

Cobble Hill Holdings
Waste Discharge Permit PE-105809
Shawnigan Lake
Compliance and Monitoring Summary
June 2015

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Preface

This report compiles Ministry of Environment, Environmental Protection Regional Operations Branch compliance activities conducted in May 2015 on Lot 23 of Cobble Hill Holdings Ltd., also known as South Island Aggregates, Stebbings Road, Shawnigan Lake.

A companion report for Lot 21 owned by 0782484 BC Ltd., adjacent to Cobble Hill Holdings Ltd. was compiled by the Land Remediation Branch, Ministry of Environment.

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Introduction and background

On August 21, 2013, Permit 105809 was issued under the *Environmental Management Act* (EMA) to Cobble Hill Holdings (CHH) for a contaminated soil treatment and landfill facility located on a parcel of land referred to as Lot 23 near Shawnigan Lake. The permit allows CHH to accept contaminated soil and process it through bioremediation prior to landfilling or to directly discharge into an engineered landfill facility, as well as discharge treated effluent meeting aquatic and drinking water standards to an ephemeral stream. No waste has been discharged to the landfill to date.

On April 8, 2015, ministry staff visited the site. The landfill facility was not in operation and had not appreciably changed since the last inspection in May 2014. The previously accepted contaminated soil was deposited in a lined asphalt paved soil management area. On April 9, 2015, CHH's qualified professional was on-site conducting quarterly sampling of groundwater and surface water, as required by the permit. The Ministry's sample results have now been reviewed by ministry staff and no issues of concern were identified.

In response to the questions raised during the April 16 meeting of community and local government representatives with the Minister, Environmental Protection Division (EPD) staff have compiled a preliminary inventory of baseline information available to the ministry pertaining to the site and immediate receiving environment, and more far field receiving environments (including Shawnigan Creek and Lake). During this meeting there was agreement to work with the CVRD and local residents to conduct sampling for the purpose of understanding the materials which were present on Lots 21 & 23.

Permit 105809 applies only to Lot 23, but to the north there is an adjacent parcel of land called Lot 21 where soil has been previously accepted under the Contaminated Sites Regulation (CSR) as well as under permit with Ministry of Energy and Mines. The property parcels' ownership has been reconfirmed, in that Lot 23 is owned by Cobble Hill Holdings Ltd. (CHH) and Lot 21 is owned by 0782484 BC Ltd. which is owned by two of the directors of CHH. Application of ownership for Lot 21 was made to the Land Titles office on August 31, 2007.

Compliance Inspection Report

EPD conducted a comprehensive compliance inspection of Lot 23 Permit 105809 on May 13, 2015, pertaining to the site and immediate receiving environment.

May 2015 site inspection by EP ROB compliance staff

The May 13, 2015 site inspection evaluated compliance against the original EMA permit as an amended permit was issued June 4, 2015. Future inspections will determine compliance with the amended permit. The full May 13 inspection report is in Appendix B. Additional requirements

to the amended permit include: community representation on the advisory committee, fulltime weather protection of the soil management area, wheel washing requirements and prohibition of reuse of landfill cell liners.

While no soils have been accepted to date with the intent of bioremediation, soils already suitable for landfilling are being held in the Soil Management Area (SMA) awaiting completion of the landfill site. No discharge has occurred to the environment from the pond during the period covered by the recent inspection. The non-compliances noted in this inspection were related to incomplete monitoring and reporting, replacement of a monitoring well, and not assigning a Tracking ID to incoming soil in accordance with the procedures as per the Soil Acceptance Plan.

Main findings from the compliance inspection include:

Operations:

- Authorized works appear to have been completed and certified as-built plans are on file.
- No discharge to the landfill facility has occurred yet. The recent soils added to the Soil Management Area (SMA) awaiting landfill have metals levels not exceeding Schedule 7 Column IV, according to the May 6, 2015 Stantec report.
- The Permittee must establish an Advisory Committee and develop terms of references to the satisfaction of the Director.

Water Treatment Plant and Pond Discharge:

- The annual average for the treatment plant has not exceeded the maximum limit of 12.1 m³/day.
- The Quarterly Monitoring Report Update (Active Earth, May 26, 2015), confirms that no discharge to the environment has taken place during the evaluation period of this inspection. Following the recent issuing of the amended permit, it is expected that all quality standards shall be met as listed in the permit.
- The follow-up treatment plant commissioning report of May 1, 2015 (Water Treatment Plant Commissioning Report, Active Earth Engineering), notes that during the commissioning period all parameters have met Provincial Health Drinking Water guidelines and all but chloride, zinc and aluminum have met Provincial Aquatic guidelines at the treatment plant, though these parameters have been met at the discharge point to the environment (from the sedimentation pond). The zinc exceedance was attributed to a now-replaced faulty component, and the aluminum exceedance was expected to be a start-up issue with the plant. Both of the zinc and aluminum concerns appear to have been addressed satisfactorily and recent treated effluent results have showed concentrations of below detection and better than guideline requirements, respectively. Chloride Aquatic Life (AW) standard has not been consistently achieved at the plant, though the standard is met at the pond discharge point to the environment. If chloride (or any other parameter) concentrations do not meet permit requirements, additional treatment may be required.

- According to the Quarterly Monitoring Report Update (July 2014 - April 2015), no discharges from the sedimentation pond occurred during that monitoring period as the water level in the pond did not reach the outlet elevation at any point. Only one shipment of soil was accepted during the period covered by this inspection and that was on May 8, 2015, from 1950 Blanshard Street, which was approximately 600 tonnes. Soils accepted during this inspection period were accompanied by documentation from Stantec Consulting, who analysed the stockpiles at 1950 Blanshard Street, Victoria, for metals to determine suitability for disposal at CHH. The Blanshard shipment took place on various days from May 8 to June 12 and totalled approximately 2060 tonnes.
- A flow measuring device has been installed at the water treatment plant but not at the discharge point and had water levels been high enough during the period covered by this inspection for a discharge to take place, failure to have a flow measuring device in place would have been noted as a non-compliance.

Monitoring:

- Groundwater Monitoring Well #4 is reported no longer operational due to tampering and must be replaced as soon as possible. According to the Quarterly Monitoring Report Update (July 2014 - April 2015), there are no impacts observed to groundwater quality related to the operations under the permit. More in depth trend analysis will be included as part of annual reports.
- Monthly sampling and quarterly receiving environment monitoring has not been conducted during this monitoring period due to the limited site activity and appeal process, resulting in being marked as in non-compliance

Reporting:

- While the Soil Acceptance Plan has been generally followed as described in section 6 of the Environmental Procedures Manual (EPM), no coded Tracking ID number (as described in EPM 6.4) was issued for the 1950 Blanshard shipment commencing May 8, 2015. The tracking process is being further refined and updated including the WAA and Soil Acceptance Forms to reflect this. The refined system is being used for all new jobs after the Blanshard shipment. The tracking system will be retroactively applied to all loads that have been received thus far. Any changes in procedure must be incorporated into the EPM.
- Regular quarterly reports were not submitted during the time of the appeal; however, quarterly reporting has resumed following the conclusion of the appeal and issue of amended permit in June. Most recent report covers period from 2014 July to 2015 April.

Receiving Environment Monitoring Results from May 13, 2015

Groundwater quality

On May 13, 2015, groundwater sampling at the CHH quarry was completed in three of seven onsite monitoring wells. The sampling was completed by Ministry of Forests, Lands and Natural Resource Operations (FLNRO) groundwater protection staff, for the Ministry of

Environment (MOE). The intent was to sample four wells, but due to low yielding wells and time constraints, only three locations were successfully sampled. At MW-1S and MW-2, the wells were purged dry using Waterra tubing with a foot valve and allowed to recover prior to sampling with a bailer. At MW-5S, three well volumes of water were purged prior to sample collection through the tubing. Dissolved metals samples were field-filtered using 0.45 micron filters and preserved to <2 pH with HNO₃ (nitric acid). In-situ observations of pH, specific conductance, temperature and oxygen reducing potential (ORP) were recorded using a YSI water quality meter in a closed flow cell attached to the Waterra tubing.

Parameters exceeding Contaminate Sites Regulation (CSR) standards

All sample results were compared to guidelines within the BC Contaminated Sites Regulation (CSR), as shown in Table 1. Arsenic (As) in MW-1S was the only parameter that exceeded the CSR aquatic life standards and drinking water standard for the May 2015 sampling (highlighted in red within Table 1).

Comparison of MOE and CHH results

Dissolved metals results from MOE sampling in May 2015 were compared to the results from the April 2015 sampling by Active Earth, the consultants working on behalf of CHH, also shown in Table 1. Within the CHH samples, shown in Table 1, arsenic exceeded the CSR aquatic life and drinking water standards, and nitrite exceeded aquatic life standards. There were no recent total metals samples from the CHH consultants to compare against. Total metals from the MOE sampling were compared against April 2014 CHH sampling. Only nitrite (N) at MW-1S and total manganese (Mn) at MW-5S had exceedances in the CHH results that were not in the MOE analytical results. There was little consistency in how the MOE lab results deviated from the CHH results. Concentrations were considerably higher for some parameters and much lower for other parameters. In summary, the differences between results from recent MOE sampling in May 2015 and results from CHH sampling in April 2015 and April 2014 had no discernable pattern. Difference in results could be attributed to timing of sampling, precipitation, sampling methodology, purge volumes, or in response to quarry activities. Relative percent difference and percentage change calculations are included in Appendix A.

Table 1: Summary of parameters exceeding CSR standards

Well ID	Parameter	MOE Lab Result (mg/L)	CSR drinking water standard (mg/L)	CHH Lab Result (mg/L)
MW-1S	Dissolved arsenic (As)	0.0511	0.01	0.0576 (2015)
	Dissolved sodium (Na)	204	200	188 (2015)
	Total aluminum (Al)	20.4	10	0.283 (2014)
	Total arsenic (As)	0.053	0.01	0.0567 (2014)
	Total barium (Ba)	1.32	1	0.026 (2014)
	Total iron (Fe)	13.7	6.5	0.15 (2014)
	Total lead (Pb)	0.0218	0.01	<MDL (2014)
	Total uranium (U)	0.0481	0.02	0.00197 (2014)
	Total sodium (Na)	232	200	183 (2014)
	Nitrite (N)	1.15*	2**	2.62 (2015)*
MW-2	Total aluminum (Al)	16.9	10	0.145 (2014)
	Total iron (Fe)	18.4	6.5	0.165 (2014)
	Total manganese (Mn)	1.05	0.55	0.0841 (2014)
MW-5S	Total manganese (Mn)	0.415*	0.55	0.666 (2014)

* not above the CSR drinking water standard

** CSR aquatic life standard

In-situ readings for pH and specific conductance were reasonably close to CHH results, with the exception of pH at MW-1S. The discrepancy between the pH values could be attributed to whether the CHH reading was from lab results or taken in the field. Table 2 summarizes the in-situ readings with what has been presented by the CHH consultants.

Table 2: In-situ readings and CHH lab results

		MW-1S		MW-2		MW-5S	
2015-05-12			SIA lab results		SIA lab results		SIA lab results
Parameter	Unit	Results	2015-04-19	Results	2015-04-19	Results	2015-04-19
Temperature	°C	8.7		9.4		9	
pH	units	10.24	9.52	7.48	7.61	6.39	6.71
Specific Conductance	µS/cm	950	1010	255.2	268	538.9	472
ORP	mV	43.3		7.8		7.8	

It was noted that the analysis and reporting of total metals within the results from CHH (Active Earth) was inconsistent. However the CSR Schedule 6, footnotes 2 (d) and 4 suggest that results for total metals concentrations, rather than for dissolved metals, should be used for comparison to the drinking water standards and that analyzing for total metals in groundwater is always recommended for all standards. Consistent sampling for both total and dissolved metals would facilitate comparison to the standards in the future.

Surface water and sediment quality

On May 13 2015, Ministry of Environment (MOE) Environmental Protection staff inspected Cobble Hill Holdings (CHH) property named in permit 105809. During this inspection surface water samples were collected for the purpose of 1) auditing a subset of the permitted monitoring sites compared to CHH's quarterly monitoring program, 2) determining surface water conditions adjacent to Site 21, and 3) assessing water quality at two Shawnigan Creek sites where previous MOE receiving environment monitoring has occurred.

In total four sites were selected to collect water samples (figure and photos attached in appendix C):

- E294426 South Shawnigan Creek d/s Elkington Forest -- upstream of CHH properties,
- E301630 Rip Rap Tributary d/s Settling Pond -- located immediately downstream from where discharges occur at the permitted site,
- E302070 Cobble Hill Holdings Lot 21 -- in the outflow seep from Lot 21 before it reaches Shawnigan Creek , and
- E294425 South Shawnigan Creek d/s South Island Aggregates -- located downstream of where Lot 21 outflow empties into the creek yet before the confluence of Shawnigan Creek and the ephemeral creek that receives discharges from the permitted site.

All samples were collected following standard MOE sampling protocols, including a minimum of 10% quality assurance and quality control (QA/QC) samples. The samples were put on ice in a dark cooler and shipped overnight to Maxxam Analytics in Burnaby, BC. Parameters analyzed included chloride, total and dissolved metals at all sampling sites in addition to field measurements of dissolved oxygen, temperature, specific conductivity and pH. In situ sediment sampling was also conducted at the Shawnigan Creek sites and analyzed for grain size, total

metals, TOC and PAHs; this data was collected to satisfy a data gap from previous receiving environment monitoring conducted by MOE and the Cowichan Valley Regional District (CVRD) as part of the Shawnigan Lake Water Quality Objectives attainment monitoring. In all cases where derivation of a water quality guideline was dependent on water hardness, the Shawnigan Creek site upstream of CHH (downstream of Elkington Forest) was used to represent background conditions.

All results were compared to the applicable BC Water Quality Guidelines (WQGs) and Sediment Quality Guidelines (SQGs) for the purposes of the protection of aquatic life and drinking water. Where available sampling results from May 13 2015 were compared to historical sampling at the same location, and/or nearby CHH quarterly sampling results that were conducted April 9 2015.

E294426 South Shawnigan Creek downstream of Elkington Forest

Results for total chloride, total metals and dissolved metals at E294426 on May 13 2015 were all within applicable maximum instantaneous and average WQGs for both drinking water and the protection of aquatic life. The 2013 data at this site indicated a marginal exceedance of the average WQG for total copper during the fall (0.74 ug/L compared to the guideline of 0.66 ug/L), however, all parameters were within applicable guidelines during the summer sampling session.

Results for stream sediment sampling of total metals at E294426 on May 13 indicate exceedances of the lower Sediment Quality Guideline (SQG) for total chromium, total iron and total nickel¹. For PAH sediment analysis, with the exception of benzo[a]pyrene equivalency where the detection limit was greater than the SQG, results were all within applicable SQGs. There are no historical sediments results for this site. This site was established to represent base line or background conditions in Shawnigan Creek.

E301630 Rip Rap Tributary 20m downstream from settling pond discharge

Results for total chloride, total metals and dissolved metals at E301630 on May 13 were all within applicable maximum instantaneous and average WQGs for both drinking water and the protection of aquatic life. Results from the MOE sampling on April 8 2015 were also within applicable guidelines. On April 9 2015, CHH conducted scheduled quarterly sampling which included two sites nearby E301630 (SW-1 and SW-3). With the exception of dissolved cadmium and total zinc where detection limits were greater than the corresponding WQGs, all parameters were found to be within applicable guidelines. Based on the results from MOE sampling in April and May, which had lower detection limits, levels of dissolved cadmium and total zinc are not considered a cause for concern.

¹ Lower SWQG is the concentration that will protect aquatic life from adverse effects of toxic substance in most situations and upper SWQGs is the concentration that if exceeded will likely cause severe effects on aquatic life.

Results for stream sediment sampling of total metals at E301630 on May 13 indicate, similar to the upstream background site, exceedances of the lower SQG for total chromium, total iron, total nickel, and additional exceedances in total copper and total manganese. For chromium, iron and nickel the differences between this site and the upstream background site were minimal. For PAH sediment analysis, with the exception of benzo[a]pyrene equivalency where the detection limit was greater than the SQG, results were all within applicable SQGs. There are no historical sediment results for this site.

E302070 Cobble Hill Holdings Lot 21

Results for total chloride, total metals and dissolved metals at E301630 on May 13 were all within applicable maximum instantaneous WQGs for both drinking water and the protection of aquatic life. Total copper slightly exceeded the average WQG for the protection of aquatic life (0.841 ug/L and 0.688 ug/L replicate compared to the guideline of 0.66 ug/L); however this guideline was developed for the comparison of the average of 5 weekly samples conducted within 30 consecutive days, not a single sample, as collected at this site. CHH sampling conducted in a similar location (“...from the outflow of the sedimentation pond, on Lot 21, and prior to the confluence with Shawnigan Creek”) on May 5 2015 also indicated a marginal exceedance of total copper when compared to the average WQG of 0.66 ug/L (0.70 ug/L); no additional exceedances at this location were detected.

E294425 South Shawnigan Creek downstream of South Island Aggregates

Results for total chloride, total metals and dissolved metals at E294425 on May 13 were all within applicable maximum instantaneous and average WQGs for both drinking water and the protection of aquatic life. A comparison of the 2013 MOE/CVRD summer/fall total metals sampling demonstrated all results were also within applicable guidelines. The results from the CHH quarterly sampling conducted April 9 2015 at the closest surface water sampling site, SW-5, were also within applicable guidelines for all parameters with the exception of one exceedance of the average WQG for total copper (1.1 ug/L compared to WQG of 0.66 ug/L). This value does not necessarily constitute an exceedance given the comparison is of a single value to a guideline designed to be compared to an average of 5 weekly samples collected over 30 consecutive days. The results from the quarterly SW-5 sampling also show the detection limits for dissolved cadmium and total zinc are greater than the WQG; however based on results from MOE sampling in May, where detection limits are lower, these two parameters are not considered a cause for concern.

Results for stream sediment sampling of total metals at E294425 on May 13 indicate exceedances of the lower and upper SQGs for total iron (49,200 ug/g compared to upper SQG of 43,766 ug/g) and total manganese (12,200 ug/g compared to upper SQG of 1,100 ug/g). The lower SQG was also exceeded in the case of total arsenic, total cadmium, total chromium, total copper, total mercury, total nickel and total zinc. Total

cobalt, total nickel and total selenium exceeded the CCME Soil Quality Guidelines for the Protection of Environmental and Human Health. The PAH sediment results showed exceedances of the lower SQG for benzo[a]pyrene equivalency, acenaphthylene, phenanthrene, fluoranthene, pyrene, benzo[a]anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene. There are no historical sediment results for this site.

In summary, the Shawnigan Creek sampling conducted by MOE in May 13 2015 indicates surface water quality upstream, adjacent and downstream of both Lot 23 and Lot 21 meets the BC water quality guidelines. The MOE water quality results, taken for auditing purposes, with respect to CHH sampling as per the permitted monitoring requirements, illustrates that all the results are very similar. There were some minor differences related to detection limits used, and individual copper concentrations seen above the average guideline values, which are based on 5 weekly samples in 30 days. However, as noted above similar copper values were also seen in the 2013 summer/fall sampling conducted by the MOE and CVRD, as part of the WQOs development program for Shawnigan Lake watershed.

The stream sediment sampling results, while similar between the Shawnigan Creek upstream site at Elkington and the tributary site downstream of CHH discharge, indicated more exceedances of both metals and PAHs at the Shawnigan Creek downstream site. In fact PAHs were only exceeded at the Shawnigan Creek downstream site. Interpreting sediment results can be more complicated or confounded by the nature of the sediment collected. Field notes indicate the Shawnigan Creek site downstream of CHH properties contained very fine/diatomaceous sediment that was easily flocked. By comparison, the sediment at the site upstream of CHH was composed largely of gravel/pebbles with light coloured clay and a thin layer of darker, organic sediment. Both metals and PAHs are known to adhere to finer particle sized sediments that tend to occur in low velocity stream sections as opposed to faster moving sections with larger sized sediment. In addition, the downstream site likely receives additional road runoff from Stebbings Road which runs adjacent the west side of the creek. As sources could be related to road runoff inputs (Stebbingd rd), CVRD may be required to participate in subsequent monitoring of storm runoff . A combination of these factors may be responsible for what appears to be a higher number of exceedances downstream. Additional information from the results of the Lot 21 soil sampling and the groundwater sampling may help provide further information related to the elevated levels in the downstream Shawnigan Creek site.

Conclusions and Recommendations

The following outlines a summary of inspection and monitoring results conducted May 13, 2015 and includes additional information collected by CHH and MOE staff. The CHH permit 105809 site has not commenced acceptance of soil into the landfill and overall there are no significant non-compliance issues. Receiving environment monitoring has shown all surface water quality meets Provincial ambient guidelines for the protection of aquatic life. Noted exceedances of Provincial ambient guidelines were for arsenic in one groundwater well and sediment quality in Shawnigan Creek downstream.

Compliance Inspection

The compliance inspection of CHH permit 105809 was generally in compliance. Actions required by the permittee include:

- Amended permit was issued June 4, 2015. Adhere to all permit conditions and ensure operating, sampling and monitoring requirements are met and reported on time.
- Install flow meter for sedimentation pond that meets BC Sampling Manual requirements (permit clause reference 1.5.4, 3.7)
- Install groundwater well to replace GW4. Ensure applicable plans and specs requirements are met (3.3)
- Include sampling information, lab info, blank info, etc. as appendix in future reports (3.9)
- Ensure Emergency Response Plan is reviewed annually as required (2.12)
- Ensure Environmental Procedures Manual is reviewed and kept up to date as required (2.13)
- All non-contact water must flow directly to settling pond prior to discharge to the environment (2.16)
- Ensure Tracking ID system is implemented as discussed in the Soil Acceptance Plan (5.1)
- Review all Details/Findings listed in Inspection Details section and take appropriate action where necessary.

Receiving Environment Monitoring Results

- Groundwater quality sampling conducted at 3 wells had results that exceeded drinking water quality guidelines for arsenic at one well
- Groundwater monitoring showed some differences between results from recent MOE sampling in May 2015 and results from CHH sampling in April 2015 and April 2014 but there was no discernable pattern. Difference in results could be attributed to timing of sampling, precipitation, sampling methodology, purge volumes, or in response to quarry activities.
- Ministry audit of CHH surface water monitoring results are similar and comparable.
- Surface water monitoring at the slope toe of Lot 21 and downstream in Shawnigan Creek has shown no exceedances of water quality guidelines except for a slight exceedance of total copper in the Lot 21 seep (E302070) for both the May 5 and May 13, 2015 sampling event.
- Shawnigan Creek sediment quality downstream Lot 21 showed exceedances of both metals and PAHs at the Shawnigan Creek downstream site. These exceedances were not significantly higher than ambient guidelines.
- Shawnigan Creek sampling conducted by MOE in May 13 2015 indicates surface water quality upstream, adjacent and downstream of both Lot 23 and Lot 21 meets the BC water quality guidelines and little to no difference was observed in Shawnigan Creek between upstream and downstream monitoring stations.

Recommendations going forward include:

- For groundwater monitoring, consistent sampling for both total and dissolved metals would facilitate comparison to the standards in the future.
- For Shawnigan Creek downstream Lot 21, further sediment characterization and quality may be needed to determine the source(s) of elevated sediment metals and PAHs. As sources could be related to road runoff inputs (Stebbingd Road), CVRD may be required to participate in subsequent monitoring of storm runoff. This data should be assessed in tandem with the Lot 21 soil quality data.

Compliance Plan

Compliance of CHH Permit 105809 will be trigger based and follow the Ministry's Compliance and Enforcement Policy and Procedures. Future inspections will be conducted based on consistent risk-based assessment and response to non-compliances.

APPENDIX A – Ground Water Quality Results

RESULTS OF CHEMICAL ANALYSES OF WATER				MW-1S				MW-2						MW-5S			
Maximum ID		CSR Standards		MG1237	AE11MW-1S	RPD	Change	MG1165	MG1166		AE11MW-2	RPD	Change	MG1241	MW-5S	RPD	Change
Sampling Date		Aquatic Life	Drinking Water	2015-05-13	2015-04-19	SIA vs.	SIA vs.	2015-05-13	2015-05-13		2015-04-19	SIA vs.	SIA vs.	2015-05-13	2015-04-19	SIA vs.	SIA vs.
COC Number		mg/L	mg/L	50216993	Active Earth	MOE	MOE	50216998	50216998	RPD	Active Earth	MOE	MOE	50216997	Active Earth	MOE	MOE
	Units			REG/1	Results	%	%	REG/1	REP/2	%	Results	%	%	REG/1	Results	%	%
Field Parameters																	
Sample End Date	N/A			20150513				20150513	20150513					20150513			
Sample End Time	N/A			15:50				14:20	14:24					15:16			
Sample Start Date	N/A			20150513				20150513	20150513					20150513			
Sample Start Time	N/A			15:35				14:13	14:20					14:56			
Temperature at Arrival	C			1				1	1					1			
Calculated Parameters																	
Filter and HNO3 Preservation	N/A			FIELD				FIELD	FIELD					FIELD			
Total Hardness (CaCO3)	mg/L			163				370	362	2				135			
Ion Balance	N/A			0.84				1.0	1.0	0				1.1			
Misc. Inorganics																	
Dissolved Hardness (CaCO3)	mg/L			18.2	22.5	-21	24	282	278	1	109	88	-61	116	205	-55	77
Alkalinity (Total as CaCO3)	mg/L			210	194	8	-8	241	244	-1	116	70	-52	105	190	-58	81
Alkalinity (PP as CaCO3)	mg/L			82.8				<0.50	<0.50					<0.50			
Bicarbonate (HCO3)	mg/L			53.6				294	298	-1				128			
Carbonate (CO3)	mg/L			99.4				<0.50	<0.50					<0.50			
Hydroxide (OH)	mg/L			<0.50				<0.50	<0.50					<0.50			
Anions																	
Dissolved Sulphate (SO4)	mg/L	1000	500	270	219	21	-19	34.6	36.1	-4	17.7	65	-49	14.9	33.6	-77	126
Dissolved Chloride (Cl)	mg/L	1500	250	45	35.1	25	-22	17	17	0	3.06	139	-82	4.2	13.2	-103	214
Nutrients																	
Nitrite (N)	mg/L	2	3.2	1.15	2.62	-78	128	0.0081	0.0037	75	<0.005			0.0133	<0.005		

RDL = Reportable Detection Limit

N/A = Not Applicable

RPD = Relative Percent Difference

Change = Percent change

Results relate only to the items tested.

Figure 1: Analytical Results for Nutrients in Groundwater

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)				MW-1S				MW-2				MW-5S			
Maxxam ID	CSR Standards			MG1237	AE11MW-1S	RPD	Change	MG1165	AE11MW-2	RPD	Change	MG1241	MW-5S	RPD	Change
Sampling Date	Aquatic Life	Drinking Water		2015-05-13	2015-04-19	SIA vs.	SIA vs.	2015-05-13	2015-04-19	SIA vs.	SIA vs.	2015-05-13	2015-04-19	SIA vs.	SIA vs.
COC Number	mg/L	mg/L		50216993	Active Earth	MOE	MOE	50216998	Active Earth	MOE	MOE	50216997	Active Earth	MOE	MOE
			Units	REG/1	Results	%	%	REG/1	Results	%	%	REG/1	Results	%	%
Dissolved Metals by ICPMS													mg/L		
Dissolved Aluminum (Al)		10	mg/L	0.0111	0.015	-30	35	0.00195	0.017	-159	772	0.015	0.002	153	-87
Dissolved Antimony (Sb)	0.2	0.006	mg/L	0.00199	0.0029	-37	46	0.000035	0.0003	-158	757	0.000271	<		
Dissolved Arsenic (As)	0.05	0.01	mg/L	0.0511	0.0576	-12	13	0.000461	0.0014	-101	204	0.0016	0.0007	78	-56
Dissolved Barium (Ba)	10	1	mg/L	0.0169	0.0175	-3	4	0.0314	0.0332	-6	6	0.0285	0.0365	-25	28
Dissolved Beryllium (Be)	0.053		mg/L	<0.00001	-			0.000013	<			<0.00001	0.00002		
Dissolved Bismuth (Bi)			mg/L	<0.000005	-			0.000005	-			<0.000005	-		
Dissolved Boron (B)	50	5	mg/L	0.093	0.09	3	-3	0.011	0.025	-78	127	0.024	0.012	67	-50
Dissolved Cadmium (Cd)		0.005	mg/L	<0.000005	0.00002			<0.000005	0.00003			0.000335	<		
Dissolved Chromium (Cr)	0.01	0.05	mg/L	0.00028	<			<0.0001	<			0.0001	<		
Dissolved Cobalt (Co)	0.04		mg/L	0.000228	0.00044	-63	93	0.00131	0.00037	112	-72	0.000162	0.00091	-140	462
Dissolved Copper (Cu)		1	mg/L	0.00426	0.0154	-113	262	0.000129	0.0005	-118	288	0.00101	0.0003	108	-70
Dissolved Iron (Fe)		6.5	mg/L	0.0081	0.02	-85	147	0.707	0.06	169	-92	0.0078	0.37	-192	4644
Dissolved Lead (Pb)	0.06	0.01	mg/L	0.0000269	0.00006	-76	123	0.0000139	<			0.0000433	0.00006	-32	39
Dissolved Lithium (Li)			mg/L	<0.0005	<			0.00089	<			<0.0005	0.001		
Dissolved Manganese (Mn)		0.55	mg/L	0.0042	0.006	-35	43	0.438	0.207	72	-53	0.153	0.236	-43	54
Dissolved Molybdenum (Mo)	10	0.25	mg/L	0.0407	0.0478	-16	17	0.000603	0.00906	-175	1402	0.00855	0.00074	168	-91
Dissolved Nickel (Ni)	1.1		mg/L	0.00256	0.0036	-34	41	0.00144	0.0017	-17	18	0.00157	0.0011	35	-30
Dissolved Selenium (Se)	0.01	0.01	mg/L	0.00314	0.0041	-27	31	0.000102	-			0.000319	<		
Dissolved Silver (Ag)	0.015		mg/L	<0.000005	<			0.000005	<			<0.000005	<		
Dissolved Strontium (Sr)			mg/L	0.0445	-			0.269	-			0.137	-		
Dissolved Thallium (Tl)	0.003		mg/L	0.0000094	<0.00001			<0.000002	<			0.0000049	<		
Dissolved Tin (Sn)			mg/L	0.00049	-			<0.0002	-			0.00055	-		
Dissolved Uranium (U)	3	0.02	mg/L	0.00373	0.00574	-42	54	0.0012	0.00145	-19	21	0.00151	0.00097	44	-36
Dissolved Vanadium (V)			mg/L	0.0751	0.0789	-5	5	<0.0002	0.0012			0.0009	<		
Dissolved Zinc (Zn)	0.9	5	mg/L	0.00076	<			0.00069	<			0.00148	<		
Dissolved Calcium (Ca)			mg/L	6.78	8.76	-25	29	93.3	33.6	94	-64	36.7	64.4	-55	75
Dissolved Magnesium (Mg)		100	mg/L	0.306	0.16	63	-48	11.9	5.99	66	-50	5.92	10.7	-58	81
Dissolved Potassium (K)			mg/L	0.825	0.71	15	-14	1.34	1.04	25	-22	1.24	3.52	-96	184
Dissolved Sodium (Na)		200	mg/L	204	188	8	-8	13.4	9.09	38	-32	8.83	12.6	-35	43

RDL = Reportable Detection Limit

N/A = Not Applicable

RPD = Relative Percent Difference

Change = Percent change

Results relate only to the items tested.

Bold, blue shading Concentration greater than CSR Drinking Water (DW) Standard

Bold, red text Concentration greater than CSR Aquatic Life (AW) Standard

Figure 2: Analytical Results for Dissolved Metals in Groundwater

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)				MW-1S				MW-2				MW-5S			
Maxxam ID	CSR Standards			MG1237	AE11MW-1S	RPD	Change	MG1165	AE11MW-2	RPD	Change	MG1241	MW-5S	RPD	Change
Sampling Date	Aquatic Life	Drinking Water		2015-05-13	2014-04-11	SIA vs.	SIA vs.	2015-05-13	2014-04-11	SIA vs.	SIA vs.	2015-05-13	2014-04-11	SIA vs.	SIA vs.
COC Number	mg/L	mg/L		50216993	Active Earth	MOE	MOE	50216998	Active Earth	MOE	MOE	50216997	Active Earth	MOE	MOE
			Units	REG/1	Results	%	%	REG/1	Results	%	%	REG/1	Results	%	%
Total Metals by ICPMS															
Total Aluminum (Al)		10	mg/L	20.4	0.283	195	-99	16.9	0.145	197	-99	2.15	2.25	-5	5
Total Antimony (Sb)		0.006	mg/L	0.000613	0.00255	-122	316	0.000141	<			0.000339	0.00072	-72	112
Total Arsenic (As)		0.01	mg/L	0.053	0.0567	-7	7	0.0053	0.0014	116	-74	0.0019	0.00043	126	-77
Total Barium (Ba)		1	mg/L	1.32	0.026	192	-98	0.116	0.027	124	-77	0.0442	<		
Total Beryllium (Be)			mg/L	0.00531	-			0.00191	-			0.00003	-		
Total Bismuth (Bi)			mg/L	0.00105	-			0.000874	-			0.00001	-		
Total Boron (B)		5	mg/L	0.164	<			<0.05	<			0.026	<		
Total Cadmium (Cd)		0.005	mg/L	0.000254	<			0.000218	<			0.000967	0.0006	47	-38
Total Chromium (Cr)		0.05	mg/L	0.00538	<			0.0103	<			0.00269	0.0031	-14	15
Total Cobalt (Co)			mg/L	0.00972	-			0.0145	-			0.00199	-		
Total Copper (Cu)		1	mg/L	0.0206	0.0074	94	-64	0.0699	<			0.00454	0.0103	-78	127
Total Iron (Fe)		6.5	mg/L	13.7	0.15	196	-99	18.4	0.165	196	-99	3.29	2.62	23	-20
Total Lead (Pb)		0.01	mg/L	0.0218	<			0.0292	<			0.000889	0.00265	-100	198
Total Lithium (Li)			mg/L	0.0163	-			0.00682	-			<0.0005	-		
Total Manganese (Mn)		0.55	mg/L	0.355	0.0087	190	-98	1.05	0.0841	170	-92	0.417	0.666	-46	60
Total Molybdenum (Mo)		0.25	mg/L	0.032	-			0.00135	-			0.00814	-		
Total Nickel (Ni)			mg/L	0.0125	-			0.0129	-			0.00382	-		
Total Selenium (Se)		0.01	mg/L	0.00302	0.0055	-58	82	0.000357	<			0.000399	<		
Total Silver (Ag)			mg/L	0.000341	-			0.00285	-			<0.000005	-		
Total Strontium (Sr)			mg/L	0.677	-			0.43	-			0.146	-		
Total Thallium (Tl)			mg/L	0.000668	-			0.00023	-			0.0000322	-		
Total Tin (Sn)			mg/L	0.00275	-			0.00099	-			0.00113	-		
Total Uranium (U)		0.02	mg/L	0.0481	0.00197	184	-96	0.0106	0.00133	155	-87	0.00175	0.00038	129	-78
Total Vanadium (V)			mg/L	0.0706	-			0.0386	-			0.00786	-		
Total Zinc (Zn)		5	mg/L	0.0329	<			0.029	<			0.0121	-		
Total Calcium (Ca)			mg/L	54.1	12.9	123	-76	117	36.3	105	-69	41.7	25.7	47	-38
Total Magnesium (Mg)		100	mg/L	6.69	0.13	192	-98	18.9	5.62	108	-70	7.53	4.77	45	-37
Total Potassium (K)			mg/L	5.02	0.79	146	-84	2.57	0.95	92	-63	1.4	0.74	62	-47
Total Sodium (Na)		200	mg/L	232	183	24	-21	13.1	8.9	38	-32	9.67	5.5	55	-43

RDL = Reportable Detection Limit

N/A = Not Applicable

RPD = Relative Percent Difference

Change = Percent change

Results relate only to the items tested.

Bold, blue shading Concentration greater than CSR Drinking Water (DW) Standard

Bold, red text Concentration greater than CSR Aquatic Life (AW) Standard

Figure 3: Analytical Results for Total Metals in Groundwater

APPENDIX B- Surface Water Sampling Locations and Photographs from May 13, 2015 Monitoring Event

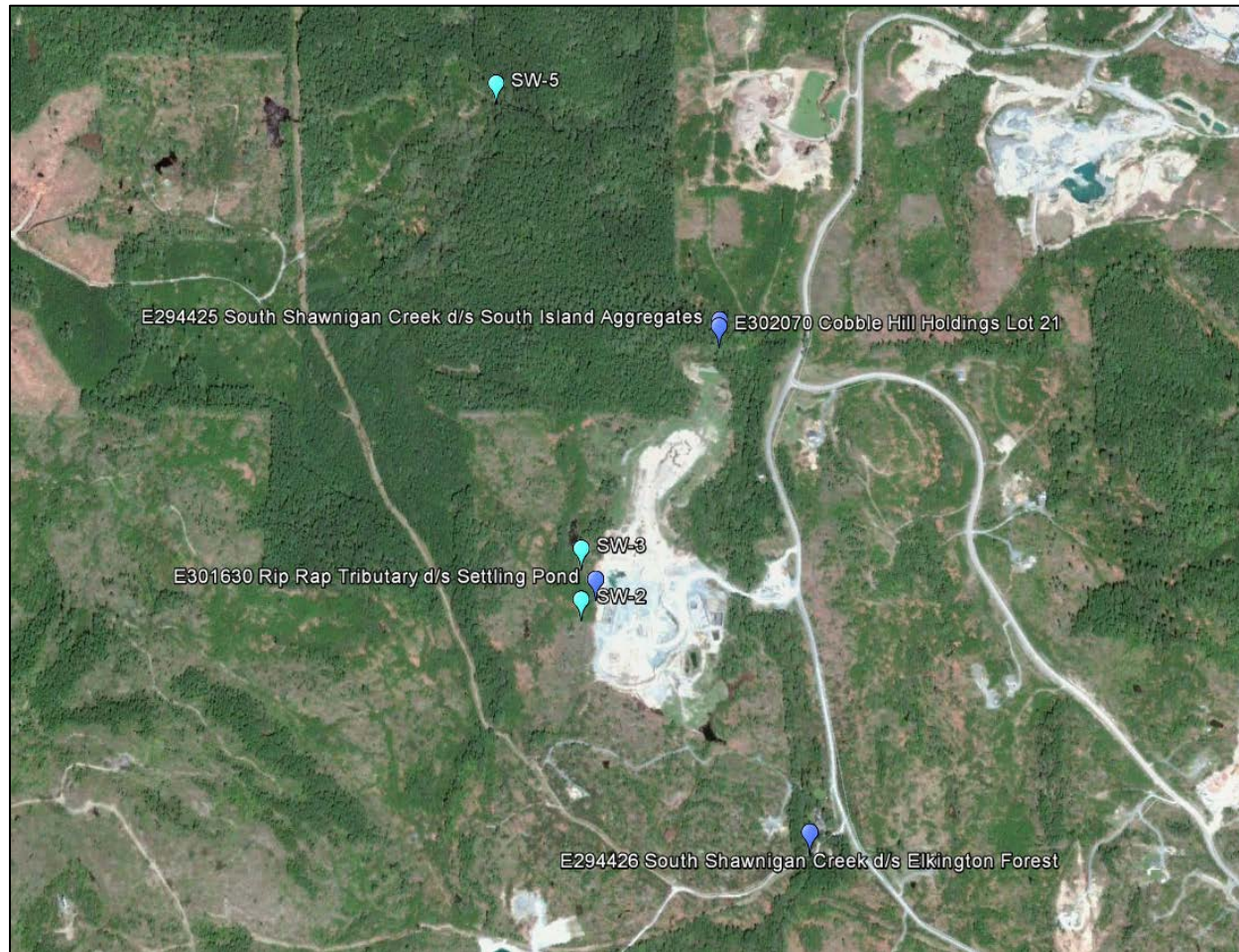




Photo 1 & 2. E294426 South Shawnigan Creek downstream Elkington Forest

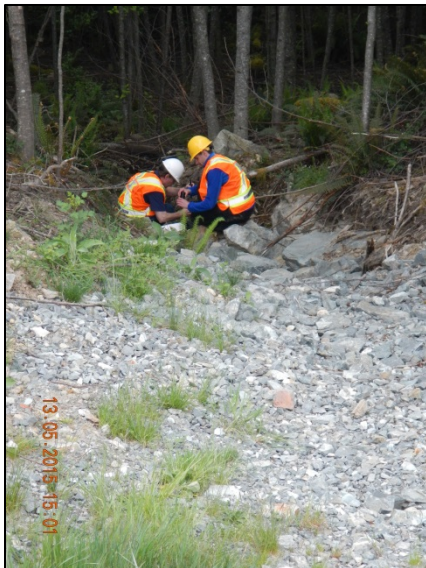


Photo 3 & 4. E301630 Rip Rap Tributary 20m downstream from settling pond discharge

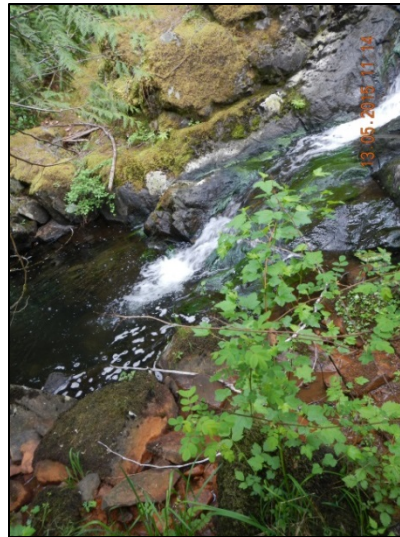


Photo 5 & 6. E302070 Cobble Hill Holdings Lot 21



Photo 7 & 8. E294425 South Shawnigan Creek downstream South Island Aggregate

APPENDIX C – Surface Water and Sediment Quality Tables

Table 1. Results of chemical analysis of water at E294426 South Shawnigan Ck D/S Elkington Forest

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E294426 South Shawnigan Ck D/S Elkington Forest

Maxam ID		MG1248	IE6419	ID6521	IB9638	IA6582		HI4747	HG5838	HE4711	HC8749	HB2970			Aquatic Life	Drinking Water		
Sampling Date		2015/05/13 10:30	2013-11-26 10:25:00 AM	2013-11-20 10:40:00 AM	2013-11-12 10:29:00 AM	2013-11-05 11:05:00 AM	2013-Fall Average 5/30	2013-08-27 10:40:00 AM	2013-08-20 10:48:00 AM	2013-08-13 11:15:00 AM	2013-08-06 11:30:00 AM	2013-07-30 11:20:00 AM	2013-Summer Average 5/30		BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216727	8384721	8384487	8384293	8383805		8377420	8376725	8376426	08375418	08375301						
Field Parameters	Units																	
Sample End Date	N/A	20150513																
Sample End Time	N/A	10:30																
Sample Start Date	N/A	20150513																
Sample Start Time	N/A	10:30																
Temperature at Arrival	C	1																
Calculated Parameters																		
Filter and HNO3 Preservation	N/A	FIELD																
Total Hardness (CaCO3)	mg/L	16.5	15.0	16.8	16.8	16.8		19.2	21.3	19.5	18.1	18.2						
Misc. Inorganics																		
Dissolved Hardness (CaCO3)	mg/L	15.5																
Anions																		
Dissolved Chloride (Cl)	mg/L	1.8													600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)																		
Dissolved Metals by ICPMS	Units																	
Dissolved Aluminum (Al)	ug/L	25.2													100	50	200	
Dissolved Antimony (Sb)	ug/L	<0.020																9
Dissolved Arsenic (As)	ug/L	0.058																
Dissolved Barium (Ba)	ug/L	3.75																1000
Dissolved Beryllium (Be)	ug/L	<0.010																0.13
Dissolved Bismuth (Bi)	ug/L	<0.0050																
Dissolved Boron (B)	ug/L	<10																
Dissolved Cadmium (Cd)	ug/L	<0.0050													0.09	0.06		
Dissolved Chromium (Cr)	ug/L	<0.10																8.9
Dissolved Cobalt (Co)	ug/L	0.0645																
Dissolved Copper (Cu)	ug/L	0.378																
Dissolved Iron (Fe)	ug/L	32.8													350			
Dissolved Lead (Pb)	ug/L	0.0109																
Dissolved Lithium (Li)	ug/L	<0.50																
Dissolved Manganese (Mn)	ug/L	9.16																
Dissolved Molybdenum (Mo)	ug/L	<0.050																
Dissolved Nickel (Ni)	ug/L	0.125																150
Dissolved Selenium (Se)	ug/L	<0.040																
Dissolved Silver (Ag)	ug/L	<0.0050																
Dissolved Strontium (Sr)	ug/L	22.7																
Dissolved Thallium (Tl)	ug/L	<0.0020																0.8
Dissolved Tin (Sn)	ug/L	<0.20																
Dissolved Uranium (U)	ug/L	0.0055																8.5
Dissolved Vanadium (V)	ug/L	0.63																
Dissolved Zinc (Zn)	ug/L	0.23																
Dissolved Calcium (Ca)	mg/L	4.81																
Dissolved Magnesium (Mg)	mg/L	0.835																

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E294426 South Shawnigan Ck D/S Elkington Forest

Maxxam ID		MG1248	IE6419	ID6521	IB9638	IA6582	2013-Fall Average 5/30	HI4747	HG5838	HE4711	HC8749	HB2970	2013-Summer Average 5/30	Aquatic Life		Drinking Water	
Sampling Date		2015/05/13 10:30	2013-11-26 10:25:00 AM	2013-11-20 10:40:00 AM	2013-11-12 10:29:00 AM	2013-11-05 11:05:00 AM		2013-08-27 10:40:00 AM	2013-08-20 10:48:00 AM	2013-08-13 11:15:00 AM	2013-08-06 11:30:00 AM	2013-07-30 11:20:00 AM		BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216727	8384721	8384487	8384293	8383805		8377420	8376725	8376426	08375418	08375301					
Field Parameters	Units																
Sample End Date	N/A	20150513															
Sample End Time	N/A	10:30															
Sample Start Date	N/A	20150513															
Sample Start Time	N/A	10:30															
Temperature at Arrival	C	1															
Calculated Parameters																	
Filter and HNO3 Preservation	N/A	FIELD															
Total Hardness (Ca CO3)	mg/L	16.5	15.0	16.8	16.8	16.8		19.2	21.3	19.5	18.1	18.2					
Misc. Inorganics																	
Dissolved Hardness (Ca CO3)	mg/L	15.5															
Anions																	
Dissolved Chloride (Cl)	mg/L	1.8												600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)																	
Total Metals by ICPMS																	
Total Aluminum (Al)	ug/L	32.5	43.7	59.3	42.1	39.3	46.10	34.4	311.0	17.7	17.3	17.8	79.64				
Total Antimony (Sb)	ug/L	<0.020	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50				9
Total Arsenic (As)	ug/L	0.070	<0.10	0.110	<0.10	<0.10	0.10	<0.10	0.150	<0.10	0.12	<0.10	0.11	5		10	
Total Barium (Ba)	ug/L	3.44	2.80	3.10	3.20	3.40	3.13	4.00	7.10	4.20	4.2	4.1	4.72				1000
Total Beryllium (Be)	ug/L	<0.010	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10				0.13
Total Bismuth (Bi)	ug/L	<0.0050	<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				
Total Boron (B)	ug/L	<10	<50	<50	<50	<50	50.00	<50	<50	<50	<50	<50	50.00	1200		5000	
Total Cadmium (Cd)	ug/L	<0.0050	<0.010	<0.010	<0.010	0.013	0.01	<0.010	0.013	<0.010	<0.010	<0.010	0.01				
Total Chromium (Cr)	ug/L	<0.10	<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				8.9
Total Cobalt (Co)	ug/L	0.0943	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	1.1400	<0.50	<0.50	<0.50	0.63	110	4		
Total Copper (Cu)	ug/L	0.438	0.770	0.630	0.740	0.830	0.74	0.430	1.050	0.590	0.32	0.56	0.59	3.55	0.66	500	
Total Iron (Fe)	ug/L	47.2	54.3	89.1	81.3	102.0	81.68	131.0	559.0	111.0	122	95.8	203.76	1000			
Total Lead (Pb)	ug/L	0.0174	<0.20	<0.20	<0.20	<0.20	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8.24	3.63	50	
Total Lithium (Li)	ug/L	<0.50	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Manganese (Mn)	ug/L	13.2	3.9	4.2	5.1	6.3	4.88	24.1	201.0	23.1	22.6	19.3	58.02	722	678		
Total Molybdenum (Mo)	ug/L	<0.050	<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00	2000	1000	250	
Total Nickel (Ni)	ug/L	0.118	<1.0	<1.0	1.500	<1.0	1.13	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				150
Total Selenium (Se)	ug/L	<0.040	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	1.00		2	10	
Total Silver (Ag)	ug/L	<0.0050	<0.020	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	0.02	3			
Total Strontium (Sr)	ug/L	26.1	20.2	21	24.6	24.2	22.50	31.0	33.2	31.0	28.9	29.1	30.64				
Total Thallium (Tl)	ug/L	<0.0020	<0.050	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.05				0.8
Total Tin (Sn)	ug/L	<0.20	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Uranium (U)	ug/L	0.0051	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10				8.5
Total Vanadium (V)	ug/L	0.26	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Zinc (Zn)	ug/L	0.36	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00	33	7.5	5000	
Total Calcium (Ca)	mg/L	5.12	4.67	5.30	5.24	5.22	5.11	6.18	6.85	6.22	5.83	5.75	6.17				
Total Magnesium (Mg)	mg/L	0.898	0.82	0.88	0.900	0.899	0.87	0.920	1.010	0.970	0.862	0.924	0.94				

Table 2. Results of chemical analysis of sediment at E294426 South Shawnigan Ck D/S Elkington Forest

Exceeded Max GL

Exceeded Ave or Lower limit GL

Result higher than RDL

RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E294426 South Shawnigan Ck D/S Elkington Forest

Maxxam ID		MG1265	Sediment Quality Guidelines		
Sampling Date		2015/05/13 10:45			
COC Number		50216732	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1			
Sample End Date	N/A	20150513			
Sample End Time	N/A	10:45			
Sample Start Date	N/A	20150513			
Sample Start Time	N/A	10:45			
Temperature at Arrival	C	1			
Parameter					
Subcontract Parameter	N/A	ATTACHED			
Misc. Inorganics					
Organic Matter	%	1.9			
Total Organic Carbon (C)	%	1.1			
Physical Properties	Units	REG/1			
Moisture	%	39			
CSR/CCME METALS IN SOIL (SEDIMENT)					
Total Metals by ICPMS	Units	REG/1			
Total Aluminum (Al)	mg/kg	23000			
Total Antimony (Sb)	mg/kg	0.21			
Total Arsenic (As)	mg/kg	3.63	5.9	17	CCME 2005
Total Barium (Ba)	mg/kg	100			
Total Beryllium (Be)	mg/kg	0.43			
Total Bismuth (Bi)	mg/kg	<0.10			
Total Cadmium (Cd)	mg/kg	0.227	0.6	3.5	CCME 2005
Total Calcium (Ca)	mg/kg	3380			
Total Chromium (Cr)	mg/kg	72.6	37.3	90	CCME 2005
Total Cobalt (Co)	mg/kg	15.0			
Total Copper (Cu)	mg/kg	32.5	35.7	197	CCME 2005
Total Iron (Fe)	mg/kg	26300	21,200 (about 2%)	43,766 (about 4%)	Jaagumagi 1992b
Total Lead (Pb)	mg/kg	3.99	35	91	CCME 2005
Total Lithium (Li)	mg/kg	8.1			
Total Magnesium (Mg)	mg/kg	5480			
Total Manganese (Mn)	mg/kg	435	460	1100	Jaagumagi 1992b
Total Mercury (Hg)	mg/kg	0.057	0.17	0.486	CCME 2005
Total Molybdenum (Mo)	mg/kg	1.18			
Total Nickel (Ni)	mg/kg	39.4	16	75	Jaagumagi 1992b
Total Phosphorus (P)	mg/kg	187			
Total Potassium (K)	mg/kg	233			
Total Selenium (Se)	mg/kg	<0.50	2	N/A	MOE 2014
Total Silver (Ag)	mg/kg	0.064	0.5	N/A	Persaud et al. 1992
Total Sodium (Na)	mg/kg	164			
Total Strontium (Sr)	mg/kg	30.3			
Total Thallium (Tl)	mg/kg	<0.050			
Total Tin (Sn)	mg/kg	0.91			
Total Titanium (Ti)	mg/kg	2090			
Total Uranium (U)	mg/kg	0.602			
Total Vanadium (V)	mg/kg	88.4			
Total Zinc (Zn)	mg/kg	34.3	123	305	CCME 2005
Total Zirconium (Zr)	mg/kg	4.68			

Exceeded Max GL
 Exceeded Ave or Lower limit GL
 Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E294426 South Shawnigan Ck D/S Elkington Forest

Maxxam ID		MG1265	Sediment Quality Guidelines		
Sampling Date		2015/05/13 10:45			
COC Number		50216732	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1			
Sample End Date	N/A	20150513			
Sample End Time	N/A	10:45			
Sample Start Date	N/A	20150513			
Sample Start Time	N/A	10:45			
Temperature at Arrival	C	1			
Parameter					
Subcontract Parameter	N/A	ATTACHED			
Misc. Inorganics					
Organic Matter	%	1.9			
Total Organic Carbon (C)	%	1.1			
Physical Properties	Units	REG/1			
Moisture	%	39			
Calculated Parameters	Units	REG/1			
Index of Additive Cancer Risk(IARC)	N/A	<0.10			
Benzo[a]pyrene equivalency	N/A	<0.10	0.0319	0.782	CCME 2005
Polycyclic Aromatics					
Naphthalene	mg/kg	<0.0010	0.0346	0.391	CCME 2005
2-Methylnaphthalene	mg/kg	<0.0010	0.0202	0.201	CCME 2005
Acenaphthylene	mg/kg	<0.00050	0.00587	0.128	CCME 2005
Acenaphthene	mg/kg	<0.00050	0.00671	0.0889	CCME 2005
Fluorene	mg/kg	<0.0010	0.0212	0.144	CCME 2005
Phenanthrene	mg/kg	<0.0010	0.0419	0.515	CCME 2005
Anthracene	mg/kg	<0.0010	0.0469	0.245	CCME 2005
Fluoranthene	mg/kg	<0.0010	0.111	2.355	CCME 2005
Pyrene	mg/kg	<0.0010	0.053	0.875	CCME 2005
Benzo(a)anthracene	mg/kg	<0.0010	0.0317	0.385	CCME 2005
Chrysene	mg/kg	<0.0010	0.0571	0.862	CCME 2005
Benzo(b&j)fluoranthene	mg/kg	<0.0010			
Benzo(k)fluoranthene	mg/kg	<0.0010	0.24	13.4	Ontario MOEE (1993)
Benzo(a)pyrene	mg/kg	<0.0010	0.0319	0.782	CCME 2005
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0020 (1)	0.2	3.2	Ontario MOEE (1993)
Dibenz(a,h)anthracene	mg/kg	<0.00050	0.00622	0.135	CCME 2005
Benzo(g,h,i)perylene	mg/kg	<0.0020	0.17	0.32	Ontario MOEE (1993)
Low Molecular Weight PAH's	mg/kg	<0.0010	0.1		EC and QC MoE (1992)
High Molecular Weight PAH's	mg/kg	<0.0010	1	N/A	EC and QC MoE (1992)
Total PAH	mg/kg	<0.0010	4	35	Long and Morgan (1990)
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	79			
D8-ACENAPHTHYLENE (sur.)	%	73			
D8-NAPHTHALENE (sur.)	%	72			
TERPHENYL-D14 (sur.)	%	84			

Table 3. Results of chemical analysis of water at E301630 Rip Rap Tributary 20M D/S from settling pond discharge

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E301630 Rip Rap Tributary 20M D/S from settling pond discharge

Maxxam ID		MG1243	MA5046	SW-1	SW-3	Aquatic Life		Drinking Water	
Sampling Date		2015/05/13	2015/04/08 15:30	09-Apr-15	09-Apr-15	BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216729							
Field Parameters	Units	REG/1							
Sample End Date	N/A	20150513							
Sample Start Date	N/A	20150513							
Temperature at Arrival	C	1							
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD							
Total Hardness (CaCO3)	mg/L	261		190	160				
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	236	169						
Anions									
Dissolved Chloride (Cl)	mg/L	13	6	6.06	8.8	600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)									
Dissolved Metals by ICPMS	Units	REG/1							
Dissolved Aluminum (Al)	ug/L	4.50	8.80	6	13	100	50	200	
Dissolved Antimony (Sb)	ug/L	0.144	0.156	<0.2	<0.2				9
Dissolved Arsenic (As)	ug/L	0.108 (1)	0.092	<0.1	<0.1				
Dissolved Barium (Ba)	ug/L	15.4	10.3	11	16.4				1000
Dissolved Beryllium (Be)	ug/L	<0.010	<0.010						0.13
Dissolved Bismuth (Bi)	ug/L	<0.0050	<0.0050						
Dissolved Boron (B)	ug/L	16	15	18	15				
Dissolved Cadmium (Cd)	ug/L	0.0056	0.0133	<0.1	<0.1	0.09	0.06		
Dissolved Chromium (Cr)	ug/L	0.13	0.12	<5	<5				8.9
Dissolved Cobalt (Co)	ug/L	0.0480	0.0443						
Dissolved Copper (Cu)	ug/L	0.991	1.120	<0.2	1				
Dissolved Iron (Fe)	ug/L	1.8	7.3	<10	<10	350			
Dissolved Lead (Pb)	ug/L	0.0065	0.0141	<0.5	<0.5				
Dissolved Lithium (Li)	ug/L	<0.50	<0.50						
Dissolved Manganese (Mn)	ug/L	5.49	1.32	<1	<1				
Dissolved Molybdenum (Mo)	ug/L	1.20	1.05	1.03	0.12				
Dissolved Nickel (Ni)	ug/L	0.875	0.752						150
Dissolved Selenium (Se)	ug/L	0.297	0.294	<0.5	<0.5				
Dissolved Silver (Ag)	ug/L	<0.0050	5180						
Dissolved Strontium (Sr)	ug/L	212	148						
Dissolved Thallium (Tl)	ug/L	0.0031	<0.0020						0.8
Dissolved Tin (Sn)	ug/L	<0.20	<0.20						
Dissolved Uranium (U)	ug/L	1.63	0.98	0.89	0.02				8.5
Dissolved Vanadium (V)	ug/L	0.71	0.82						
Dissolved Zinc (Zn)	ug/L	0.33	1.08 (1)	<2	<2				
Dissolved Calcium (Ca)	mg/L	77.4	55.2	57.8	42.6				
Dissolved Magnesium (Mg)	mg/L	10.3	7.5	7.18	10.5				

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E301630 Rip Rap Tributary 20M D/S from settling pond discharge

Maxxam ID		MG1243	MA5046	SW-1	SW-3	Aquatic Life		Drinking Water	
Sampling Date		2015/05/13	2015/04/08 15:30	09-Apr-15	09-Apr-15	BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216729							
Field Parameters	Units	REG/1							
Sample End Date	N/A	20150513							
Sample Start Date	N/A	20150513							
Temperature at Arrival	C	1							
Calculated Parameters									
Filter and HNO3 Preservation	N/A	FIELD							
Total Hardness (CaCO3)	mg/L	261		190	160				
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	236	169						
Anions									
Dissolved Chloride (Cl)	mg/L	13	6	6.06	8.8	600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)									
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	10.5	15.1	20	22				
Total Antimony (Sb)	ug/L	0.140	0.158	<0.5	<0.5				9
Total Arsenic (As)	ug/L	0.086	0.086	0.07	0.14	5		10	
Total Barium (Ba)	ug/L	15.9	9.8	10.7	15.9				1000
Total Beryllium (Be)	ug/L	<0.010	<0.010						0.13
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050						
Total Boron (B)	ug/L	20	14	16	15	1200		5000	
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	<0.1	<0.1				
Total Chromium (Cr)	ug/L	<0.10	0.12	<0.5	<0.5				8.9
Total Cobalt (Co)	ug/L	0.0608	0.0414			110	4		
Total Copper (Cu)	ug/L	1.05	0.96	1.3	0.7	3.55	2	500	
Total Iron (Fe)	ug/L	6.2	14.5	16	<10	1000			
Total Lead (Pb)	ug/L	0.0057	0.0304	<0.5	<0.05	8.24	3.63	50	
Total Lithium (Li)	ug/L	<0.50	<0.50						
Total Manganese (Mn)	ug/L	6.39	1.50	2	2	722	678		
Total Molybdenum (Mo)	ug/L	1.26	1.02	1.2	<0.1	2000	1000	250	
Total Nickel (Ni)	ug/L	0.918	0.700						150
Total Selenium (Se)	ug/L	0.295	0.291	<0.5	<0.5		2	10	
Total Silver (Ag)	ug/L	<0.0050	<0.0050			3			
Total Strontium (Sr)	ug/L	219	148						
Total Thallium (Tl)	ug/L	0.0090	0.0045						0.8
Total Tin (Sn)	ug/L	<0.20	<0.20						
Total Uranium (U)	ug/L	1.74	0.95	1.08	0.03				8.5
Total Vanadium (V)	ug/L	0.75	0.74						
Total Zinc (Zn)	ug/L	0.21	0.32	<50	<50	33	7.5	5000	
Total Calcium (Ca)	mg/L	86.2	60.1	62.8	45.2				
Total Magnesium (Mg)	mg/L	11.0	7.3	7.98	11.4				

Table 4. Results of chemical analysis of sediment at E301630 Rip Rap Tributary 20M D/S from settling pond

Exceeded Max GL

Exceeded Ave or Lower limit GL

Result higher than RDL

**RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E301630 Rip Rap Tributary 20M D/S from settling pond discharge**

Maxxam ID		MG1267	Sediment Quality Guidelines		
Sampling Date		2015/05/13			
COC Number		50216748	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1			
Sample End Date	N/A	20150513			
Sample Start Date	N/A	20150513			
Temperature at Arrival	C	1			
Parameter					
Subcontract Parameter	N/A	ATTACHED			
Misc. Inorganics					
Organic Matter	%	4.7			
Total Organic Carbon (C)	%	2.7			
PHYSICAL TESTING (SEDIMENT)					
Physical Properties	Units	REG/1			
Moisture	%	29			
CSR/CCME METALS IN SOIL (SEDIMENT)					
Total Metals by ICPMS	Units	REG/1			
Total Aluminum (Al)	mg/kg	21300			
Total Antimony (Sb)	mg/kg	0.25			
Total Arsenic (As)	mg/kg	3.53	5.9	17	CCME 2005
Total Barium (Ba)	mg/kg	84.7			
Total Beryllium (Be)	mg/kg	0.42			
Total Bismuth (Bi)	mg/kg	<0.10			
Total Cadmium (Cd)	mg/kg	0.204	0.6	3.5	CCME 2005
Total Calcium (Ca)	mg/kg	9410			
Total Chromium (Cr)	mg/kg	64.2	37.3	90	CCME 2005
Total Cobalt (Co)	mg/kg	21.5			
Total Copper (Cu)	mg/kg	55.2	35.7	197	CCME 2005
Total Iron (Fe)	mg/kg	28000	21,200 (about 2%)	43,766 (about 4%)	Jaagumagi 1992b
Total Lead (Pb)	mg/kg	10.0	35	91	CCME 2005
Total Lithium (Li)	mg/kg	9.9			
Total Magnesium (Mg)	mg/kg	7500			
Total Manganese (Mn)	mg/kg	927	460	1100	Jaagumagi 1992b
Total Mercury (Hg)	mg/kg	0.065	0.17	0.486	CCME 2005
Total Molybdenum (Mo)	mg/kg	1.28			
Total Nickel (Ni)	mg/kg	42.3	16	75	Jaagumagi 1992b
Total Phosphorus (P)	mg/kg	800			
Total Potassium (K)	mg/kg	625			
Total Selenium (Se)	mg/kg	0.61	2	N/A	MOE 2014
Total Silver (Ag)	mg/kg	0.068	0.5	N/A	Persaud et al. 1992
Total Sodium (Na)	mg/kg	249			
Total Strontium (Sr)	mg/kg	45.8			
Total Thallium (Tl)	mg/kg	<0.050			
Total Tin (Sn)	mg/kg	0.81			
Total Titanium (Ti)	mg/kg	1420			
Total Uranium (U)	mg/kg	1.98			
Total Vanadium (V)	mg/kg	85.2			
Total Zinc (Zn)	mg/kg	45.4	123	305	CCME 2005
Total Zirconium (Zr)	mg/kg	3.01			

discharge

Exceeded Max GL
 Exceeded Ave or Lower limit GL
 Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E301630 Rip Rap Tributary 20M D/S from settling pond discharge

Maxxam ID		MG1267	Sediment Quality Guidelines		
Sampling Date		2015/05/13			
COC Number		50216748	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1			
Sample End Date	N/A	20150513			
Sample Start Date	N/A	20150513			
Temperature at Arrival	C	1			
Parameter					
Subcontract Parameter	N/A	ATTACHED			
Misc. Inorganics					
Organic Matter	%	4.7			
Total Organic Carbon (C)	%	2.7			
PHYSICAL TESTING (SEDIMENT)					
Physical Properties	Units	REG/1			
Moisture	%	29			
CCME PAH IN SEDIMENTS BY GC-MS (SEDIMENT)					
Calculated Parameters	Units	REG/1			
Index of Additive Cancer Risk(IARC)	N/A	<0.10			
Benzo[a]pyrene equivalency	N/A	<0.10	0.0319	0.782	CCME 2005
Polycyclic Aromatics					
Naphthalene	mg/kg	0.0013	0.0346	0.391	CCME 2005
2-Methylnaphthalene	mg/kg	<0.0010	0.0202	0.201	CCME 2005
Acenaphthylene	mg/kg	0.0011	0.00587	0.128	CCME 2005
Acenaphthene	mg/kg	<0.00050	0.00671	0.0889	CCME 2005
Fluorene	mg/kg	<0.0010	0.0212	0.144	CCME 2005
Phenanthrene	mg/kg	0.0035 (1)	0.0419	0.515	CCME 2005
Anthracene	mg/kg	<0.0010 (2)	0.0469	0.245	CCME 2005
Fluoranthene	mg/kg	0.0054	0.111	2.355	CCME 2005
Pyrene	mg/kg	0.0080	0.053	0.875	CCME 2005
Benzo(a)anthracene	mg/kg	0.0028	0.0317	0.385	CCME 2005
Chrysene	mg/kg	0.0028	0.0571	0.862	CCME 2005
Benzo(b&j)fluoranthene	mg/kg	0.0058			
Benzo(k)fluoranthene	mg/kg	0.0017	0.24	13.4	Ontario MOEE (1993)
Benzo(a)pyrene	mg/kg	<0.0032 (3)	0.0319	0.782	CCME 2005
Indeno(1,2,3-cd)pyrene	mg/kg	<0.0020	0.2	3.2	Ontario MOEE (1993)
Dibenz(a,h)anthracene	mg/kg	0.00056	0.00622	0.135	CCME 2005
Benzo(g,h,i)perylene	mg/kg	<0.0020	0.17	0.32	Ontario MOEE (1993)
Low Molecular Weight PAH's	mg/kg	0.0059	0.1		EC and QC MoE (1992)
High Molecular Weight PAH's	mg/kg	0.020	1	N/A	EC and QC MoE (1992)
Total PAH	mg/kg	0.026	4	35	Long and Morgan (1990)
Surrogate Recovery (%)					
D10-ANTHRACENE (sur.)	%	83			
D8-ACENAPHTHYLENE (sur.)	%	78			
D8-NAPHTHALENE (sur.)	%	76			
TERPHENYL-D14 (sur.)	%	89			

Table 5. Results of chemical analysis of water at E302070 Cobble Hill Holdings Lot 21

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER				SIA Sampling		Aquatic Life		Drinking Water	
Maxxam ID		MG1245	MG1246	Seepage at Edge of Fill	Flow out of Pond	BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
Sampling Date		2015/05/13 12:00	2015/05/13 12:00						
COC Number		50216730	50216730						
Field Parameters	Units	REG/1	REP/2						
Sample End Date	N/A	20150513	20150513	05-May-15	05-May-15				
Sample End Time	N/A	12:00	12:00						
Sample Start Date	N/A	20150513	20150513						
Sample Start Time	N/A	12:00	12:00						
Temperature at Arrival	C	1	1						
Calculated Parameters									
Filter and HNO3 Preservation	N/A								
Total Hardness (CaCO3)	mg/L	136	128	174	130				
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	127							
Anions									
Dissolved Chloride (Cl)	mg/L	42				600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)									
Dissolved Metals by ICPMS	Units								
Dissolved Aluminum (Al)	ug/L	19.7		30	20	100	50	200	
Dissolved Antimony (Sb)	ug/L	0.039		<0.2	<0.2				9
Dissolved Arsenic (As)	ug/L	0.212		0.1	<0.1				
Dissolved Barium (Ba)	ug/L	15.5		43	14				1000
Dissolved Beryllium (Be)	ug/L	<0.010							0.13
Dissolved Bismuth (Bi)	ug/L	<0.0050							
Dissolved Boron (B)	ug/L	<10		16	12				
Dissolved Cadmium (Cd)	ug/L	<0.0050		0.04	<0.01	0.09	0.06		
Dissolved Chromium (Cr)	ug/L	0.10		<0.5	<0.5				8.9
Dissolved Cobalt (Co)	ug/L	1.08							
Dissolved Copper (Cu)	ug/L	0.609		0.5	0.6				
Dissolved Iron (Fe)	ug/L	281		14600	150	350			
Dissolved Lead (Pb)	ug/L	0.0105		<0.05	<0.05				
Dissolved Lithium (Li)	ug/L	<0.50							
Dissolved Manganese (Mn)	ug/L	539		4050	654				
Dissolved Molybdenum (Mo)	ug/L	0.231							
Dissolved Nickel (Ni)	ug/L	0.518							150
Dissolved Selenium (Se)	ug/L	0.092		<0.5	<0.5				
Dissolved Silver (Ag)	ug/L	<0.0050							
Dissolved Strontium (Sr)	ug/L	130							
Dissolved Thallium (Tl)	ug/L	0.0020							0.8
Dissolved Tin (Sn)	ug/L	<0.20							
Dissolved Uranium (U)	ug/L	0.0156		0.01	0.02				8.5
Dissolved Vanadium (V)	ug/L	0.27							
Dissolved Zinc (Zn)	ug/L	0.41		6	3				
Dissolved Calcium (Ca)	mg/L	33.2		44.4	34				
Dissolved Magnesium (Mg)	mg/L	10.7		15.4	10.9				

Exceeded Max GL
 Exceeded Ave or Lower limit GL
 Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER				SIA Sampling		Aquatic Life		Drinking Water	
Maxxam ID		MG1245	MG1246	Seepage at Edge of Fill	Flow out of Pond	BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
Sampling Date		2015/05/13 12:00	2015/05/13 12:00						
COC Number		50216730	50216730						
Field Parameters	Units	REG/1	REP/2						
Sample End Date	N/A	20150513	20150513	05-May-15	05-May-15				
Sample End Time	N/A	12:00	12:00						
Sample Start Date	N/A	20150513	20150513						
Sample Start Time	N/A	12:00	12:00						
Temperature at Arrival	C	1	1						
Calculated Parameters									
Filter and HNO3 Preservation	N/A								
Total Hardness (CaCO3)	mg/L	136	128	174	130				
Misc. Inorganics									
Dissolved Hardness (CaCO3)	mg/L	127							
Anions									
Dissolved Chloride (Cl)	mg/L	42				600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)									
Total Metals by ICPMS									
Total Aluminum (Al)	ug/L	85.4	77.6	47	59				
Total Antimony (Sb)	ug/L	0.046	0.046	<0.5	<0.5				9
Total Arsenic (As)	ug/L	0.223	0.209	0.3	0.3	5		10	
Total Barium (Ba)	ug/L	15.7	17.0	43.9	14.3				1000
Total Beryllium (Be)	ug/L	<0.010	<0.010						0.13
Total Bismuth (Bi)	ug/L	<0.0050	<0.0050						
Total Boron (B)	ug/L	11	13	19	13	1200		5000	
Total Cadmium (Cd)	ug/L	<0.0050	<0.0050	<0.01	<0.01				
Total Chromium (Cr)	ug/L	0.19	0.14	<0.5	<0.5				8.9
Total Cobalt (Co)	ug/L	1.11	1.05			110	4		
Total Copper (Cu)	ug/L	0.841	0.688	<0.5	0.7	3.55	0.66	500	
Total Iron (Fe)	ug/L	563	464	16200	349	1000			
Total Lead (Pb)	ug/L	0.131	0.0879	<0.05	<0.05	8.24	3.63	50	
Total Lithium (Li)	ug/L	<0.50	<0.50						
Total Manganese (Mn)	ug/L	462	448	4230	694	722	678		
Total Molybdenum (Mo)	ug/L	0.286	0.288			2000	1000	250	
Total Nickel (Ni)	ug/L	0.624	0.568						150
Total Selenium (Se)	ug/L	0.112	0.088	<0.5	<0.5		2	10	
Total Silver (Ag)	ug/L	<0.0050	<0.0050			3			
Total Strontium (Sr)	ug/L	137	134						
Total Thallium (Tl)	ug/L	<0.0020	<0.0020						0.8
Total Tin (Sn)	ug/L	<0.20	<0.20						
Total Uranium (U)	ug/L	0.0178	0.0179	0.01	0.02				8.5
Total Vanadium (V)	ug/L	0.63	0.55						
Total Zinc (Zn)	ug/L	0.44	0.30	<5	<5	33	7.5	5000	
Total Calcium (Ca)	mg/L	36.7	34.2	46	33.9	>20			
Total Magnesium (Mg)	mg/L	10.7	10.4	15.8	10.9				

Table 6. Results of chemical analysis of water at E294425 South Shawnigan Creek D/S South Island Aggregate

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E294425 South Shawnigan Creek D/S South Island Aggregate

Maxsam ID		MG1244	SW-5	IE6418	ID6520	IB9637	IA6581	2013-Fall Average 5/30	HI4746	HG5837	HE4711	HC8748	HB2969	2013-Summer Average 5/30	Aquatic Life		Drinking Water	
Sampling Date		2015/05/13 11:30	09-Apr-15	2013-11-26 10:50:00 AM	2013-11-20 11:05:00 AM	2013-11-12 10:53:00 AM	2013-11-05 11:20:00 AM		2013-08-27 11:30:00 AM	2013-08-20 11:25:00 AM	2013-08-13 11:15:00 AM	2013-08-06 12:00:00 PM	2013-07-30 11:45:00 AM		BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216728		8384721	8384487	8384293	8383805		8377420	8376725	8376426	08375418	8375301					
Field Parameters	Units	REG/1																
Sample End Date	N/A	20150513																
Sample End Time	N/A	11:30																
Sample Start Date	N/A	20150513																
Sample Start Time	N/A	11:30																
Temperature at Arrival	C	1																
Calculated Parameters																		
Filter and HNO3 Preservation	N/A	FIELD																
Total Hardness (CaCO3)	mg/L	22.6	17.1	17.1	18.8	18.6	18.9		35.1	41.7	36.8	30.2	34.5					
Misc. Inorganics																		
Dissolved Hardness (CaCO3)	mg/L	21.0																
Anions																		
Dissolved Chloride (Cl)	mg/L	2.8	2.51												600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)																		
Dissolved Metals by ICPMS	Units	REG/1																
Dissolved Aluminum (Al)	ug/L	19.1	40												100	50	200	
Dissolved Antimony (Sb)	ug/L	<0.020	<0.2															9
Dissolved Arsenic (As)	ug/L	0.057	<0.1															
Dissolved Barium (Ba)	ug/L	3.86	3.7															1000
Dissolved Beryllium (Be)	ug/L	<0.010																0.13
Dissolved Bismuth (Bi)	ug/L	<0.0050																
Dissolved Boron (B)	ug/L	<10	7															
Dissolved Cadmium (Cd)	ug/L	<0.0050	<0.1												0.09	0.06		
Dissolved Chromium (Cr)	ug/L	<0.10	<5															8.9
Dissolved Cobalt (Co)	ug/L	0.0317																
Dissolved Copper (Cu)	ug/L	0.368	0.5															
Dissolved Iron (Fe)	ug/L	45.2	27												350			
Dissolved Lead (Pb)	ug/L	0.0073	<0.5															
Dissolved Lithium (Li)	ug/L	<0.50																
Dissolved Manganese (Mn)	ug/L	2.58	2															
Dissolved Molybdenum (Mo)	ug/L	<0.050	<0.05															
Dissolved Nickel (Ni)	ug/L	0.121																150
Dissolved Selenium (Se)	ug/L	<0.040	<0.5															
Dissolved Silver (Ag)	ug/L	<0.0050																
Dissolved Strontium (Sr)	ug/L	27.7																
Dissolved Thallium (Tl)	ug/L	<0.0020																0.8
Dissolved Tin (Sn)	ug/L	<0.20																
Dissolved Uranium (U)	ug/L	0.0054	<0.1															8.5
Dissolved Vanadium (V)	ug/L	0.50																
Dissolved Zinc (Zn)	ug/L	0.23	2															
Dissolved Calcium (Ca)	mg/L	6.19	4.79															
Dissolved Magnesium (Mg)	mg/L	1.35	1.02															

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF WATER: E294425 South Shawngigan Creek D/S South Island Aggregate

Maxxam ID		MG1244	SW-5	IE6418	ID6520	IB9637	IA6581	2013-Fall Average 5/30	HI4746	HG5837	HE4711	HC8748	HB2969	2013-Summer Average 5/30	Aquatic Life		Drinking Water	
Sampling Date		2015/05/13 11:30	09-Apr-15	2013-11-26 10:50:00 AM	2013-11-20 11:05:00 AM	2013-11-12 10:53:00 AM	2013-11-05 11:20:00 AM		2013-08-27 11:30:00 AM	2013-08-20 11:25:00 AM	2013-08-13 11:15:00 AM	2013-08-06 12:00:00 PM	2013-07-30 11:45:00 AM		BC WQG Max	BC WQG Ave	BC WQG Max	BC WWQG
COC Number		50216728		8384721	8384487	8384293	8383805		8377420	8376725	8376426	08375418	8375301					
Field Parameters	Units	REG/1																
Sample End Date	N/A	20150513																
Sample End Time	N/A	11:30																
Sample Start Date	N/A	20150513																
Sample Start Time	N/A	11:30																
Temperature at Arrival	C	1																
Calculated Parameters																		
Filter and HNO3 Preservation	N/A	FIELD																
Total Hardness (CaCO3)	mg/L	22.6	17.1	17.1	18.8	18.6	18.9		35.1	41.7	36.8	30.2	34.5					
Misc. Inorganics																		
Dissolved Hardness (CaCO3)	mg/L	21.0																
Anions																		
Dissolved Chloride (Cl)	mg/L	2.8	2.51												600	150	250	
ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)																		
Total Metals by ICPMS																		
Total Aluminum (Al)	ug/L	41.4	42	44.0	68.5	41.6	42.1	49.05	23.5	23.1	28	19.3	16	21.98				
Total Antimony (Sb)	ug/L	<0.020	<0.5	<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50				9
Total Arsenic (As)	ug/L	0.044	0.08	<0.10	0.100	<0.10	<0.10	0.10	<0.10	0.110	0.14	<0.10	0.12	0.11	5		10	
Total Barium (Ba)	ug/L	4.20	3.6	3.00	3.50	3.60	3.60	3.43	5.80	6.40	6.6	5.8	5.7	6.06				1000
Total Beryllium (Be)	ug/L	<0.010		<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10				0.13
Total Bismuth (Bi)	ug/L	<0.0050		<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				
Total Boron (B)	ug/L	<10	5	<50	<50	<50	<50	50.00	<50	<50	<50	<50	<50	50.00	1200		5000	
Total Cadmium (Cd)	ug/L	<0.0050	<0.1	<0.010	<0.010	<0.010	<0.010	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	0.01				
Total Chromium (Cr)	ug/L	<0.10	<0.5	<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				8.9
Total Cobalt (Co)	ug/L	0.104		<0.50	<0.50	<0.50	<0.50	0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	110	4		
Total Copper (Cu)	ug/L	0.479	1.1	0.690	0.630	0.580	0.680	0.65	0.440	0.370	0.44	0.32	0.38	0.39	3.55	0.66	500	
Total Iron (Fe)	ug/L	90.5	55	63.5	99.7	84.1	100.0	86.83	58.1	51.9	69.3	46.3	42.4	53.60	1000			
Total Lead (Pb)	ug/L	0.0274	<0.05	<0.20	<0.20	<0.20	<0.20	0.20	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	8.24	3.63	50	
Total Lithium (Li)	ug/L	<0.50		<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Manganese (Mn)	ug/L	14.7	6	7.2	8.5	6.1	6.2	7.00	37.3	45.7	29.4	17.9	16	29.26	722	678		
Total Molybdenum (Mo)	ug/L	<0.050	<0.1	<1.0	<1.0	<1.0	<1.0	1.00	<1.0	<1.0	<1.0	<1.0	<1.0	1.00	2000	1000	250	
Total Nickel (Ni)	ug/L	0.154		<1.0	2.7	<1.0	3.700	2.10	<1.0	<1.0	<1.0	<1.0	<1.0	1.00				150
Total Selenium (Se)	ug/L	<0.040	<0.5	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	0.11	<0.10	<0.10	0.10		2	10	
Total Silver (Ag)	ug/L	<0.0050		<0.020	<0.020	<0.020	<0.020	0.02	<0.020	<0.020	<0.020	<0.020	<0.020	0.02	3			
Total Strontium (Sr)	ug/L	28.5		21.2	23.5	24.9	24.7	23.58	43.2	50.8	45.9	39.2	42	44.22				
Total Thallium (Tl)	ug/L	<0.0020		<0.050	<0.050	<0.050	<0.050	0.05	<0.050	<0.050	<0.050	<0.050	<0.050	0.05				0.8
Total Tin (Sn)	ug/L	<0.20		<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Uranium (U)	ug/L	0.0051	<0.1	<0.10	<0.10	<0.10	<0.10	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.10				8.5
Total Vanadium (V)	ug/L	0.32		<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00				
Total Zinc (Zn)	ug/L	0.42	<50	<5.0	<5.0	<5.0	<5.0	5.00	<5.0	<5.0	<5.0	<5.0	<5.0	5.00	33	7.5	5000	
Total Calcium (Ca)	mg/L	6.62	5.04	5.17	5.79	5.65	5.66	5.57	9.93	11.90	10.4	8.75	10.1	10.22				
Total Magnesium (Mg)	mg/L	1.48	1.09	1.02	1.06	1.090	1.150	1.08	2.510	2.920	2.63	2.03	2.25	2.47				

Table 7. Results of chemical analysis of sediment at E294425 South Shawnigan Creek D/S South Island Aggregate

Exceeded Max GL

Exceeded Ave or Lower limit GL

Result higher than RDL

RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E294425 South Shawnigan CK D/S South Island Aggregate

Maxxam ID		MG1259	MG1260	Sediment Quality Guidelines		
Sampling Date		2015/05/13 11:45	2015/05/13 11:46			
COC Number		50216747	50216747	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1	REP/2			
Sample End Date	N/A	20150513	20150513			
Sample End Time	N/A	11:45	11:46			
Sample Start Date	N/A	20150513	20150513			
Sample Start Time	N/A	11:45	11:46			
Temperature at Arrival	C	1	1			
Parameter						
Subcontract Parameter	N/A	ATTACHED				
Misc. Inorganics						
Organic Matter	%	21				
Total Organic Carbon (C)	%	12				
PHYSICAL TESTING (SEDIMENT)						
Physical Properties	Units	REG/1	REP/3			
Moisture	%	86	87			
CSR/CCME METALS IN SOIL (SEDIMENT)						
Total Metals by ICPMS	Units	REG/1	REP/2			
Total Aluminum (Al)	mg/kg	25200	26100			
Total Antimony (Sb)	mg/kg	0.41	0.44			
Total Arsenic (As)	mg/kg	5.86	6.45	5.9	17	CCME 2005
Total Barium (Ba)	mg/kg	244	261			
Total Beryllium (Be)	mg/kg	0.81	0.81			
Total Bismuth (Bi)	mg/kg	0.13	0.19			
Total Cadmium (Cd)	mg/kg	0.736	0.823	0.6	3.5	CCME 2005
Total Calcium (Ca)	mg/kg	10700	11800			
Total Chromium (Cr)	mg/kg	51.4	50.0	37.3	90	CCME 2005
Total Cobalt (Co)	mg/kg	73.8	79.4			
Total Copper (Cu)	mg/kg	56.9	62.7	35.7	197	CCME 2005
Total Iron (Fe)	mg/kg	46400	49200	21,200 (about 2%)	43,766 (about 4%)	Jaagumagi 1992b
Total Lead (Pb)	mg/kg	24.2	27.1	35	91	CCME 2005
Total Lithium (Li)	mg/kg	11.4	12.6			
Total Magnesium (Mg)	mg/kg	6290	6910			
Total Manganese (Mn)	mg/kg	11300	12200	460	1100	Jaagumagi 1992b
Total Mercury (Hg)	mg/kg	0.182	0.185	0.17	0.486	CCME 2005
Total Molybdenum (Mo)	mg/kg	2.07	2.28			
Total Nickel (Ni)	mg/kg	52.9	52.0	16	75	Jaagumagi 1992b
Total Phosphorus (P)	mg/kg	895	1010			
Total Potassium (K)	mg/kg	772	799			
Total Selenium (Se)	mg/kg	1.36	1.45	2	N/A	MOE 2014
Total Silver (Ag)	mg/kg	0.122	0.146	0.5	N/A	Persaud et al. 1992
Total Sodium (Na)	mg/kg	248	337			
Total Strontium (Sr)	mg/kg	68.2	72.8			
Total Thallium (Tl)	mg/kg	0.152	0.158			
Total Tin (Sn)	mg/kg	1.78	1.53			
Total Titanium (Ti)	mg/kg	835	834			
Total Uranium (U)	mg/kg	1.32	1.39			
Total Vanadium (V)	mg/kg	77.2	82.5			
Total Zinc (Zn)	mg/kg	136	152	123	305	CCME 2005
Total Zirconium (Zr)	mg/kg	1.18	1.29			

Exceeded Max GL
Exceeded Ave or Lower limit GL
Result higher than RDL



RESULTS OF CHEMICAL ANALYSES OF SEDIMENT: E294425 South Shawnigan CK D/S South Island Aggregate

Maxxam ID		MG1259	MG1260	Sediment Quality Guidelines		
Sampling Date		2015/05/13 11:45	2015/05/13 11:46			
COC Number		50216747	50216747	Lower SWQG (µg/g dry weight)	Upper SWQG (µg/g dry weight)	Reference
Field Parameters	Units	REG/1	REP/2			
Sample End Date	N/A	20150513	20150513			
Sample End Time	N/A	11:45	11:46			
Sample Start Date	N/A	20150513	20150513			
Sample Start Time	N/A	11:45	11:46			
Temperature at Arrival	C	1	1			
Parameter						
Subcontract Parameter	N/A	ATTACHED				
Misc. Inorganics						
Organic Matter	%	21				
Total Organic Carbon (C)	%	12				
PHYSICAL TESTING (SEDIMENT)						
Physical Properties	Units	REG/1	REP/3			
Moisture	%	86	87			
CCME PAH IN SEDIMENTS BY GC-MS (SEDIMENT)						
Calculated Parameters	Units	REG/1	REP/3			
Index of Additive Cancer Risk(IARC)	N/A	1.4	1.4			
Benzo[a]pyrene equivalency	N/A	0.10	<0.10	0.0319	0.782	CCME 2005
Polycyclic Aromatics						
Naphthalene	mg/kg	<0.0071 (1)	<0.0078 (1)	0.0346	0.391	CCME 2005
2-Methylnaphthalene	mg/kg	<0.0071 (1)	<0.0078 (1)	0.0202	0.201	CCME 2005
Acenaphthylene	mg/kg	0.014 (1)	0.013 (1)	0.00587	0.128	CCME 2005
Acenaphthene	mg/kg	<0.0036 (1)	<0.0039 (1)	0.00671	0.0889	CCME 2005
Fluorene	mg/kg	<0.0071 (1)	<0.0078 (1)	0.0212	0.144	CCME 2005
Phenanthrene	mg/kg	0.054 (1)	0.045 (1)	0.0419	0.515	CCME 2005
Anthracene	mg/kg	0.013 (1)	0.013 (1)	0.0469	0.245	CCME 2005
Fluoranthene	mg/kg	0.13 (1)	0.12 (1)	0.111	2.355	CCME 2005
Pyrene	mg/kg	0.12 (1)	0.11 (1)	0.053	0.875	CCME 2005
Benzo(a)anthracene	mg/kg	0.067 (1)	0.065 (1)	0.0317	0.385	CCME 2005
Chrysene	mg/kg	0.082 (1)	0.086 (1)	0.0571	0.862	CCME 2005
Benzo(b&j)fluoranthene	mg/kg	0.11 (1)	0.11 (1)			
Benzo(k)fluoranthene	mg/kg	0.035 (1)	0.035 (1)	0.24	13.4	Ontario MOEE (1993)
Benzo(a)pyrene	mg/kg	0.062 (1)	0.065 (1)	0.0319	0.782	CCME 2005
Indeno(1,2,3-cd)pyrene	mg/kg	0.040 (1)	0.041 (1)	0.2	3.2	Ontario MOEE (1993)
Dibenz(a,h)anthracene	mg/kg	0.012 (1)	<0.012 (2)	0.00622	0.135	CCME 2005
Benzo(g,h,i)perylene	mg/kg	0.042 (1)	0.040 (1)	0.17	0.32	Ontario MOEE (1993)
Low Molecular Weight PAH's	mg/kg	0.080	0.070	0.1		EC and QC MoE (1992)
High Molecular Weight PAH's	mg/kg	0.47	0.44	1	N/A	EC and QC MoE (1992)
Total PAH	mg/kg	0.55	0.51	4	35	Long and Morgan (1990)
Surrogate Recovery (%)						
D10-ANTHRACENE (sur.)	%	79	79			
D8-ACENAPHTHYLENE (sur.)	%	73	73			
D8-NAPHTHALENE (sur.)	%	71	71			
TERPHENYL-D14 (sur.)	%	87	90			

(1) Detection limit raised due to high moisture content.

(2) Detection limits raised due to matrix interference.

APPENDIX D: Compliance Inspection Report



Ministry of Environment Inspection Record

Environmental Protection Division

Inspection: Number: 20849		Inspection Status: <i>FINAL</i>	
Trigger: <u>Incident</u>		Date: 2015-05-13	Total Non-Compliance(s): 5
EP System: <u>AMS</u>		EP Number: 105809	EP Status: <u>Active</u>
Region: <u>West Coast</u>		Regional Office: <u>Nanaimo</u>	Audit Number:
Regulated Party:			
Cobble Hill Holdings (BC0754588)			
Contact(s):			
Marty Block			
Address:		Telephone Number: (250)743-3332	
Mailing:		Fax Number:	
South Island Aggregates Ltd.		Email:	
PO Box 282 Malahat BC V0R 2L0		marty.sia@shaw.ca	
Inspector	Laura Hunse		Risk Ranking: <u>1 to 2 = Medium</u>
Name(s):			
Location Description:		Receiving Environment: <u>Surfacewater</u>	
Latitude: 48.5511	N	Longitude: 123.6066	W
460 Stebbings Road, Shawnigan Lake			

Summary

Incidents of Non-Compliance Observed:

Yes

MONITORING AND REPORTING REQUIREMENTS

Inspection Period: **From:** 2014-06-01 **To:** 2015-05-13

Requirement Source:

Permit

Activity: On Site

Waste Type: Effluent

Non-Compliance Decision Matrix Level:

Level 1

Non-Compliance Decision Matrix Category:

Category A

Inspection Summary:

Facility was inspected May 13, 2015, and included sampling of groundwater and receiving environment surface water. Results of the sampling are discussed under separate memos. The Environmental Appeal Board delivered its decision on March 20, 2015, and an amended permit was issued June 4, 2015, with additional requirements including community representation on the advisory committee, fulltime weather protection of the soil management area, wheel washing requirement, and prohibition of reuse of landfill cell liners. The landfill construction is not yet complete, therefore no discharge to land has yet taken place, and there was no discharge to the environment from the pond during the period covered by this inspection, therefore many clauses below are marked undetermined or not applicable. This inspection evaluates compliance against the original permit. Future inspections will determine compliance with the amended permit, and it is noted that all requirements of the new amended are currently in effect. One shipment of metals contaminated soil, commencing May 8, 2015, from construction of new commercial/residential development in Victoria, has been received over the period covered by this inspection, and is awaiting landfilling. No soils have been accepted to date with the intent of bioremediation. Annual report for 2015 is due March 31, 2016. Non-compliances noted in this inspection are related to incomplete monitoring and reporting and not assigning a Tracking ID to incoming soil in accordance with the procedures listed in the Environmental Procedures Manual.

Response:

Advisory

ACTIONS REQUIRED BY REGULATED PARTY:

- 1) Amended permit was issued June 4, 2015. Adhere to all permit conditions and ensure operating, sampling and monitoring requirements are met and reported on time.

- 2) Install flow meter for sedimentation pond that meets BC Sampling Manual requirements (permit clause reference 1.5.4, 3.7)
- 3) Install groundwater well to replace GW4. Ensure applicable plans and specs requirements are met (3.3)
- 4) Include sampling information, lab info, blank info, etc. as appendix in future reports (3.9)
- 5) Ensure Emergency Response Plan is reviewed annually as required (2.12)
- 6) Ensure Environmental Procedures Manual is reviewed and kept up to date as required (2.13)
- 7) All non-contact water must report directly to settling pond prior to discharge to the environment (2.16)
- 8) Ensure Tracking ID system is implemented as discussed in the Soil Acceptance Plan (5.1)
- 9) Review all Details/Findings listed in Inspection Details section below and take appropriate action where necessary.

This inspection report serves as an advisory to the permittee noting non-compliances. Please notify me in writing within 30 days of receipt of this letter, advising what corrective measures have and are being taken to bring this authorization into compliance. Contact me with any concerns or question at laura.hunse@gov.bc.ca or 250.751.3224.

ADDITIONAL COMMENTS:

Compliance Summary	In	Out	N/A	N/D
Discharge	4	0	3	1
Operations	13	0	9	4
Reporting	1	2	0	1
Monitoring	1	3	2	1

Inspection Details

Requirement Type:	Requirement Description:	Details/Findings:	Compliance:

<u>Discharge</u>	1.1 Authorized Discharges ____ General Conditions This section applies to the discharge of refuse from a contaminated soil treatment and to the landfill facility. 1.1.1 The combined maximum rate of discharge from the treatment and to the landfill facility if 100 000 tonnes/yr. Estimated density of soil accepted at the site ranges from 1.5 to 1.8 t/m³ for the purpose of sampling incoming soil or treated soil for characterization. The above density estimate may be modified at any time with a scientific sampling method approved by the Director.	Landfill facility construction not yet complete. No discharge to the landfill has occurred.	<u>Not Applicable</u>
<u>Operations</u>	1.1.4 The authorized works as defined under Subsections 1.2.1, 1.3.1, 1.4.5 and 1.5.4 must be complete and in operation while discharging.	Landfill facility construction not yet complete, discharge not yet occurring.	<u>Not Applicable</u>
<u>Operations</u>	1.2 Authorized Discharge ____ Treatment Facility This section applies to the discharge of refuse from a soil treatment facility. The site reference number for this discharge is E292169. 1.2.1 The authorised works are a lined asphalt paved soil management and bioremediation treatment area of approximately 1800 m², temporary soil holding area (as described under Subsection 2.3), biocell, berm, primary and secondary containment detection and inspection sumps and associated cleanout ports, catch	Authorized works appear to have been completed and certified as-built plans are on file.	<u>In</u>

	basins, groundwater monitoring wells (as described under Subsection 3.3), management works and related appurtenances approximately located as shown on Figure A of the permit.		
<u>Operations</u>	1.2.3 The types of soil that can be bio-remediated at the treatment facility are soils contaminated with hydrocarbons, specifically soils contaminated with Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Styrene, Methyl Tertiary Butyl Ether (MTBE), Volatile Petroleum Hydrocarbons (VPHs), Light and Heavy Extractable Petroleum Hydrocarbons (LEPHs/HEPHs), Polycyclic Aromatic Hydrocarbons (PAHs), Chlorinated Hydrocarbons, Phenolic Substances, Chloride, Sodium and Glycols as defined in Schedules 4 and 5 of the CSR. Soils co-contaminated with hydrocarbons as described in this section and metals or other contaminants not suitable for bioremediation meeting industrial land use standards as defined in Schedules 4 and 5 of the CSR may also be accepted for treatment at the biocell.	No soils were bioremediated during the period covered by this inspection. Soils awaiting landfilling have analysis supporting	<u>Not Applicable</u>
<u>Operations</u>	1.3 Authorized Discharge ____ Landfill Facility This section applies to the discharge of refuse from a soil treatment facility and from relocated contaminated soil and associated ash. The site reference number for this discharge is E292889.	The landfill facility construction is not yet complete.	<u>Not Applicable</u>

	1.3.1 The authorized works are a landfill, engineered lined landfill cells, perimeter ditches, erosion and sedimentation control infrastructure, primary and secondary containment detection and inspection sumps and associated cleanout ports, catch basins, groundwater monitoring wells, management works and related appurtenances approximately located as shown on Figure A of the permit.		
<u>Discharge</u>	1.3.2 The characteristics of the discharge must be better than: Hazardous waste, as described in the Schedule 1, 1.1, 3 and 4 (Part 3, table 1 ____ Leachate Quality Standards) of the Hazardous Waste Regulation (HWR) and must be limited to contaminated soils and associated ash. Hazardous waste (as defined in the Environmental Management Act and the HWR), liquids, putrescible and other wastes must not be discharged. The Director may specify different standards and other substances in writing for the protection of human health or the environment.	No discharge to the landfill facility has occurred yet. The recent soils added to the Soil Management Area (SMA) awaiting landfill have metals levels not exceeding Schedule 7 Column IV, according to the May 6, 2015 Stantec report.	<u>In</u>
<u>Discharge</u>	1.3.3 The types of soil that can be discharged at the landfill facility are soils and associated ash contaminated with metals, Dioxins, Furans, BTEX, MTBE, VPHs, LEPHs/HEPHs, PAHs, Styrene, Chlorinated Hydrocarbons, Phenolic Substances, Chloride, Sodium and Glycols as defined in Schedules 4 and 5 of the CSR.	No discharge to the landfill facility has occurred yet. The recent soils added to the SMA awaiting landfill have metals levels not exceeding Schedule 7 Column IV, according to the May 6, 2015 Stantec report.	<u>In</u>

<u>Discharge</u>	1.4 This section applies to the discharge of effluent from the water treatment system (WTS). The site reference number for the WTS discharge is E292170. 1.4.1 The annual average rate of the WTS discharge is 12.1 cubic metres per day.	The annual average has not exceeded 12.1 m3/day.	<u>In</u>
<u>Discharge</u>	1.4.2 The maximum rate of the WTS discharge is 274 cubic metres per day.	The maximum discharge rate has not been exceeded.	<u>In</u>
<u>Discharge</u>	1.4.4 The characteristics of the discharged treated effluent must be equivalent to or better than the most stringent of those British Columbia Approved Water Quality Guidelines (BCAWQG) and A Compendium of Working Water Quality Guidelines for British Columbia (BCWWQG) for Freshwater Aquatic Life (AL) protection and Drinking Water (DW) uses for the parameters of concern: Inorganic Substances including metals, VPHw, LEPhw, VHW6-10, EPHw10-19, PAHs, BTEX, Styrene, Chlorinated Hydrocarbons, Phenolic Substances, Chloride, Sodium, Glycols, pH and Oil & Grease. Dioxins and Furans analysis must be conducted at a laboratory and using an analytical method agreed to by the Director and results must be below detection limit at all times. The source of the discharge must be limited to site stormwater runoff and water from the primary and secondary containment systems	According to the Quarterly Monitoring Report Update (Active Earth, May 26, 2015). No discharge to the environment has taken place during the evaluation period of this inspection. Following the recent issuing of the amended permit, it is expected that all quality standards shall be met as listed in the permit. If changes to the quality requirements are desired, an application to amend the permit must be submitted. The follow-up commissioning report of May 1, 2015 (Water Treatment Plant Commissioning Report, Active Earth Engineering), notes that during this commissioning period all parameters have met Health Drinking Water guidelines and all but chloride, zinc and aluminum have met Aquatic guidelines at the treatment plant, though these parameters have been met at the discharge point to the environment (from the sedimentation pond). Both of the zinc and aluminum concerns appear to have been addressed satisfactorily, but the chloride AW standard has not been consistently	<u>Not Determined</u>

	authorized under Subsections 1.2.1, 1.3.1 and 1.4.5. The Director may specify different standards and other substances in writing for the protection of human health or the environment.	achieved (though the standard is met at the pond discharge point). If chloride (or any other parameter) concentrations do not meet permit requirements, additional treatment may be required.	
<u>Operations</u>	1.4.5 The authorized works are surface runoff collection and diversion ditches associated with the WTS, WTS (including pH control and flocculent injection system, settling tank, bag and activated carbon filters), leachate and leak detection reservoirs, flow measurement device, monitoring and sampling equipment, reservoirs and related appurtenances approximately located as shown on Figure A of the permit. 1.4.6 The authorized works must be complete and in operation while discharging.	Works are in place.	<u>In</u>
<u>Discharge</u>	1.5 Ancillary Discharge ____ Settling Pond This section applies to the discharge of stormwater from the settling pond. The site reference number for the settling pond outlet is E292898. 1.5.1 The rate of the settling pond discharge is 42,500 cubic metres per day for up to 1 in 10 year return period flood event of 24 hour duration.	No pond discharge occurred during the period covered by this inspection. See findings in 1.5.3, below.	<u>Not Applicable</u>
<u>Discharge</u>	1.5.3 The characteristics of the settling pond discharge effluent (SW-1) must be equivalent to or better	According to the Quarterly Monitoring Report Update (July 2014 - April 2015), no discharges from the sedimentation	<u>Not Applicable</u>

	than the most stringent of those BCAWQG and BCWWQG for Freshwater Aquatic Life uses and Total Suspended Solids (TSS) must not exceed 25 mg/L for up to 1 in 10 year return period flood event of 24 hour duration. For flood events greater than 1 in 10 year return period flood event of 24 hour duration, the characteristics of the settling pond discharge must not exceed background concentrations (SW-4). The source of the discharge must be limited to non contact site stormwater runoff and treated effluent released from the WTS described in Subsection 1.4. The Director may specify different standards and other substances in writing for the protection of human health or the environment.	pond occurred during that monitoring period as the water level in the pond did not reach the outlet elevation at any point.	
<u>Operations</u>	1.5.4 The authorized works are surface runoff collection and diversion ditches, leachate, surface runoff and leak detection control reservoirs, one surface settling pond, flow measurement device, monitoring and sampling equipment, emergency overflow and related appurtenances approximately located as shown on Figure A of the permit. 1.5.5 The authorized works must be complete and in operation while discharging.	A flow measuring device has not been installed for the ancillary discharge. This was noted in the previous inspection as well and would be marked out of compliance had water levels reached high enough to discharge during the period covered by this inspection.	<u>Not Applicable</u>

<u>Operations</u>	1.5.6 Settled solids which have accumulated in the settling pond must be removed as required to maintain a minimum water depth below the pond decant of 0.5 metre. The removed solids must be disposed of in a manner approved by the Director.	There has not been significant quantities of settled solids to necessitate removal to date.	<u>Not Applicable</u>
<u>Operations</u>	2.1 Soils and Associated Ash Unacceptable for Treatment The following types of waste must not be accepted for treatment at the site: 1) Hazardous waste as defined in the HWR; 2) Soils contaminated with any substances not included in Subsection 1.2 above with concentrations exceeding relevant standards specified in Schedule 4 and 5 of the CSR; 3) Soils and associated ash that cannot be treated or landfilled successfully in the opinion of the Director; and 4) Liquid waste or soil and associated ash with a water content exceeding those described in the Soil Acceptance Plan. 5) Restricted wastes listed in the Soil Acceptance Plan described in Subsection 2.2 of this permit.	To date no soils/ash have been taken in for treatment. According to the documentation, all soils meet the quality requirements of section 1.3.2 and 1.3.3 of the permit and are awaiting landfilling (upon completion of the landfill cell).	<u>Not Applicable</u>
<u>Operations</u>	2.2 Screening and Acceptance of Soil The Permittee must submit a Soil Acceptance Plan prepared by a Qualified Professional to the satisfaction of the Director for screening soil and associated ash for all potential contaminants of concern	Only one shipment of soil was accepted during period covered by this inspection and that was on May 8, 2015, from 1950 Blanshard Street, which was approximately 600 tonnes. Soils accepted during this inspection period were accompanied by documentation from Stantec Consulting, who analysed	<u>In</u>

	prior to receiving any material at the facility. No changes must be made to the plan without prior approval by the Director. The Director may amend the plan for the protection of human health or the environment. Those soils suspected to be unacceptable must be either rejected immediately or placed in a holding area (as defined in Subsection 2.3) within the soil management area waiting further re-characterization by a Qualified Professional in accordance with Technical Guidance Document #1 (Site Characterization and Confirmation Testing). If further characterization confirms soils as unacceptable for treatment or landfilling (as defined in Subsections 1.2 and 1.3) the soil must not be mixed with any other soil and must be removed from the facility in accordance with the requirements of the Environmental Management Act and of the CSR	the stockpiles at 1950 Blanshard Street, Victoria, for metals to determine suitability for disposal at CHH. The Blanshard shipment took place on various days from May 8 to June 12 and totalled approximately 2060 tonnes.	
<u>Operations</u>	2.3 Holding Area for Soil and Associated Ash Suspected/Determined to be Unacceptable The Permittee must designate a holding area within the soil management area for short term storage of soil waiting for re-characterization or shipment to an appropriate management site as determined by a Qualified Professional. Short term storage must not exceed 30 days from the	There are no soils awaiting re-characterization.	<u>Not Applicable</u>

	day of the delivery or as agreed by the Director. The soil must be kept separate from the soil treatment area and be protected from the weather at all times.		
<u>Operations</u>	2.4 Bedrock Integrity Inspection and Risk Assessment A bedrock integrity inspection and risk assessment report must be submitted to the Director prior to the construction of any landfill cells. For any abnormalities (open fractures, presence of water, percolation, etc) identified during the inspection, the Permittee must notify the Director immediately and issue a structural report within 30 days following the inspection. The report must be submitted to the satisfaction of the Director and prepared by a suitably Qualified Professional and must include, but is not limited to: a) all relevant information collected during the inspection and detailing the abnormality; b) an explanation and/or interpretation of the abnormality; c) a risk assessment in regards to the risk to human health and the receiving environment; and d) remedial action planned and/or taken to control the risks.	This report has been submitted to the satisfaction of the director (Bedrock Integrity Inspection and Risk Assessment, Oct 13, 2013, Active Earth Engineering Ltd.)	<u>In</u>
<u>Operations</u>	2.5 Soil Aeration a) Where the thickness of contaminated soil within the soil treatment facility is greater than 30	No soils have been taken accepted for bioremediation during this period nor to date.	<u>Not Applicable</u>

	cm, the Permittee must periodically conduct mechanical soil aeration. Soil aeration must only be done under the following conditions to prevent nuisance to potential receptors: i. Ventilation index for Southern Vancouver Island for the day of soil turning is forecast as <u>good</u>; ii. No sooner than three hours after sunrise and no later than two hours before sunset but within the authorized discharge period defined under Subsection 1.1.2; iii. Favorable weather conditions (considering temperature and wind direction, etc.) b) Prior to every soil aeration event the Permittee must record the ventilation index forecast, time of sunrise and sunset, time and duration of aeration, and ambient temperature. Records must be tabulated along with soil volumes aerated and chemical characteristics in the biocell at the time of aeration.		
<u>Operations</u>	2.6 Soil Amendment and Prohibition of Blending Bioremediation must be undertaken without blending/mixing of contaminated soil with cleaner soils for the purpose of dilution to meet the required standards. Soil amendments which will enhance remediation potential, including bulking materials such as sawdust or straw, may be added prior to or during treatment. Should water be	No soils have been accepted for bioremediation during this period nor to date.	<u>Not Applicable</u>

	required to enhance soil treatment, contact water generated at the facility must be used in priority.		
<u>Operations</u>	2.7 Weather Protection The Permittee must cover the soil treatment piles, soil holding area and active landfill areas completely from November to April when not actively worked on and provide sufficient weather protection and containment for nutrients stored at the site for the protection of human health and the environment. The Permittee must cover any soil stored within the holding area at all times.	Cover not required at time of inspection, though permanent cover will be required as part of the amended permit.	<u>Not Determined</u>
<u>Operations</u>	2.8 Erosion and Sedimentation Control The Permittee must ensure erosion and sedimentation control measures are implemented with the soil management and treatment area and the landfill area, to limit sediment releases to the settling pond, the water treatment system and to the receiving waters. Storm water runoff must be diverted away from the soil management and treatment area and all active landfill areas at all times. Erosion and sedimentation controls must be developed and implemented according to industry best management practices and consider the Aggregate Operators Best Management Practices Handbook prepared by the Ministry of Energy	Erosion and sedimentation control are discussed in the Environmental Procedures Manual (Section 7 of EPM).	<u>In</u>

	and Mines.		
<u>Operations</u>	2.9 Odour Control There must be no objectionable hydrocarbon odour evident outside the property boundaries. The Permittee must, at a minimum, implement contingency measures if the ambient air quality sampling results exceed the air quality standards defined under Subsection 3.5. The contingency measures must be defined in the EPM as documented in Subsection 2.13 and include, but are not limited to, reduced soil aeration times and the covering of soil piles. The Director may amend the permit to require the implementation of additional control measures to limit odour generation.	No objectionable odour observed or reported.	<u>In</u>
<u>Operations</u>	2.10 Dust Control Fugitive dust created within the operation area must be suppressed. Measured dustfall must not exceed the B.C. Ambient Air Quality Residential Objective of 1.7 mg/(dm²-day) over a two week averaging period at the property boundary. The contingency measures must be documented in the EPM as defined in Subsection 2.13 and include, but not limited to, reduced activities, covering or application of dust suppressant on soil piles and exposed areas.	Dust suppression tactics are discussed in section 8.1 of the EPM. No measured dustfall records submitted.	<u>Not Determined</u>

	The Director may amend the permit to require the implementation of additional control measures on fugitive dust sources.		
<u>Operations</u>	2.12 Maintenance of Works and Emergency Procedures The Permittee must inspect the authorized works regularly and maintain them in good working order. In the event of an emergency or condition beyond the control of the Permittee which prevents effective operation of the authorized works or leads to unauthorized discharge, the Permittee must comply with all applicable statutory requirements, immediately notify the Director, and take appropriate remedial action for the prevention or mitigation of pollution. The Director may reduce or suspend operations to protect human health or the environment until the authorized works have been restored and/or corrective steps have been taken to prevent unauthorized discharges. The Permittee must prepare and maintain an Emergency Response Plan (ERP) to the satisfaction of the Director that describes the procedures to be taken to prevent or mitigate any discharge in contravention of the EPM. The ERP must be immediately implemented if there is a discharge, or any risk of a discharge in contravention of the EPM. In addition, an up-dated ERP, including a report on any emergency responses, taken	The ERP has been submitted to the satisfaction of the director and is listed in section 9 of the EPM.	<u>In</u>

	in the previous year, must be kept available, on site for inspection, as defined under Subsection 5.1. The Permittee must review the ERP at least on an annual basis to determine if any changes are required and submit any revisions to the Director for acceptance.		
<u>Operations</u>	2.13 Environmental Procedures Manual An Environmental Procedures Manual (EPM) must be prepared and submitted by the Permittee to the Director. No soil may be received prior to acceptance of the EPM by the Director. The EPM must be kept current and available for use as a guide at all times at the facility. The manual must cover all typical aspects of an Environmental Management Systems (EMS) relevant to the management of the soil treatment, water treatment and landfill facilities including but not limited to, the following items: a) Risk identification and prioritization; b) Administrative and engineering controls; c) Roles and responsibilities; d) Training requirements; e) A Soil Acceptance Plan; f) A Water Management Plan; g) An Environmental Monitoring Plan, including on and off site monitoring locations and the sampling procedures for soil, water, groundwater and air quality, as required;	The EPM has been submitted to the director as required. Most recent version on file is v 1.3, 2015 June.	<u>In</u>

	h) An Emergency Response Plan, including contingency measures. i) Details on the site preparation and the construction of landfill cells; j) Operation, inspection and maintenance of the soil management and treatment facility, the landfill facility, the water treatment system, erosion and sediment controls measures, the settling pond and associated appurtenances; k) Internal and external EMS audits, and; l) Notification, reporting, investigation and corrective and preventive measures. The Permittee must review the EPM at least on an annual basis to determine if any changes are required and submit any revisions to the Director for acceptance. Annual reviews and submission of revisions are due on March 31 of each year.		
<u>Operations</u>	2.14 Advisory Committee The Permittee must establish an Advisory Committee and develop terms of references to the satisfaction of the Director. The Committee must be composed of one representative of each relevant regulatory agency and one representative from the local government. The Committee must meet annually within 3 months of the submission of the annual report as required under Subsection 5.3 and provide advice to the Director within 30 days of the meeting. Based on advice of the Committee, the Director	It is anticipated that the permittee will proceed with establishing this committee.	<u>Not Determined</u>

	may revise the monitoring, sampling and reporting requirements in Sections 3 and 5.		
<u>Operations</u>	2.15 Qualified Professionals All facilities and information, including works, plans, bedrock integrity and risk assessment, assessments, sampling, monitoring, investigations, surveys, programs and reports, must be conducted and certified by Qualified Professionals. "Qualified Professional" means a person who a) is registered to practice in British Columbia with his or her appropriate professional association, acts under that professional association's code of ethics, and is subject to disciplinary action by that professional association, and; b) through suitable education, experience, accreditation and knowledge may be reasonably relied on to provide advice within his or her area of expertise as it relates to this permit.	In compliance	<u>In</u>
<u>Operations</u>	2.16 Bypasses The discharge of contaminants which have bypassed the authorized treatment works is prohibited unless the prior approval of the Director is obtained and confirmed in writing, except those authorized under Subsection 1.2 of this permit. Temporary storage or accidental deposit of contaminated soil at areas	Water Management Plan (various sections, EPM) -- all non-contact waters must report to the sedimentation pond. It appears that a sump has been created to drain waters from just north of the sedimentation pond directly to the pond outlet (photos 7 and 8, attached), though no pumping was not actually occurring at time of inspection. Any non-contact waters must be diverted to the sediment pond for settling prior to discharge.	<u>Not Determined</u>

	other than the soil management area is considered a bypass.		
<u>Operations</u>	2.17 Process Modifications The Director must be notified in writing prior to implementing changes to any process that may adversely affect the quality and/or quantity of the discharge.	Process modifications not implemented.	<u>In</u>
<u>Operations</u>	2.18 Plans - New Works Plans and specifications of the works must be certified by a Qualified Professional registered to practice in the Province of British Columbia, and submitted to the Director. A Qualified Professional must certify that the works have been constructed in accordance with the plans before discharge commences.	Ensure QP certifies construction of permanent cell prior to discharge.	<u>In</u>
<u>Monitoring</u>	3. MONITORING AND SAMPLING REQUIREMENTS 3.1 Incoming Soil and Associated Ash Sampling and Analysis The Permittee must follow sampling procedures and frequency specified in the approved Soil Acceptance Plan described under Subsection 2.2 to verify soil and associated ash quality. The contaminants must include, but not be limited to, the parameters of concern listed in Subsection 1.3.3, as determined by a Qualified Professional. The Director may require testing of soil and associated ash for additional parameters.	QA/QC sampling conducted as described in section 6.5 of the EPM.	<u>In</u>

<u>Monitoring</u>	3.2 Treated Soil Sampling and Analysis The Permittee must sample and characterize each batch of treated soil in accordance with Technical Guidance #1 Site Characterization and Confirmation Testing or an equivalent sampling protocol approved by the Director. Each batch must be considered to be of suspect waste soil quality. Soil must be analysed prior to disposal as authorised in Subsection 1.2 and 1.3 of this permit. The samples must be analysed for the parameters relevant to the type of contamination for which the soil is undergoing treatment as determined by a Qualified Professional. The appropriate parameters must include, but must not be limited to, the parameters of concern listed in Subsection 1.3.3 as determined by a Qualified Professional. Confirmation of completion of soil treatment must be obtained in writing from a Qualified Professional prior to discharge, for each stockpile of treated soil.	This is applicable to soils that have been bioremediated at the permitted facility, and no soils have been treated to date.	<u>Not Applicable</u>
<u>Monitoring</u>	3.3 Groundwater Sampling and Analysis The Permittee must install and maintain a minimum of seven groundwater sampling facilities (MW-1 (S/D), MW-2, MW-3(S/D), MW-4 and MW-5) as shown on Figure B and obtain groundwater samples once each quarter in a manner satisfactory	MW-4 is reported no longer operational due to tampering and has not yet been replaced. It must be replaced as soon as possible. Ensure proper documentation is submitted to the director as required. According to the Quarterly Monitoring Report Update (July 2014 - April 2015), there are no impacts observed to groundwater quality related to the	<u>Out</u>

	to the Director. MW-4 and MW-5 must be drilled using a non-destructive method and cores must be logged by a Qualified Professional. The design and location of the wells must be to the satisfaction of the Director. Proper care must be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc. Groundwater samples must be analysed for all potential contaminants of concern. The contaminants may include, but not be limited to, the parameters of concern listed in Subsection 1.3.3, as determined by a Qualified Professional. The groundwater quality must be compared to the standards described in Schedules 6 and 10 of the CSR or any additional standards specified by the Director in writing. The Permittee may be required to install additional groundwater sampling facilities upon request. The location and structural details of these sampling facilities are subject to the approval of the Director.	operations under the permit. More in depth trend analysis will be included as part of annual reports.	
<u>Monitoring</u>	3.4 Surface Water Sampling and Analysis The Permittee must sample the water treatment system effluent (WTS) and the settling pond discharge point (SW-1) monthly and every 2000 m3 for	Monthly sampling has not been conducted during this monitoring period due to the limited site activity and appeal process.	<u>Out</u>

	the water treatment system discharge effluent in a manner suitable to the Director. Proper care must be taken in sampling, storing and transporting the samples to adequately control temperature and avoid contamination, breakage, etc. Turbidity of the settling pond discharge effluent (SW-1) must be monitored bi-weekly between November to April and after every event greater than 1 in 10 year return period flood event of 24 hour duration. Surface water samples must be analysed for all potential contaminants of concern. The contaminants may include, but not be limited to, the parameters of concern listed in Subsection 1.3.3, as determined by a Qualified Professional. The surface water quality results must be compared to the standards set out in Subsection 1.4.4 and 1.4.5.		
<u>Monitoring</u>	3.5 Air Quality Monitoring The Permittee must collect monthly ambient air samples during the active season (i.e. between April and November, inclusive) at the down-wind property line using a Summa___ Canister. Ambient air samples must also be collected using a Summa___ Canister if and when soils with measurable volatile contaminant concentrations exceeding the established thresholds are being managed or treated at the soil	Loads on site do not have measureable volatile contaminant concentrations exceeding the established thresholds.	<u>Not Applicable</u>

	treatment facility at the location and as documented in the EPM. The ambient air sample must be analysed for the all potential contaminants of concern, as determined by a Qualified Professional, and results must be compared to the CSR Schedule 11 RL standards. In the event that results exceed the standards, the Permittee must follow the requirements stated under Subsection 2.9.		
<u>Monitoring</u>	3.6 Receiving Environment Sampling The Permittee must implement a receiving environment monitoring program for the receiving groundwater and surface water summarized in the table below and as defined under the EPM: The following Groundwater sites to be sampled quarterly: Up Gradient (MW-4) Southeast corner of the site Quarterly Down Gradient (MW-1(S/D)) On site Down Gradient (MW-2) Property boundary Down Gradient (MW-3(S/D)) Property boundary Down Gradient (MW-5) North of the site The following Surface Water sites to be sampled 5 in 30, which refers to at least 5 weekly samples taken in a period of 30 days, 2 times/year, conducted during fall first flush event	The receiving environment was not sampled quarterly during this monitoring period due to limited site activity and appeal process.	<u>Out</u>

	and in the spring freshet. Due to the ephemeral nature of some of the creeks, the first 5 in 30 sample should be collected when the ground has first been saturated. Up Gradient (SW-4) Shawnigan Creek Up Gradient (SW-2) Ephemeral Creek 1 Down Gradient (SW-5) Shawnigan Creek Down Gradient (SW-3) Ephemeral Creek 2 Flow measurements must be collected from all surface water monitoring locations at the time of sampling. Based on the results from the receiving environment monitoring program, the monitoring requirements may be extended or altered by the Director.		
<u>Monitoring</u>	3.9 Quality Assurance a) The Permittee must obtain from the analytical laboratory (ies) their precision, accuracy and blank data for each sample set submitted as well as an evaluation of the data acceptability, based on the criteria set by the laboratory. b) A duplicate sample must be prepared and submitted for analysis for each parameter sampled for each monitoring period. c) The analytical laboratory (ies) must be registered in accordance with the	Please include original lab analysis, blank, and duplicate sample documentation as appendix in future reports.	<u>Not Determined</u>

	Canadian Association of Laboratory Accreditation (CALA) unless otherwise instructed by the Director.		
<u>Operations</u>	4. SECURITY REQUIREMENTS 4.1 Closure Plan The Permittee must submit a closure plan to the satisfaction of the Director in 6 months after the issuance of this permit. Based on monitoring results or changes in the operation, the Director may require amendment of the plan for environmental protection. The closure plan must include, but may not be limited to investigations of soil, sediments, surface water and groundwater quality and treatment, identification and assessment of any residual contamination. If any residual contamination is identified, the Permittee will be required to remediate the site to meet the applicable soil, surface water and groundwater standards and objectives, as determined by the Director. The closure plan must be reviewed at least every five (5) years to inform the security adjustment defined in Subsection 4.2.	Submitted as required. (See Closure Plan and Financial Security Posting, Oct 22, 2013, Active Earth Engineering Ltd.)	<u>In</u>
<u>Operations</u>	4.2 Posting of Security and Costs The Permittee must submit a cost estimate for maintenance, monitoring, remediation and closure of the landfill for the active life of the site and a minimum twenty-five year	Submitted as required. (See Closure Plan and Financial Security Posting, Oct 22, 2013, Active Earth Engineering Ltd.)	<u>In</u>

post-closure period based on the current updated Closure Plan referred to in Subsection 4.1. The cost estimate must be prepared or reviewed by a suitably qualified, independent third party. The cost estimate is subject to the Director's approval.

An updated cost estimate must be reassessed and submitted to the Director for approval at least once every five (5) years and the security adjusted accordingly. The Director has the discretion to require reassessment on a more frequent basis.

The Permittee must provide and maintain security in a form and amount specified by the Director. At the discretion of the Director security may be applied, to any of the following:

- ___ To correct any inadequacy of the works relating to their construction, operation and maintenance;
- ___ To correct any non-compliance with this permit or the Environmental Management Act; and remediation.

Any money spent from the posted security must be replenished within sixty (60) days or as otherwise specified by the Director.

The operation of the facility without valid security is not authorized.

The Permittee may request the return

	of security where the title of the works has been transferred to a municipal authority or where the posted amount exceeds the estimated closure and post-closure costs, including remediation. Granting the request is at the discretion of the Director.		
<u>Reporting</u>	5. REPORTING REQUIREMENTS 5.1 Records Maintain for inspection by Environmental Protection Division staff, a record of the following logs, suitably tabulated: 1) Landfill cells construction QA/QC results; 2) Maintenance records of pollution control equipment listed as authorized works; 3) Facility inspection log with a record of observations of the soil management and treatment and landfill areas (including but not limited to bedrock integrity, liner, cover, stormwater and effluent collection and treatment works inspections), and preventative and corrective actions identified and implemented; 4) Current soil and associated ash inventory, including volumes and characteristics of soils and associated ash in the soil management and treatment area and landfill area; 5) Tracking ID number linked to soil and associated ash analysis results and the signature of a Qualified Professional who certifies completion	5) Though essentially the Soil Acceptance Plan has been followed as described in section 6 of the EPM, no coded Tracking ID number (as described in EPM 6.4) was issued for the 1950 Blanshard shipment commencing May 8, although there is an associated project number. I understand the tracking process is being further refined and updated WAA and Soil Acceptance Forms to reflect this. The refined system is being used for all new jobs after the Blanshard shipment, the tracking system will be retroactively applied to all loads that have been received thus far. Ensure any changes are incorporated into the EPM.	<u>Out</u>

	of remediation in accordance with the requirements of the CSR and compliance with this permit; 6) Location of each batch of soil and associated ash in the soil management and treatment and landfill area on a map;		
<u>Reporting</u>	5.1 Records cont'd from above 7) Analyses of screening of incoming soils and associated ash, and associated QA/QC results, as described in Subsection 2.1 and 2.2 of this permit; 8) Soil treatment activities including turning records and quantities of nutrients, bacteria seed or amendments added by date; 9) Weather conditions during turning events as described in Subsection 2.5 of this permit; 10) Results of the vapour and dust monitoring activities as required; 11) Analyses of treated soil, and associated QA/QC results, as described in Subsection 1.2 of this permit; 12) Quarterly volumes of soil stored in the holding area, awaiting final disposal as described in Subsection 2.3 of this permit; 13) A summary of Emergency Response Plan exercises, and incidents, including effluent/soil spills, requiring the Emergency Response Plan implementation. The above records of analyses for the re-characterization or characterization of incoming soil or treated soil,	7. QA/QC results provided as requested.	<u>In</u>

	respectively, must include batch sizes, number of samples collected and analysed per volume. Records must be kept on site or at another location acceptable to the Director for at least three years and made available upon request.		
<u>Reporting</u>	5.2 Environmental Quarterly Reports The Permittee must submit environmental quarterly reports prepared by a Qualified Professional with all monitoring data and associated QA/QC results, interpretations, conclusions and recommendations in a format acceptable to the Director and post the results online and provide a hard copy to the Director no later than 30 days after the end of each quarter.	Regular quarterly reports were not submitted during the time of the appeal; however, quarterly reporting has resumed following the conclusion of the appeal and issue of amended permit in June. Most recent report covers period from 2014 July to 2015 April.	<u>Out</u>
<u>Reporting</u>	5.3 Environmental Annual Reports The Permittee must submit an environmental annual report prepared by a Qualified Professional with monitoring data and associated QA/QC results, interpretations, conclusions and recommendations in a format acceptable to the Director no later than March 31 of each year. The environmental annual report must include, but is not limited to, the following: 1) An executive summary; 2) Quality and quantity (in tonnes and m3) of soil and associated ash	Not evaluated for 2014 due to very limited site activity and appeal process. 2015 report will be due at the closing of March, 2016.	<u>Not Determined</u>

received for treatment, direct landfilling and as direct landfill cover;
3) Quality and quantity (in tonnes and m3) of soil and associated ash that could not be treated in the soil treatment facility and soil and associated ash rejected and diverted to other facilities for treatment and/or disposal;
4) Updated maps showing the active landfill area, the areas reclaimed and the location of each landfill cells (completed and in progress);
5) Landfill operational plan and remaining landfill life and capacity;
6) Review of the preceding year of operation, plans for the next year and a summary of any new information or changes to the facilities and plans, assessments, programs and reports;
7) Review of any non-compliances with the conditions of this permit, including an action plan and schedule to achieve compliance (as per Subsection 6.1); and
8) Results from the Environmental Monitoring Plan with interpretations, conclusions and recommendations.

The Permittee must post the environmental annual report online and provide a hard copy to the local library by March 31 of each year. The Permittee may omit proprietary information from the publically available environmental annual report in accordance with the Freedom of Information and Protection of Privacy Act, as agreed to by the Director.

Inspection Details Continued

Were the following collected during inspection:	
Samples? ☒	EMS No.
Photos? ☒	
Other (please specify) Groundwater and surface water reports submitted under separate memo.	
Is the Inspection related to an EA Project? ☐	EA Project Certificate No.

INSPECTION CONDUCTED BY:	
Signature Laura Hunse	Date Signed 2015-06-22
ENCLOSURE(S) TO REGULATED PARTY & DESCRIPTION: 	
CVIS Archives	
REGULATORY CONSIDERATIONS:	
This inspection document may not list all requirements as listed in the permit PR-105809. Please refer to the official permit document for full text and all requirements.	
DISCLAIMER:	
Please note that sections of the permit, regulation or code of practice referenced in this inspection record are for guidance and are not the official version. Please refer to the original permit, regulation or code of practice. To see the most up to date version of regulations and codes of practices please visit: http://www.bclaws.ca/ If you require a copy of the original permit, please contact the inspector noted on this inspection record or visit: http://www2.gov.bc.ca/gov/topic.page?id=DF89089126D042FD96DF5D8C1D8B1E41&title=Publicly%20Viewable%20Authorizations It is also important to note that this inspection record does not necessarily reflect each requirement or condition of the authorization therefore compliance is noted only for the requirements or conditions listed in the inspection record.	

		Mailing Address:	
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Ministry of Environment	West Coast Region Environmental Protection Division	2080-A Labieux Rd Nanaimo, BC V9T 6J9	Phone: (250) 751-3100 Fax: (250) 751-3103
Website: http://www.gov.bc.ca			

Authorization: 105809	Client Name: Cobble Hill Holdings (BC0754588)
CVIS IR #: 20570	May 13, 2015 Site Inspection Photos

General site
overview



Authorization: 105809	Client Name: Cobble Hill Holdings (BC0754588)
CVIS IR #: 20570	May 13, 2015 Site Inspection Photos

Photo 1

Nearly complete landfill cell with roll of liner, looking approx. NE



Photo 2

Looking approx. SW



Authorization: 105809	Client Name: Cobble Hill Holdings (BC0754588)
CVIS IR #: 20570	May 13, 2015 Site Inspection Photos

Photo 3

Soil management
area with 1950
Blanshard soil in
foreground



Photo 4

Soil pile
regulated in
agreement with
land remediation
group



Authorization: 105809	Client Name: Cobble Hill Holdings (BC0754588)
CVIS IR #: 20570	May 13, 2015 Site Inspection Photos

Photo 5

Soil management
area holding
pond



Photo 6

Wastewater
treatment plant
and (dry) settling
pond



Authorization: 105809	Client Name: Cobble Hill Holdings (BC0754588)
CVIS IR #: 20570	May 13, 2015 Site Inspection Photos

Photo 7

Non-contact
water sump



Photo 8

Sump hose
directly to
sedimentation
pond discharge
pipe

