



November 17, 2015

File: PR-105809

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RE: Surface Stormwater Quality at Cobble Hill Holdings November 14, 2015; Metals, TSS and Turbidity

Runoff was observed leaving the west boundary of Cobble Hill Holdings quarry site (PR-105809) following a heavy rainfall event November 12 & 13, 2015. Ministry staff were on site to sample and observe conditions on November 14, 2015. At that time, a very low volume trickle was observed leaving the site though it was evident that higher flow was present prior to constructed channeling. The purpose of sampling was to determine whether the subsequent runoff had contacted landfilled material and whether it meets ambient water quality guidelines.

Samples of surface water runoff were collected on November 14, 2015 at three locations at PR-105809 with an additional sample collected in a seep at the north end of Lot 21 and one in Shawnigan Creek several kilometers downstream. A brief summary of sampling locations:

- SW1 – approximately 15 m west of permitted discharge point from settling pond in ephemeral creek (no actual discharge from pipe was occurring at sample time)
- CHH1- surface runoff 0.5 m inside west boundary perimeter fence approximately 60 m south of the discharge point from settling pond to ephemeral creek
- CHH2 – surface runoff at 0.5 m outside of west boundary perimeter fence approximately 60 m south of the discharge point from settling pond to ephemeral creek
- REG SC – Shawnigan Creek approximately 1.2 km upstream of south Shawnigan Lake at bridge at Sooke Lake Road
- L21S – North boundary of Lot 21 bottom slope toe drainage seep into Shawnigan Creek

Parameters analyzed were turbidity, total suspended solids (TSS), pH, metals, chloride, sulphate and PAHs. All samples were collected following standard MOE sampling protocols. The samples were put on ice in a cooler and shipped overnight to ALS Global in Burnaby, BC.

Water sample results were compared to applicable BC and Health Canada Drinking Water Guidelines¹ and BC Water Quality Guidelines (WQGs) for the protection of aquatic life². Most water quality results were below applicable guideline levels except where noted below.

¹ http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index-eng.php#t2

Results for TSS were below detection limits for all samples except for the Lot 21 drainage seep which had a TSS level of 12.4 mg/L. BC guidelines for the protection of aquatic life are change of < 5mg/L (chronic exposure) and change of < 25 mg/L (acute exposure) from background levels. This result is not surprising given that samples are collected immediately downstream from runoff over exposed soils during a heavy rainfall event where risk of solids material entering sample bottles are high.

Turbidity levels were also relatively low except for the L21S sample with 31.8 NTU (nephelometric turbidity units). The CHH1, CHH2 and SW1 had turbidity levels similar to the downstream Shawnigan Creek turbidity level (REG SC). The BC drinking water quality guideline is no greater than a change of 1 NTU from background levels. Given the flow volume of the seep in relation to the Shawnigan Creek flows on November 14th, the turbidity and TSS values from the L21S are a negligible contribution to overall Creek water quality.

A review of the metals results against Health Canada Drinking Water (HC DW) guidelines showed generally no exceedances except for a slight exceedance of the aluminum guideline which is intended as drinking water treatment operational guidance for facilities that use aluminum-based coagulants. Sites REG SC, CHH2 and L21S had aluminum concentrations of 0.176 mg/L, 0.231 mg/L and 0.297mg/L respectively. The L21S sample had slightly elevated iron and manganese levels above the Health Canada guidelines which are both aesthetic guidelines referring to taste and laundry staining.

Sulphate and chloride concentrations were measured and sample concentrations met applicable guidelines. While the CHH1 & 2 and SW1 samples had relatively higher sulphate concentrations than Shawnigan Creek downstream (REG SC) and Lot 21 seep sulphate levels, the concentrations measured were well below the drinking water guideline of 500 mg/L.

All surface water polycyclic aromatic hydrocarbons analyses were below the lowest analytical detection limits.

Overall the surface water quality results are generally within applicable ambient guideline levels and do not pose a risk to aquatic life nor human health. The three samples collected near the landfill PR-105809 indicate that the runoff sampled had not contacted landfilled materials.

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Attachment: Table of Results

² <http://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines>

Cobble Hill Holdings November 14, 2015 Stormwater Quality Results													
Client Sample ID		REG SW1	REG SC	REG CHH1	REG CHH2	REG L21S							
Date Sampled		14-Nov-2015	14-Nov-2015	14-Nov-2015	14-Nov-2015	14-Nov-2015							
ALS Sample ID		L1702465-1	L1702466-1	L1702464-1	L1702463-1	L1702462-1							
Parameter	Lowest Detection Limit	Units	Water	Water	Water	Water	Water	Drinking Water Quality Guidelines (approved and working)				Water Quality Guidelines (approved and working) for the Protection of Aquatic Life	
								Units	BC DW	Health Can DW	Chronic	Acute	
Physical Tests (Water)													
Conductivity	2.0	uS/cm	573	44.9	332	287	306						
Hardness (as CaCO3)	0.50	mg/L	207	14.5	122	104	114						
pH	0.10	pH	7.08	7.13	6.41	6.39	7.42						
Total Suspended Solids	3.0	mg/L	<3.0	<3.0	<3.0	<3.0	12.4	mg/L				Change of 5	Change of 25
Turbidity	0.10	NTU	1.65	1.72	1.16	3.61	31.8	NTU	Change of 1				Change of 5
Chloride (Cl) total	0.50	mg/L	28.4	2.96	9.82	7.74	8.98	mg/L dissolved	250	250	150	600	
Sulfate (SO4)	0.30	mg/L	157	3.66	101	85.9	17.5	mg/L	500	500	218		
Total Metals (Water)													
Aluminum (Al)-Total	0.0030	mg/L	0.0753	0.176	0.0995	0.231	0.297	µg/L		100 (foot note #1)			
Antimony (Sb)-Total	0.00010	mg/L	0.00042	<0.00010	<0.00010	<0.00010	0.00011	µg/L	14	6		20	
Arsenic (As)-Total	0.00010	mg/L	0.00013	0.00013	0.00012	0.00014	0.00027	µg/L		10		5	
Barium (Ba)-Total	0.000050	mg/L	0.0205	0.00378	0.0443	0.0452	0.0186	µg/L		1000	1000	5000	
Beryllium (Be)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	µg/L	4		5.3		
Bismuth (Bi)-Total	0.000050	mg/L	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	µg/L					
Boron (B)-Total	0.010	mg/L	0.040	<0.010	0.013	0.012	0.017	µg/L	5000	5000		1200	
Cadmium (Cd)-Total	0.000050	mg/L	0.000137	<0.000050	0.000072	0.000095	<0.000050	µg/L	5	5			Under review
Calcium (Ca)-Total	0.050	mg/L	65.4	4.22	39.4	33.2	30.5	mg/L					
Chromium (Cr)-Total	0.00010	mg/L	0.00027	0.00036	0.00021	0.00031	0.00062	µg/L	50	50		1	
Cobalt (Co)-Total	0.00010	mg/L	0.00079	<0.00010	0.00020	0.00021	0.00208	µg/L			4	110	
Copper (Cu)-Total	0.00050	mg/L	0.00194	0.00102	0.00107	0.00109	0.00175	µg/L	500	1000	1, 2.2, 2.9, 2.8	6.4, 7.2, 8.8, 8.5	
Iron (Fe)-Total	0.0050	mg/L	0.0788	0.118	0.0505	0.149	2.92	µg/L		300 (footnote #2)		1000	
Lead (Pb)-Total	0.000050	mg/L	0.000083	0.000060	<0.000050	0.000090	0.000254	µg/L	50	10	4.5, 4.8, 5.4, 5.3	1.7, 38.7, 54.5, 51.1	
Magnesium (Mg)-Total	0.0050	mg/L	10.7	0.968	5.73	5.12	9.14	mg/L					
Manganese (Mn)-Total	0.00010	mg/L	0.0324	0.00534	0.0185	0.0134	0.810	µg/L		50 (footnote #2)	800	1100	
Molybdenum (Mo)-Total	0.000050	mg/L	0.00179	<0.000050	0.000286	0.000218	0.000235	µg/L	250		1000	2000	
Nickel (Ni)-Total	0.00050	mg/L	0.00172	<0.00050	0.00084	0.00081	0.00115	µg/L				25	
Phosphorus (P)-Total	0.010	mg/L	0.016	0.013	<0.010	0.023	0.016	µg/L					
Potassium (K)-Total	0.050	mg/L	1.99	0.287	1.18	1.27	0.874	mg/L				373	
Selenium (Se)-Total	0.000050	mg/L	0.000589	<0.000050	0.000554	0.000600	0.000097	µg/L	10	10	2		
Silicon (Si)-Total	0.050	mg/L	4.37	3.43	3.90	3.91	4.35	µg/L					
Silver (Ag)-Total	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	µg/L			0.05	0.1	
Sodium (Na)-Total	0.050	mg/L	21.8	2.45	8.85	7.66	14.5	mg/L		200			
Strontium (Sr)-Total	0.00020	mg/L	0.223	0.0184	0.0983	0.0863	0.113	µg/L					
Sulfur (S)-Total	0.50	mg/L	56.1	1.26	34.3	29.7	6.07	mg/L					
Thallium (Tl)-Total	0.000010	mg/L	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	µg/L	2			0.3	
Tin (Sn)-Total	0.00010	mg/L	<0.00010	<0.00010	<0.00010	<0.00010	<0.00010	µg/L					
Titanium (Ti)-Total	0.00030	mg/L	0.00408	0.00459	0.00322	0.0151	0.0123	µg/L				2000	
Uranium (U)-Total	0.000010	mg/L	0.000562	<0.000010	0.000023	0.000025	0.000063	µg/L		20		300	
Vanadium (V)-Total	0.00050	mg/L	0.00089	0.00067	0.00058	0.00086	0.00128	µg/L				6	
Zinc (Zn)-Total	0.0030	mg/L	<0.0030	<0.0030	<0.0030	<0.0030	<0.0030	µg/L	5000	5000	7.5	33	
PAHs (Water)													
All congeners below lowest analytical detection limit													
1. All guideline for operational consideration for dw treatment using coagulants													
2. Aesthetic guideline for taste and laundry staining													
Exceeded guideline													