, why?

3. Are there any additional comments you would like to make about the ESR topics or how the information will be reported to the public and decision makers (report format or style, methods of distribution, etc.)?

Table 1
Potential selection criteria for Core Area Treatment Facilities
DRAFT

Topic	Criteria	Weight	Indicators	Ratings	Scores
Biological Features	Ecological integrity		Extent of site disturbance	Low—0 to 25%	1
				Moderate—25-50%	2
				High—50-100%	3
	Ecological features		Extent of sensitive ecosystems (source: CRD SEI data and site inspections)	Extensive sensitive ecosystems	1
				Some sensitive ecosystems	2
				No sensitive ecosystems	3
			Presence of important habitat (source: VNHS and site inspections)	Extensive important habitat	1
				Some important habitat	2
				No important habitat	3
			Rare species (source: BC CDC database)	Site provides habitat for rare species or habitats	1
				Part of site provides habitat for rare species or habitats	2
				Site does not provide habitat for rare species or habitats	3
	Watercourse sensitivity		Presence of important watercourses (fish-bearing, restored streams, etc.)	Watercourses within 50 m	1
				Watercourses within 30 m	2
				Watercourses within 10 m	3
Community	Land use	Proximity to residential areas	0-50 m	1	
			50-100 m	2	
			100 m +	3	
		Proximity to commercial, light industrial, institutional areas	0-50 m	1	
			50-100 m	2	
			100 m +	3	
		Consistency with community plans and bylaws	Considerable inconsistency	1	
			Some inconsistency	2	
			No inconsistency	3	
	Local use		Level of informal community use	High	1
				Moderate	2
				Low	3
Level of organized community use (primarily recreation)			High	1	
			Moderate	2	
			Low	3	
Archaeology & Heritage	Archaeology	Density of registered sites	High	1	
			Moderate	2	
			Low	3	

Topic	Criteria	Weight	Indicators	Ratings	Scores			
			Archaeological potential	High	1			
				Moderate	2			
				Low	3			
	Traditional use			Level and importance of traditional use reported by First Nations	High	1		
					Moderate	2		
					Low	3		
	Heritage structures		Presence of registered heritage structures	Within 20 m	1			
				20 - 50 m	2			
				More than 50 m	3			
Geotechnical	Foundation support conditions		Presence of fill	0-1 m deep	1			
				1-3 m deep	2			
				More than 3 m deep	3			
			Surface geology			Poor	1	
						Good	2	
						Excellent	3	
			Site drainage			Poor	1	
						Good	2	
						Excellent	3	
	Site stability			Slope stability	Poor	1		
					Good	2		
					Excellent	3		
				Seismic risk			High	1
							Moderate	2
							Low	3
Flood hazard			In floodplain	1				
			Near floodplain	2				
			Outside floodplain	3				
Engineering	Slope		Site steepness	8 – 15 %	1			
				2 – 8 %	2			
				Less than 2%	3			
	Elevation		Elevation above sewer trunk	More than 20 m	1			
				10 - 20 m	2			
				Less than 10 m	3			
			Elevation above discharge point (sea level)			Less than 5 m	1	
						5 - 10 m	2	
						More than 10 m	3	
	Trunks		Proximity to existing sewer trunks	More than 1 km	1			
				500-1,000 m	2			
				Less than 500 m	3			
Outfall location		Proximity to potentially suitable marine outfall location	More than 250 m	1				
			100-250 m	2				
			Less than 100 m	3				
Existing contamination	Known contamination		Registered contaminated sites	Registered contaminated site	1			
				Unknown or potential contamination	2			
				Free of contamination	3			
Transportation	Road adequacy		Distance to arterial roads	More than 250 m	1			
				100 - 250 m	2			
				Less than 100 m	3			
			Adequacy of local roads for facility traffic			Poor	1	
						Adequate	2	
						Good	3	

PHASE 1 REPORT:

CORE AREA LIQUID WASTE TREATMENT SITE SELECTION AND SCREENING LEVEL ENVIRONMENTAL AND SOCIAL REVIEW

DRAFT CONTENTS

1.0 SUMMARY

2.0 INTRODUCTION

- 2.1 Context and background
- 2.2 Approach to the study
- 2.3 Project Team

3.0 DESCRIPTION OF THE TREATMENT FACILITIES AND THEIR OPERATIONS

- 3.1 Selected treatment alternatives
- 3.2 Treatment facility technology and operations
- 3.3 Inputs and outputs
- 3.4 Facility footprint (land requirements)
- 3.5 Trunks, outfalls, and utilities
- 3.6 Transportation and traffic – operations
- 3.7 Noise, vibration, light, and emissions
- 3.8 Drainage management
- 3.9 Safety, security, and relationship to surrounding properties

4.0 SITE SELECTION AND ASSESSMENT METHODS

- 4.1 Site selection approach and methods
- 4.2 Environmental and social review approach and methods

5.0 SAANICH EAST-NORTH OAK BAY AREA

- 5.1 Site selection
 - 5.1.1 General area description
 - 5.1.2 Site selection analysis and results

- 5.2 Environmental and social review
 - 5.2.1 Landforms, geology, and soils
 - 5.2.1.1 Study methods
 - 5.2.1.2 Existing conditions
 - 5.2.1.3 Landforms, geology, and soils impacts and mitigation measures
 - 5.2.1.4 Cumulative effects assessment – landforms, geology and soils
 - 5.2.2 Hydrology and water quality
 - 5.2.2.1 Study methods
 - 5.2.2.2 Existing conditions
 - 5.2.2.3 Hydrology and water quality impacts and mitigation measures
 - 5.2.2.4 Cumulative effects assessment – hydrology and water quality
 - 5.2.3 Plant life
 - 5.2.3.1 Study methods
 - 5.2.3.2 Existing conditions
 - 5.2.3.3 Plant life impacts and mitigation measures
 - 5.2.3.4 Cumulative effects assessment – plant life
 - 5.2.4 Animal life
 - 5.2.4.1 Study methods
 - 5.2.4.2 Existing conditions
 - 5.2.4.3 Animal life impacts and mitigation measures
 - 5.2.4.4 Cumulative effects assessment – animal life
 - 5.2.5 Transportation
 - 5.2.5.1 Study methods
 - 5.2.5.2 Existing conditions
 - 5.2.5.3 Traffic impacts and mitigation measures
 - 5.2.5.4 Cumulative effects assessment – transportation
 - 5.2.6 Land use and community
 - 5.2.6.1 Study methods
 - 5.2.6.2 Existing conditions
 - 5.2.6.3 Land use and neighbourhood impacts and mitigation measures
 - 5.2.6.4 Cumulative effects assessment – Land use and community
 - 5.2.7 Archaeology and heritage
 - 5.2.7.1 Study methods
 - 5.2.7.2 Existing conditions
 - 5.2.7.3 Archaeology and heritage impacts and mitigation measures
 - 5.2.7.4 Cumulative effects assessment – archaeology and heritage

6.0 WEST SHORE AREA

- 6.1 Site selection
 - 6.1.1 General area description
 - 6.1.2 Site selection analysis and results
- 6.2 Environmental and social review

- 6.2.1 Landforms, geology, and soils
 - 6.2.1.1 Study methods
 - 6.2.1.2 Existing conditions
 - 6.2.1.3 Landforms, geology, and soils impacts and mitigation measures
 - 6.2.1.4 Cumulative effects assessment – landforms, geology and soils
- 6.2.2 Hydrology and water quality
 - 6.2.2.1 Study methods
 - 6.2.2.2 Existing conditions
 - 6.2.2.3 Hydrology and water quality impacts and mitigation measures
 - 6.2.2.4 Cumulative effects assessment – hydrology and water quality
- 6.2.3 Plant life
 - 6.2.3.1 Study methods
 - 6.2.3.2 Existing conditions
 - 6.2.3.3 Plant life impacts and mitigation measures
 - 6.2.3.4 Cumulative effects assessment – plant life
- 6.2.4 Animal life
 - 6.2.4.1 Study methods
 - 6.2.4.2 Existing conditions
 - 6.2.4.3 Animal life impacts and mitigation measures
 - 6.2.4.4 Cumulative effects assessment – animal life
- 6.2.5 Transportation
 - 6.2.5.1 Study methods
 - 6.2.5.2 Existing conditions
 - 6.2.5.3 Traffic impacts and mitigation measures
 - 6.2.5.4 Cumulative effects assessment – transportation
- 6.2.6 Land use and community
 - 6.2.6.1 Study methods
 - 6.2.6.2 Existing conditions
 - 6.2.6.3 Land use and neighbourhood impacts and mitigation measures
 - 6.2.6.4 Cumulative effects assessment – Land use and community
- 6.2.7 Archaeology and heritage
 - 6.2.7.1 Study methods
 - 6.2.7.2 Existing conditions
 - 6.2.7.3 Archaeology and heritage impacts and mitigation measures
 - 6.2.7.4 Cumulative effects assessment – archaeology and heritage

7.0 REFERENCES

8.0 APPENDICES