7 June 2017

2016 WATER QUALITY MONITORING REPORT

Vernon Compost Facility 551 Commonage Road Vernon, BC

Submitted to: City of Kelowna 1435 Water Street Kelowna, BC V1Y 1J4

REPORT

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) is pleased to provide the City of Kelowna (CoK) with this monitoring report that documents the results of water quality monitoring completed in 2016 at the Kelowna-Vernon Biosolids Composting Facility located at 551 Commonage Road in Vernon, BC (hereafter referred to as the Site). The monitoring data were collected by CoK personnel and provided to Golder for compiling this report.

It is our understanding that the purpose of the monitoring program is to assess potential leachate infiltration of stormwater runoff/leachate that is generated at the Site. The monitoring program addresses recommendations made by the BC Ministry of Environment (MoE) in a letter to the CoK entitled *"Response to the Notice of Proposed Expansion of Biosolid Composting Facility"*, dated 27 April 2010; and by Golder in subsequent letters and annual monitoring reports prepared for the CoK for submission to MoE.

2.0 BACKGROUND

The composting facility was constructed in 2006 and is located on Commonage Road in Vernon, BC (Figures 1 and 2). The Site composts wastewater treatment plant biosolid material and currently consists of an administration building, sludge receiving building, a mixing building, primary and secondary aeration cells, and a compost curing area. An expansion of the facility was completed in 2010, at which time the entire composting curing area was paved. Prior to the construction of the composting facility, a septage disposal facility was operated at the Site by the City of Vernon (CoV) and the North Okanagan Regional District (NORD).

The Site is surrounded primarily by undeveloped and agricultural land. Surface water bodies in close proximity to the Site include the following (refer to Figures 1 and 2):

- Drainage Pond: located approximately 100 m west of the composting facility, between the Site and Commonage Road, and used to store stormwater runoff generated at the Site.
- Rose's Pond: located approximately 200 m northwest of the composting facility (and approximately 100 m northwest of the Drainage Pond), on the northwest side of Commonage Road.
- Davidson Pond: a privately owned pond on the Davidson Property, located approximately 100 m south of the composting facility (and approximately 200 m south and southwest of the Drainage Pond).

Stormwater runoff generated at the Site is directed towards a drainage trench along the Site's south-western boundary, and then gravity-fed into the Drainage Pond (Figure 2). Water entering the drainage trench and Drainage Pond consists primarily of stormwater that may contain leachate from the compost material stored on the curing pads; and potentially process water runoff, as water is regularly added to the compost material, particularly in the hot summer months. Leachate from the primary and secondary aeration cells at the Site is directed to a holding tank and then truck-hauled for treatment at the CoV sewage reclamation facility, which discharges into MacKay Reservoir located approximately 2 km west-southwest of the Site (Golder, February 2010).

Effluent from, or on route to, the CoV's sewage reclamation facility is periodically used to flush the drainage trench: in the summer months, treated (chlorinated) effluent from the Mackay Reservoir is used, and in the winter months, effluent on route to the Reservoir is diverted and treated (filtered and/or chlorinated), then used to flush the drainage trench. When the water level at the Drainage Pond is near capacity, water is pumped to the CoV's sewage reclamation facility.



In 2009, the CoK retained Golder to complete an initial review of the Site, which was documented in the report titled *"Interim Report on Leachate Drainage Pond, Kelowna – Vernon Compost Facility"*, dated 17 February 2010. The purpose of the report was to compile local and regional data on the hydrogeology in the area, monitor water quality, and monitor drainage and pond water levels to assess potential infiltration of leachate. The 2010 report indicated that the Composting Facility and the Drainage Pond are located on dense glacial tills that inhibit water infiltration into the groundwater aquifer located within the underlying bedrock. It was inferred that water infiltrating into the ground would likely migrate along the top of the glacial till and may eventually discharge into local ponds (i.e., Davidson Pond and Rose's Pond), with a small component of infiltration migrating vertically through the till into deeper bedrock fractures.

Between 2010 and 2015, the CoK conducted monitoring programs at the Drainage Pond, and at Davidson Pond and Rose's Pond (except in 2013), to assess whether water at the Drainage Pond may be infiltrating into the ground and discharging into Rose's Pond and/or Davidson Pond. The results of these monitoring programs have been documented in various reports prepared by Golder and submitted to the CoK.

In July 2010, CoK personnel installed an evaporation pan at the Drainage Pond to monitor daily water levels in the pan, along with water levels at the Drainage Pond, as an indicator of water loss due to evaporation or potential infiltration. In 2010, it was found that the regular flushing of the one-inch and/or six-inch drainage lines, combined with the outflow pump operating intermittently, did not allow for a meaningful assessment of water loss at the Drainage Pond. For this reason, subsequent recommendations were to conduct observations on days when the drainage lines were not flushing and the pump was shut-off, and when no rainfall was expected. Additional recommendations for 2016 included that readings/measurements be taken over three 48-hour periods; once in the spring months (i.e., May or June), once in the summer months (i.e., July or August) and again in the fall (i.e., September or October); and that consideration be given to collecting this evaporation pan and water level data with pressure transducers to capture the small level changes (Golder, 2016). As discussed below, no Drainage Pond level or evaporation pan readings were made by the CoK in 2016.

As per the 9 June 2016 amendments to the Organic Matter Recycling Regulation, a permit issued pursuant to the *Environmental Management Act* (EMA) is required for facilities that process food waste or biosolids; that have the design capacity to produce 5,000 dry tonnes or greater of compost per year; and that do no currently hold an approval or operation certificate. The CoK is currently in the process of applying to the MoE for a Regional Biosolids Composting Facility Permit. It is understand that the MoE will require that the drainage trench and Drainage Pond be lined with an impermeable liner; however, details of the permit that may affect future water quality monitoring requirements at the Site are not known at this time.

3.0 2016 SCOPE OF WORK

The 2016 monitoring included the following scope of work by CoK personnel:

- Collect monthly samples between March and September of 2016 at the Drainage Pond, Rose's Pond and Davidson Pond for analysis of potential indicators of biosolids (i.e., septage) contaminants including:
 - Phosphorous, chloride, ammonia, nitrate, nitrite, total kjeldahl nitrogen and total nitrogen.
 - Biological oxygen demand (BOD) and chemical oxygen demand (COD).
 - Microbiological analyses (total coliforms and E.coli).
 - Metals (total and dissolved; with lower detection limits for total beryllium and total selenium).
 - PH, conductivity, total suspended solids (TSS) and hardness.
- Review of analytical results.





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Attempts were made to measure Drainage Pond levels and corresponding evaporation pan levels in 2016; however, flushing of the drain lines prevented taking meaningful measurements.

Based on the above scope of work, Golder has prepared this monitoring report for submission to the MoE by the CoK. The monitoring report provides discussions on:

- Water quality results for the Drainage pond.
- Water quality results for Davidson Pond and Rose's Pond, including potential impacts from the Drainage Pond.
- Recommendations for the 2017 water quality monitoring program.

It is noted that recommendations for the 2017 water quality monitoring program may need to be modified in 2017 (and/or subsequent years) following issuance of the Regional Biosolids Composting Facility Permit, and dependent on the permit requirements.

4.0 SURFACE WATER ASSESSMENT CRITERIA

Pond water quality data were tabulated by Golder and compared to the following standards and/or criteria:

- Freshwater aquatic life (AW) standards in the BC Ministry of Environment (MoE) Contaminated Sites Regulation (CSR; B.C. Reg. 375/96, includes amendments up to B.C. Reg. 184/2016, 19 July 2016).
- Drinking water (DW) standards in the CSR.
- BC MoE's "British Columbia Approved Water Quality Guidelines: Aquatic Life, Wildlife & Agriculture, Summary Report", dated January 2017 (BCWQG) for freshwater aquatic life (AW) criteria. Where applicable, the most conservative of the long-term average and short-term maximum guidelines are referenced.
- BC MoE's "Working Water Quality Guidelines for British Columbia (2015)" for freshwater aquatic life (AW) criteria.

According to BC MoE Technical Guidance Document 15: *Concentration Limits for the Protection of Aquatic Receiving Environments* (Version 1.0; April 2013):

- For maintained watercourses, the CSR AW standards are applicable to surface water, porewater and groundwater.
- Surface water in aquatic receiving environments other than maintained watercourses should be evaluated against the BCWQG.



For the purposes of this assessment, the Drainage Pond is considered to be a maintained watercourse; and as there is no overland flow from the Drainage Pond, and potential contaminants can only migrate through groundwater to other surface water bodies or drinking water wells, the water quality data from the Drainage Pond has been compared to the CSR AW and DW standards. Rose's Pond and Davidson Pond are considered to be aquatic receiving environments, and water quality data for these two ponds have been compared to the BCWQG, and conservatively against the CSR AW and DW standards.

In October 2016, the BC MoE announced the Stage 10 Omnibus changes to the CSR, which are effective as of 1 November 2017. As this report is for water quality monitoring conducted in 2016, the Stage 10 CSR standards have not been presented in this report. However, the Stage 10 CSR standards would apply in 2017.

For the comparison of ammonia concentrations, the BCWQG AW guideline for ammonia is pH and temperature dependent and was derived using the laboratory reported pH values for each sample and an assumed temperature of 10° Celsius.

For the comparison of metals concentrations, the total metals (unfiltered) concentrations in the samples were used for comparison to the CSR standards and the BCWQG AW guidelines (except for aluminum and cadmium, where BCWQG AW guidelines are for dissolved concentrations; and for iron, where there are BCWQG AW guidelines for both total and dissolved iron), in accordance with standard practice for surface water samples.

5.0 FIELD MONITORING

5.1 Field Monitoring

Field monitoring in 2016 was conducted between March and September 2016 and included the following tasks:

- Sampling of the Drainage Pond monthly in March through September 2016 (for a total of seven samples) and analysis of samples for septage contaminants listed under Section 3.0.
- Sampling of Davidson Pond and Rose's Pond monthly in March through September 2016 (for a total of seven samples) and analysis of samples for septage contaminants listed under Section 3.0.

5.2 Field Methods

CoK staff collected all water levels and water samples described in this report. Grab samples were collected from below the water surface near the shoreline of each pond, and placed in bottles supplied by ALS Environmental Laboratory (ALS) of Burnaby, BC. The sample bottles were placed in chilled coolers and transported via overnight courier. The ALS laboratory analytical reports were provided to Golder by the CoK. Golder tabulated the 2016 data to allow for an assessment of the water quality results; tabulated data are provided in this report along with the 2014 and 2015 data.



6.0 RESULTS 6.1 Drainage Pond Quality

A summary of the analytical results for water samples collected from the Drainage Pond in 2016 is presented in Table 1, attached. The ALS laboratory analytical reports (laboratory report numbers L1742616-1, L1752610-1, L1763882-1, L1777367-1, L1794599-1, L1811981-1 and L1832582-1) are included in Appendix A.

The following is a summary of the 2016 analytical results. Results were compared to the CSR AW and DW standards, where applicable.

- Ammonia (as N) concentrations exceeded the applicable CSR AW standard during the March and April sampling events (there is no CSR DW standard for ammonia-N).
- All other concentrations of nutrients parameters, chloride and total metals in the Drainage Pond were below the applicable CSR AW and DW standards.
- Nitrate (as N) concentrations were elevated in March and April compared to those in May through September.
- Parameter concentrations measured in 2016 were generally within the range of concentrations measured in 2014 and 2015, with the exception of the chloride concentration in April 2016 (129 mg/L), which was higher than those measured in 2014, 2015 and the remainder of 2016.
- Concentrations of total coliforms and E.coli in the samples collected from the Drainage Pond were the lowest in May, with most probable number (mpn) per 100 mL of 100 for total coliforms and <10 mpn/100 mL for E.coli. The highest concentrations were measured in August with total coliforms of >241,960 mpn/100mL and 130,000 mpn/100mL of E.coli.

6.2 Davidson Pond and Rose's Pond Quality

A summary of the analytical results for water samples collected from the neighbouring Davidson and Rose's Ponds in 2014 is presented in Table 2, attached. The ALS laboratory analytical reports (laboratory report numbers for Davidson Pond: L1742616-2, L1752610-2, L1763882-2, L1777367-2, L1794599-2, L1811981-2 and L1832582-2; and for Rose's Pond: L1742616-3, L1752610-3, L1763882-3, L1777367-3, L1794599-3, L1811981-3 and L1832582-3) are included in Appendix A.

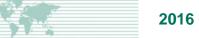
The following is a summary of the 2016 analytical results. Results were compared to the BCWQG AW guidelines and the CSR AW and DW standards, where applicable.

6.2.1 Davidson Pond

Concentrations of most parameters were less than the BCWQG AW guidelines and CSR AW and DW standards during the seven sampling events in 2016, except for the following parameters:

Chloride concentrations exceeded the long-term average BCWQG AW guideline and the CSR DW standard, but were less than the CSR AW standard and the short-term maximum BCWQG AW guideline, during all sampling events.





- The total magnesium concentrations measured in August and September exceeded the CSR DW standard (there are no BCWQG or CSR AW criteria for magnesium).
- The total sodium concentrations exceeded the CSR DW standard during all sampling events (there are no BCWQG or CSR AW criteria for sodium).
- The reported detection limit for total beryllium exceeded the applicable BCWQG AW guideline during all sampling events.

Samples collected from Davidson Pond during the 2016 sampling events had total coliform and E. coli counts that were generally elevated; however, between March and July, total coliform and E.coli counts were lower than at the Drainage Pond. The highest total coliform and E.coli counts at Davidson Pond were measured in September 2016, and were significantly higher than those measured in 2014, 2015 and the remainder of 2016. It appears that this sample may have been switched with the Drainage Pond sample collected in September 2016, based on historical counts recorded at both ponds from 2014 through 2016.

Parameter concentrations measured in 2016 at Davidson Pond were generally within the range of concentrations measured in 2014 and 2015.

6.2.2 Rose's Pond

Concentrations of most parameters were less than the BCWQG AW guidelines and CSR AW and DW standards during the seven sampling events in 2016, except for the following parameters:

- Total arsenic concentrations exceeded the BCWQG AW guideline during the July, August, and September sampling events, but were less than the CSR AW and DW standards.
- Chloride concentrations exceeded the long-term average BCWQG AW guideline and the CSR DW, but were less than the CSR AW standard, during all sampling events. The August chloride concentrations also exceeded the short-term maximum BCWQG AW guideline.
- Total magnesium concentrations exceeded the CSR DW standard during all sampling events.
- Total sodium concentrations exceeded the CSR DW standard during all sampling events.
- The reported detection limit for total beryllium exceeded the applicable BCWQG AW guideline during all sampling events.

Samples collected from Rose's Pond during the 2014 sampling events had total coliform counts that were generally elevated but typically lower than in the Drainage Pond.

Parameter concentrations measured in 2016 at Rose's Pond were generally within the range of concentrations measured in 2014 and 2015.



7.0 DISCUSSION

The concentrations of typical septage contaminants (ammonia, nitrate, nitrite, total nitrogen, orthophosphate and microbiological parameters) at the Drainage Pond, Davidson Pond and Rose's Pond were generally within the range of analysis from month to month during the sampling events in 2016, and generally within the range of concentrations previously measured in 2014 and 2015. The exception to this was the ammonia concentrations (particularly in the Drainage Pond) and the total coliforms and E.coli concentrations (in all three ponds), which exhibited variability between sampling events.

The ammonia concentrations at the Drainage Pond exceeded the CSR AW standard on two occasions in early 2016; however, all other parameter concentrations were below the applicable CSR AW and DW standards. The reported ammonia (as N) concentrations at the Drainage Pond were much greater than the nitrate (as N) and nitrite (as N) concentrations, indicative that little nitrification is occurring. The total nitrogen concentrations at the Drainage Pond were greater than the combined ammonia, nitrate and nitrite concentrations, indicative that a portion of the total nitrogen in the water samples was organic nitrogen.

Similar to the 2014 and 2015 water quality monitoring results, samples collected during the 2016 sampling events indicated that septage parameter concentrations and BOD were higher at the Drainage Pond than at Davidson Pond and Rose's Pond, as follows:

- Total nitrogen concentrations were more than approximately 2 times greater at the Drainage Pond than at Davidson Pond and Rose's Pond.
- BOD concentrations were up to approximately 6 times greater at the Drainage Pond than at Davidson Pond and Rose's Pond.
- Orthophosphate concentrations were approximately 1 to 3 orders of magnitude greater at the Drainage Pond than at Davidson Pond and Rose's Pond.
- Certain metals parameters were higher at the Drainage Pond than at Davidson Pond and Rose's Pond (including, but not limited to: aluminum, barium, boron, iron, manganese, molybdenum, phosphorus and zinc).

Similar to the 2014 and 2015 water quality monitoring results, samples collected during the 2016 sampling events indicated that certain inorganic and metals parameters were higher at Davidson Pond and Rose's Pond relative to the Drainage Pond, as follows:

- Chloride concentrations were approximately 3 times higher at Davidson Pond, and up to 6 times higher at Rose's Pond, than at the Drainage Pond.
- Magnesium concentrations were on average approximately 3 times higher at Davidson Pond, and approximately 1 order of magnitude greater at Rose's Pond, than at the Drainage Pond.
- Sodium concentrations were on average approximately 5 times higher at Davidson Pond, and approximately
 1 order of magnitude greater at Rose's Pond, than at the Drainage Pond.
- Potassium concentrations were on average approximately 2 times higher at Davidson Pond, and approximately 4 to 5 times higher at Rose's Pond, than at the Drainage Pond.
- Arsenic concentrations were slightly higher at Rose's Pond than at Davidson Pond and the Drainage Pond.



8.0 CONCLUSIONS

Water potentially infiltrating from the Drainage Pond may be considered a source of contamination for groundwater, particularly with respect to ammonia, which exceeded applicable standards on two occasions in 2016; however, as it has previously been assessed that evaporation from the Drainage Pond is inferred to account for most of the losses within the Drainage Pond (compared to infiltration) and exceedances noted at one pond(s) were not noted at the other pond(s), the water quality at Davidson Pond and Rose's Pond does not appear to be adversely impacted by water that may be migrating from the Drainage Pond.

Should the City of Kelowna wish to assess groundwater quality in the area of the ponds, consideration could be given to installing monitoring wells between the Drainage Pond and Rose's Pond and between the Drainage Pond and Davidson Pond.

The City of Kelowna should confirm that the quality of the water pumped from the Drainage Pond to the City of Vernon's sewage reclamation facility is acceptable, particularly with respect to ammonia and orthophosphate concentrations.

9.0 RECOMMENDATIONS FOR 2017

Golder proposes monthly monitoring at the Drainage Pond and at the neighbouring Davidson Pond and Rose's Pond between April and November (or, when the pond is not frozen) in 2017, as follows:

- Collecting and analyzing samples for potential septage contaminants including:
 - Phosphorous (ortho-phosphate), chloride, ammonia, nitrate, nitrite, and total kjeldahl nitrogen.
 - BOD and COD.
 - Metals (total and dissolved).
 - pH, total dissolved solids (TDS), total suspended solids (TSS) and hardness.
- The City of Kelowna should request that the laboratory use lower detection limits for total beryllium (i.e., <0.0001 mg/L).</p>
- Compile an annual report to the City of Kelowna with comparison of water sample results to applicable standards.
- Obtain evaporation pan readings and staff gauge measurement at the Drainage Pond. In order to have a meaningful interpretation of pond evaporation versus infiltration, it is recommended that these readings/measurements be taken over three 48-hour periods in 2017; once in the spring (i.e., May or June), once in the summer (i.e., July or August) and again in the fall (i.e., September or October). Consideration should be given to collecting this evaporation pan and water level data with pressure transducers to capture the small level changes.
- The field pH and temperature of the water samples should be measured with a properly-calibrated meter by City personnel during the collection of pond water samples, so that the suitability of the ammonia guidelines can be assessed. Often laboratory-measured pH can be slightly different than field pH, due to geochemical changes in the sample bottle during transport. The field pH and temperature will assist in the assessment of pond water quality and in determining the appropriate criteria to use in the comparison of analytical ammonia results.



Additionally, samples should be taken such that minimal to no suspended particles or disturbed sediment are collected in the sampling bottles, and that no surface matter (i.e., algae) is inadvertently collected. Field notes should be recorded during sampling events and reviewed in conjunction with the analytical water quality data.

10.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of the City of Kelowna. The findings, interpretations and conclusions are based solely on the Site conditions during the sampling events. The data presented in this report represent the leachate quality conditions at the sampling locations tested. Leachate conditions may vary with location, depth, sampling, methodology, analytical techniques and other factors.

Except where specifically stated to the contrary, the information contained in this report (including reports, information and data) was provided to Golder by others, and has not been independently verified or otherwise examined by Golder to determine its accuracy of completeness. Golder has relied in good faith on this information and does not accept responsibility of any deficiency, misstatements or inaccuracies contained in the report as a result of omissions, misinterpretation and/or fraudulent acts of the persons interviewed or contacted, or errors or omissions in the reviewed documentation.

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The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

If new information is discovered during future work, including excavations, borings or other studies, Golder should be requested to re-evaluate the conclusions presented in this report and to provide amendments as required.





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11.0 CLOSURE

We trust that this report provides the information you require at this time. Should you have any questions or require additional information, please do not hesitate to contact the undersigned.

Yours very truly,

GOLDER ASSOCIATES LTD.



Pana Athanasopoulos, MSc, PGeo Senior Hydrogeologist

PA/JF/jlj

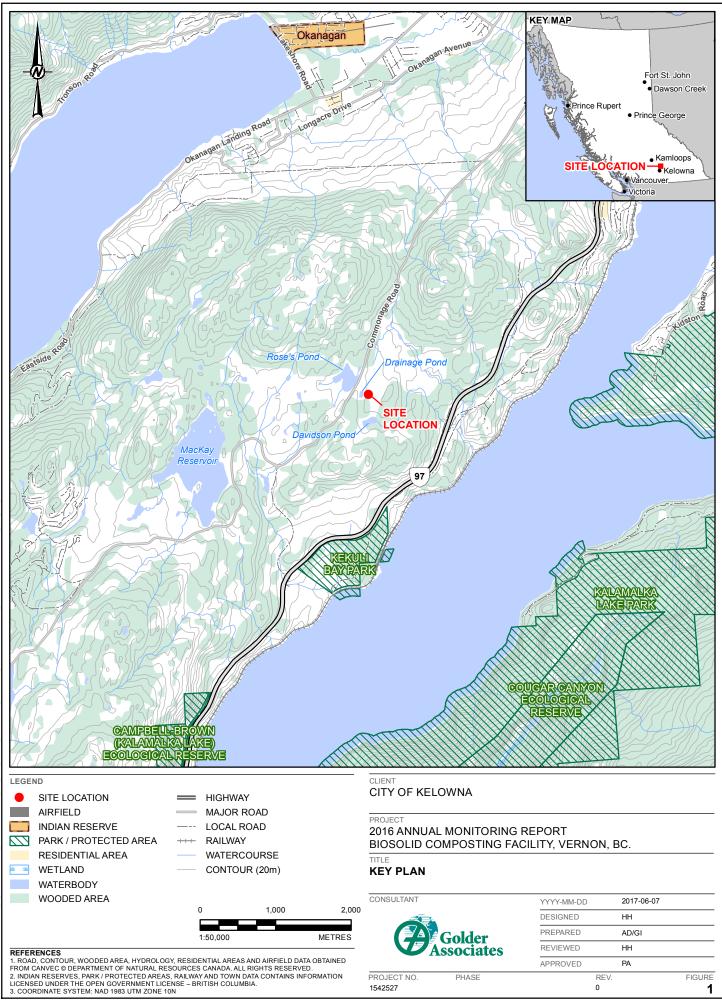


Jacqueline Foley, MSc, GeoL Associate, Senior Hydrogeologist

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PROJECT 2016 ANNUAL MONITORING REPORT BIOSOILD COMPOSTING FACILITY, VERNON, BC.

TITLE SITE PLAN

CONSULTANT

1542527



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Golder Associates PROJECT NO. PHASE

2017-06-07 YYYY-MM-DD DESIGNED ΗH PREPARED AD REVIEWED ΗH APPROVED PA REV. 0

2

Table 1: 2014 - 2016 Results of Water Analyses - Drainage Pond City of Kelowna-Vernon Biosolids Facility Commonage Road, Vernon, BC

Location													D	rainage Pond									
Laboratory ID	Aquatic Life		Drinking		L1440745-1	L1462088-1	L1502217-1	L1515479-1	L1532630-1	L1547862-3	L1625288-1	L1645255-1	L1656492-1	L1669705-1	L1684336-1	L1698669-1	L1742616-1	L1752610-1	L1763882-1	L1777367-1	L1794599-1	L1811981-1	L1832582-1
Date	CSR-AW ⁽¹⁾		Water		07-Apr-14	28-May-14	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	8-Mar-16	05-Apr-16	03-May-16	01-Jun-16	05-Jul-16	10-Aug-16	21-Sep-16
	(freshwater)	Notes	CSR-DW ⁽¹⁾	Notes		-	-						-	-				·	-			0	·
General Parameters	(inconnucci)	110100	OOK DI	110100																			
pH (laboratory)			7.57		9.13	8.15	9.21	8.25	8.50	8.11	9.44	8.12	8.67	8.22	8.19	7.57	7.82	8.19	9.11	8.17	8.03	8.19	8.24
conductivity (laboratory)			1.51		1460	949	922	977	928	918	883	1250	944	847	987	769	1670	1710	1050	992	919	961	962
total suspended solids (TSS)					43.9	4.6	46.9	9.2	320	7.4	37.8	31.0	27.6	34.0	16.0	52.4	21.5	32.1	22.4	552 7.5	24.8	5.0	<3.0
biochemical oxygen demand (5-day B	וחס				25.9	3.8	27.7	6.0	13.5	<2.0	13.1	41.1	13.2	13.1	6.1	15.5	12.8	13.6	7.3	3.7	10.8	<2.0	6.2
chemical oxygen demand	00)				118	59	155	92	93	57	10.1	430	92	88	102	195	158	86	60	37	102	55	75
hardness as CaCO3					576	247	233	246	242	217	239	260	232	199	227	157	575	592	305	247	225	234	222
Inorganics					010		200	2.0	2.2		200							002	000	2.17	220	201	
ammonia (total; as N)	1.31 - 18.4	pH/T			1.97	2.06	0.0990	5.76	2.79	1.35	0.0265	19.7	0.192	5.13	3.94	8.68	13.9	4.98	0.0232	1.55	1.84	0.965	2.33
nitrate (as N)	400	p.,,,	10	1	1.35	0.540	0.068	0.118	0.997	2.75	<0.010	<0.025	0.152	0.172	0.090	0.222	6.84	5.82	0.0202	0.521	0.408	0.533	0.336
nitrite (as N)	0.2 - 2	CI	3.2		0.127	0.032	0.034	0.094	0.085	0.077	<0.0020	< 0.0050	0.226	0.109	0.0160	0.678	0.513	0.229	0.0886	0.0606	0.159	0.127	0.211
total nitrogen	-		-	4	8.76	4.31	7.02	8.56	7.43	5.54	4.68	36.6	5.02	9.70	7.75	17.5	25.1	15.6	2.98	3.66	3.38	3.26	4.71
chloride	1500		250		105	98.7	104	102	97.2	97.4	96	117	102	85.6	102	64.1	112	129	105	98.7	102	99.2	99.4
ortho-phosphate (dissolved; as P)		-		-	0.455	1.42	1.84	2.02	1.02	0.683	0.450	4.92	1.03	2.68	1.60	3.99	2.98	1.19	0.464	0.968	2.01	1.21	1.36
Total Kjeldahl Nitrogen					-	-	-	-	-	-	-	-	-	-	-	-	-	9.06	2.39	3.08	2.81	2.77	4.16
Microbiological Analyses																							
total coliforms (mpn/100mL)					236	3650	10500	242000	38700	5790	12000	92100	1180	>241960	41100	>241960	37200	1780	100	>24196	64900	>241960	1660
Escherichia coli (mpn/100mL)					1	107	4	14100	980	62	7	13000	12	19900	2420	19900	2000	30	<10	70	411	130000	<10
Total Metals				-	0.074	0.005	0.000	0.000	0.400	0.004	0.000												
aluminum	0.0		9.5		0.074	0.065	0.038	0.069	0.130 <0.00050	0.021	0.068	0.198	0.066	0.258	0.166	0.705	0.225	0.182	0.066	0.116	0.080	0.088	0.116
antimony	0.2		0.006		<0.00050 0.0019	<0.00050 0.0012	<0.00050 0.0016	<0.00050 0.0017	<0.00050 0.0014	<0.00050 <0.0010	<0.00050 0.0013	< 0.00050	< 0.00050	<0.00050	< 0.00050	<0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	<0.00050	< 0.00050
arsenic barium	10		1		0.0019	0.0012	0.0010	0.030	0.023	<0.0010	0.0013	0.0050 0.036	0.0013 0.023	0.0022 0.034	0.0016 0.030	0.0029 0.050	0.0033 0.048	0.0019 0.039	0.0013 0.027	0.0011 0.029	0.0023 0.027	0.0011 0.033	0.00136 0.034
beryllium	0.053			J	< 0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.020	<0.0050	<0.0050	<0.023	< 0.034	<0.030	<0.0050	<0.048	<0.0050	<0.027	<0.029	< 0.027	<0.0050	<0.034
bismuth	0.000				<0.20	<0.20	<0.20	-	-	-	-	<0.20	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
boron	50		5	1	0.14	0.16	0.17	0.20	0.17	0.17	0.17	0.21	0.16	0.16	0.17	0.14	0.13	0.14	0.15	0.16	0.17	0.14	0.16
cadmium	0.0001 - > 0.0006	н	0.005		<0.000050	<0.000050	0.000087	<0.000050	<0.000050	<0.000050	<0.000050	0.000467	<0.000050	0.000095	0.000063	0.000272	0.000146	0.000071	<0.000050	<0.000050	<0.000050	<0.000050	0.0000468
calcium					117	58.1	55.5	64.3	55.3	50.9	57.0	62.6	55.0	48.9	54.7	41.5	123	122	65.5	58.9	54.4	54.5	53.1
chromium	0.010 ^{VI} , 0.090 ^{III}	V	0.05	-	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00098	<0.00050	0.00066	<0.00050	0.00168	0.00104	0.00090	<0.00050	<0.00050	<0.00050	0.00177	<0.0010
cobalt	0.04				0.00064	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00081	<0.00050	<0.00050	<0.00050	0.00074	0.00076	0.00076	<0.00050	<0.00050	<0.00050	<0.00050	0.00042
copper	0.020 - 0.090	н	1		0.0056	0.0061	0.0090	0.0066	0.0051	0.0071	0.0045	0.0531	0.0051	0.0148	0.0092	0.0373	0.0234	0.0118	0.0039	0.0036	0.0070	0.0047	0.0117
iron		· · · ·	6.5		0.205	0.154	0.094	0.162	0.238	0.057	0.142	0.384	0.114	0.272	0.238	0.893	0.472	0.409	0.130	0.225	0.179	0.141	0.206
lead	0.040 - 0.160	н	0.01		<0.0010	<0.0010	< 0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0034	<0.0010	0.0013	<0.0010	0.0031	<0.0010	<0.0010	< 0.0010	<0.0010	< 0.0010	< 0.0010	< 0.00050
lithium			0.73	S	<0.050 64.8	<0.050 25.2	<0.050	<0.050 27.0	<0.050 23.8	<0.050 21.9	<0.050 23.6	<0.050	< 0.050	<0.050	<0.050	< 0.050	< 0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.0107
magnesium manganese			100 0.55		0.221	0.143	0.087	0.159	0.122	<0.010	0.123	25.2 0.193	22.1 0.104	19.8 0.140	22.3 0.130	16.1 0.276	66.1 0.265	68.6 0.208	30.4 0.109	23.8 0.158	22.1 0.124	21.2 0.126	22.0 0.147
manganese mercury	0.001		0.001		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.104	<0.00020	<0.00020	<0.276	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0000050
molybdenum	10		0.25		0.0057	0.0066	0.0075	0.0065	0.0048	0.0043	0.0057	0.0069	0.0053	0.0057	0.0060	0.0042	0.0067	0.0056	0.0052	0.0045	0.0055	0.0045	0.0044
nickel	0.250 - 1.5	н			<0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0025
phosphorus		-			1.35	1.67	2.52		-	-	-	6.10	-	-	1.90	5.73	3.85	1.88	0.93	1.20	2.99	1.53	1.66
potassium				_	24.4	21.0	28.4	-	-	-	-	72.7	-	-	24.7	27.2	33.3	26.7	19.9	22.0	25.5	19.9	22.1
selenium	0.01		0.01		0.0025	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0042	0.0035	<0.0010	<0.0010	<0.0010	<0.0010	0.000534
silicon	0.0005	·			5.41	3.61	2.84	-	-	-	-	4.47	-	-	4.28	4.16	5.98	5.81	3.56	3.54	3.75	3.46	3.96
silver	0.0005 - 0.015	н	000	1	0.000051	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000279	<0.000050	0.000111	0.000098	0.000215	0.000093	<0.000050	<0.000050	< 0.000050	<0.000050	< 0.000050	0.000063
sodium			200		125 1.18	104 0.583	105 0.535	116	95.4	101	93.1	106	98.2	90.0	93.9	73.3	131	146	110	103	99.8	101	108
strontium thallium	0.003		22	S	<0.00020	<0.00020	<0.00020	- <0.00020	- <0.00020	- <0.00020	<0.00020	0.566	-	-	0.545	0.359	1.16	1.23 <0.00020	0.642 <0.00020	0.566 <0.00020	0.549 <0.00020	0.527 <0.00020	0.558 <0.00020
titanium	1				<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020 <0.050	<0.00020 <0.050	<0.00020 <0.050	<0.00020 <0.050	<0.00020 <0.050	<0.00020 <0.050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
tin			22	s	<0.030	<0.030	<0.030	-	-		-	< 0.030	<0.050	<0.050	< 0.030	<0.030	<0.030	< 0.030	< 0.030	<0.030	< 0.030	<0.030	<0.00050
uranium	3		0.02		0.00444	0.00197	0.00209	0.00180	0.00178	0.00100	0.00223	0.00250	0.00202	0.00214	0.00241	0.00116	0.00615	0.00592	0.00265	0.00204	0.00224	0.00210	0.00193
vanadium				3	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	<0.030	< 0.030	<0.030	< 0.030	< 0.030	< 0.030	< 0.030	<0.030	<0.030	< 0.030	< 0.030	0.00126
zinc	0.075 - > 2.4	н	5	1	0.0267	0.0266	0.0282	0.0180	0.0238	0.0385	0.0196	0.0866	0.0198	0.0310	0.0188	0.0822	0.0715	0.0539	0.0240	0.0229	0.0191	0.0237	0.0284
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Table 1: 2014 - 2016 Results of Water Analyses - Drainage Pond City of Kelowna-Vernon Biosolids Facility Commonage Road, Vernon, BC

Location													D	rainage Pond									
Laboratory ID	Aquatic Life		Drinking		L1440745-1	L1462088-1	L1502217-1	L1515479-1	L1532630-1	L1547862-3	L1625288-1	L1645255-1	L1656492-1	L1669705-1	L1684336-1	L1698669-1	L1742616-1	L1752610-1	L1763882-1	L1777367-1	L1794599-1	L1811981-1	L1832582-1
Date	CSR-AW ⁽¹⁾		Water		07-Apr-14	28-May-14	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	8-Mar-16	05-Apr-16	03-May-16	01-Jun-16	05-Jul-16	10-Aug-16	21-Sep-16
	(freshwater)	Notes	CSR-DW ⁽¹⁾	Notes																			
Dissolved Metals	· · · · · · · · ·	-																					-
aluminum		_	9.5		0.036	0.013	0.014	0.017	0.021	0.072	0.017	0.067	0.018	0.063	0.033	0.104	0.045	0.025	0.015	0.013	0.030	0.010	0.0185
antimony	0.2		0.006		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	< 0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
arsenic	0.05		0.01		0.0016	0.0012	0.0015	0.0016	0.0013	<0.0010	0.0011	0.0046	0.0012	0.0020	0.0016	0.0026	0.0031	0.0018	0.0012	0.0010	0.0021	0.0012	0.00114
barium	10		1		<0.020	<0.020	<0.020	0.023	<0.020	<0.020	<0.020	0.028	0.020	<0.020	0.024	<0.020	0.032	0.032	0.026	0.026	0.020	0.033	0.030
beryllium	0.053			-	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010
bismuth	-				<0.20	<0.20	<0.20	-	-	-	-	<0.20	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
boron	50		5		0.14	0.16	0.17	0.17	0.18	0.16	0.17	0.20	0.16	0.16	0.17	0.13	0.13	0.14	0.15	0.16	0.16	0.16	0.17
cadmium	0.0001 - > 0.0006	Н	0.005		<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000154	<0.000050	<0.000050	<0.000050	0.000126	0.000088	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.0000229
calcium					121	57.5	54.7	58.3	56.6	50.0	56.8	62.4	55.7	47.5	54.9	37.9	120	123	70.2	59.7	53.8	57.2	53.9
chromium	0.010 ^{VI} , 0.090 ^{III}	V	0.05		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	0.00064	< 0.00050	0.00066	<0.00050	<0.00050	<0.00050	0.00064	0.00058	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010
cobalt	0.04		8		0.00055	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	< 0.00050	0.00064	<0.00050	<0.00050	< 0.00050	<0.00050	0.00067	0.00069	<0.00050	<0.00050	< 0.00050	<0.00050	0.00032
copper	0.020 - 0.090	н	1		0.0025	0.0036	0.0059	0.0037	0.0025	0.0096	0.0030	0.0219	0.0030	0.0065	0.0045	0.0174	0.0147	0.0057	0.0024	0.0021	0.0048	0.0031	0.0036
iron			6.5		< 0.030	0.056	<0.030	0.046	<0.030	0.174	< 0.030	0.210	< 0.030	0.034	0.041	0.177	0.162	0.064	< 0.030	0.053	0.072	0.037	0.043
lead	0.040 - 0.160	н	0.01		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0015	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	< 0.00050
lithium			0.73	S	< 0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	< 0.050	<0.050	< 0.050	< 0.050	< 0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.0095
magnesium			100		66.4	25.1	23.3	24.4	24.4	21.7	23.6	25.2	22.4	19.4	21.9	15.2	66.8	69.0	31.4	23.9	22.1	22.1	21.2
manganese			0.55		0.026	0.062	0.010	<0.010	<0.010	0.074	<0.010	0.023	<0.010	<0.010	<0.010	0.128	0.144	0.102	<0.010	0.139	0.050	0.102	0.0596
mercury	0.001		0.001		<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.000025
molybdenum	10		0.25		0.0060	0.0065	0.0072	0.0065	0.0049	0.0050	0.0057	0.0063	0.0053	0.0056	0.0057	0.0041	0.0065	0.0056	0.0049	0.0041	0.0052	0.0042	0.0040
nickel	0.250 - 1.5	н			<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	< 0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.0016
phosphorus					0.81	1.51	1.42	-	-	-	-	5.32	-	-	1.74	4.37	3.31	1.34	0.64	1.15	2.58	1.48	1.49
potassium					24.6	20.9	28.6	-	-	-	-	76.4	-	-	24.3	25.6	31.3	24.9	21.1	21.7	25.4	20.5	20.3
selenium	0.01		0.01		0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0039	0.0034	<0.0010	<0.0010	<0.0010	<0.0010	0.000507
silicon		•		S	5.44	3.43	2.87	-	-	-	-	3.63	-	-	4.08	3.30	5.50	5.73	3.61	3.35	3.62	3.45	3.71
silver	0.0005 - 0.015	н			<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	0.000071	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000020
sodium			200		126	103	107	106	98.2	99.2	93.9	110	100	86.9	94.8	71.2	125	148	118	103	99.5	105	101
strontium			22	S	1.16	0.578	0.522	-	-	-	-	0.557	-	-	0.546	0.316	1.10	1.27	0.682	0.568	0.542	0.549	0.539
thallium	0.003				<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.000014	<0.00020	<0.00020	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.00020
tin		•	22	S	<0.030	<0.030	<0.030	-	-	-	-	<0.030	-	-	<0.030	<0.030	< 0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.00050
titanium	1			-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.010
uranium	3		0.02		0.00478	0.00195	0.00197	0.00182	0.00179	-	0.00217	0.00246	0.00208	0.00198	0.00233	0.00079	0.00602	0.00606	0.00185	0.00173	0.00210	0.00194	0.00173
vanadium		•		-	<0.030	<0.030	<0.030	<0.030	<0.030	0.00122	<0.030	<0.030	< 0.030	<0.030	<0.030	<0.030	< 0.030	<0.030	<0.030	<0.030	<0.030	<0.030	0.00097
zinc	0.075 - > 2.4	н	5		0.0118	0.0254	0.0146	0.0134	0.0169	<0.030	0.0072	0.0508	0.0144	0.0137	0.0119	0.0448	0.0549	0.0423	0.0194	0.0248	0.0181	0.0238	0.0212
Notes:	-	-	-		-						-						-						

All concentrations in milligrams per litre (mg/L), unless otherwise noted. (1) Standards from the Contaminated Sites Regulation (CSR), updated to July 2016.

Land Use abbreviations: AW (Aquatic Life); and DW (Drinking Water). H = standard is Hardness dependent; pH = standard is pH dependent; CI = standard is chloride dependent; S = refer to CSR Schedule 10; V = standard is valence dependent, VI=chromium VI and III=chromium III; T = standard varies with temperature (10 deg C assumed for ammonia criteria).

19.7

indicates parameter concentration exceeds applicable CSR AW or DW standards

Table 2: 2014 - 2016 Results of Water Analyses at Davidson Pond and Rose's Pond City of Kelowna-Vernon Biosolids Facility, Commonage Road, Vernon, BC

Location					1							Da	vidson Pond								
SCN	Aquatic Life	Drinking	BC Water Quality		L1502217-2	L1515479-2	L1532630-2	L1547862-2	L1625288-2	L1645255-2	L1656492-2	L1669705-2	L1684336-2	L1698669-2	L1742616-2	L1752610-2	L1763882-2	L1777367-2	L1794599-2	L1811981-2	L1832582-2
Date	CSR-AW	ຍິ Water ຍິ	Aquatic Life	tes	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	8-Mar-16	5-Apr-16	3-May-16	1-Jun-16	5-Jul-16	10-Aug-16	21-Sep-16
	(freshwater)	^o Z CSR-DW ^o Z	(freshwater)	° Z																	
Parameters				_																	ļ
pH (laboratory)			<u>6.5 - 9.0</u>		8.68	8.77	8.49	8.31	8.70	8.67	8.71	8.64	8.46	8.35	8.75	8.73	8.81	8.66	8.77	8.82	8.62
conductivity (laboratory)					3140	3110	3160	3210	2870	3250	3350	3230	3500	3480	2480	2980	3100	3250	3140	3470	3550
total suspended solids (TSS)					<3.0	6.6	8.9	19.0	5.5	4.6	3.0	10.2	23.3	16.3	12.8	<3.0	3.4	<3.0	6.0	3.4	<3.0
biochemical oxygen demand (5-day BOD)					<2.0	<2.0	<2.0	<2.0	<2.0	2.9	<2.0	<2.0	4.9	4.1	5.7	<2.0	<2.0	<2.0	<2.0	<2.0	2.1
chemical oxygen demand (COD)					56 532	63 526	70 531	90	64 539	64	63	58	79	63	1050	57	56	61	58	101	75
hardness as CaCO3					532	520	531	545	539	527	525	544	549	564	461	533	566	561	540	563	565
Inorganics	1.31 - 18.4		0.424 4.04*	pH/T	0.0176	0.0235	0.203	0.957	0.0142	0.0149	0.0114	0.119	0.166	0.583	0.0111	0.0283	0.0238	0.0208	0.0143	0.0455	0.0278
ammonia (total; as N) nitrate (as N)	400	10	<u>0.131 - 1.84*</u> <u>3.0*</u>	pm/ i	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.119	<0.100	0.79	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
nitrite (as N)	0.2 - 2	CI 3.2	0.02 - 0.20	CI	<0.020	<0.020	<0.020	0.050	<0.020	<0.10	<0.020	<0.020	<0.020	0.79	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
total nitrogen					1.60	467	1.82	2.79	1.60	1.69	1.71	1.90	2.47	2.62	1.69	1.70	1.55	2.49	1.72	1.81	1.72
chloride	1500	250	<u>150⁺, 600*</u>		310	311	327	319	303	329	326	322	311	340	254	296	304	312	307	336	347
ortho-phosphate (dissolved; as P)			0.005 to 0.015	see note 1	0.011	0.0022	0.0085	0.0883	<0.0010	<0.0010	<0.0010	<0.0010	0.0027	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0010	<0.0010
Total Kjeldahl Nitrogen					-	-	-	-	-	-	-	-	-	-	-	1.66	1.54	2.49	1.72	1.73	1.72
Microbiological Analyses					1																
total coliforms (mpn/100mL)					173000	13000	2910	411	11200	92100	24200	1730	1530	248	88	71	365	387	>2419.6	>241960	488000
Escherichia coli (mpn/100mL)					261	61	17	2	3	17	3	6	22	12	48	6	1	<1	<1	21	2720
Total Metals			0.5		<0.010	0.166	0.038	0.053	0.027												
aluminum antimony	0.2	9.5 0.006	0.009	ssolved Metals	<0.00050	<0.00050	<0.00050	<0.00050	< 0.00050	< 0.010	< 0.010	0.012	0.122	0.034	0.056	0.0107	< 0.0060	0.0063	<0.0060	0.0435	< 0.015
arsenic	0.05	0.00	0.005	vv	0.0031	0.0034	0.0035	0.0032	0.0032	<0.00050 0.0028	<0.00050 0.0028	<0.00050 0.0036	0.00052 0.0046	<0.00050 0.0038	<0.00050 0.0026	<0.00050 0.00312	<0.00050 0.00298	<0.00050 0.00317	<0.00050 0.00358	<0.00050 0.00347	<0.00050 0.00358
barium	10	1	1	W	<0.020	<0.020	<0.020	<0.020	< 0.020	<0.0028	<0.028	<0.0036	<0.0046	<0.0038	<0.0026	0.00312	<0.00298	<0.00317	<0.020	<0.00347	<0.00358
beryllium	0.053		0.00013	Ŵ	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.020 <0.0050	<0.020 <0.0050	<0.020 <0.0050	<0.020 <0.0050	<0.020 <0.0050	<0.020 <0.0050	<0.020	<0.020 <0.0010	<0.020 <0.0010	<0.020 <0.0010	<0.020 <0.0010	<0.020 <0.0010
bismuth	0.033		0.00013	vv	<0.20	-	-	-	-	<0.20	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
boron	50	5	1.2		<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
cadmium	0.0001 - > 0.0006	H 0.005		solved Metals	<0.00010	<0.00010	<0.00010	<0.00010	< 0.000050	< 0.000050	<0.000050	<0.000050	<0.000050	<0.000050	< 0.000050	< 0.000010	< 0.000010	< 0.000010	<0.000010	< 0.000010	<0.000025
calcium					59.9	62.2	61.7	61.0	64.6	58.2	57.0	58.7	61.5	60.5	61.7	67.5	66.4	64.1	59.9	54.9	52.4
chromium	0.010 ^{vi} , 0.090 ^m	V 0.05	0.001 ^{VI} , 0.0089 ^{III}	W	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cobalt	0.04		0.004		<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00030	<0.00030	<0.00030	< 0.00030	<0.00050
copper	0.020 - 0.090	H 1	calculation	Н	< 0.0010	0.0013	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0025	0.0017	<0.0010	<0.0010	0.0012	0.0010	<0.0010	<0.0010	<0.0025
iron		6.5	<u>1*</u>		< 0.030	0.083	0.069	0.111	0.043	<0.030	<0.030	<0.030	0.153	0.053	0.094	<0.030	<0.030	<0.030	<0.030	0.054	<0.030
lead	0.040 - 0.160	H 0.01	calculation	Н	<0.0010 <0.050	<0.0010 <0.050	<0.0010	<0.0010 <0.050	<0.0010 <0.050	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	<0.00050	< 0.00050	< 0.00050	<0.00050	< 0.00050	< 0.00050
lithium		0.73 S			<0.050 91.6	<0.050 93.9	<0.050 99.1	<0.050 97.2	<0.050 88.5	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.0392	0.0402	0.0423	0.0474	0.0495	0.0501
magnesium manganese		0.55	calculation	н	0.029	0.032	99.1 0.125	97.2 0.103	0.032	88.3 0.022	96.7 0.012	98.7 0.129	101 0.161	98.9 0.158	75.9 0.111	91.1 0.0340	89.8 0.0405	93.1 0.0415	97.7 0.0110	104 0.0149	110 0.0841
manganese mercury	0.001	0.001		11	<0.00020	<0.00020	<0.00020	<0.00020	< 0.00020	0.022 <0.00020	<0.0020	<0.00020	<0.00020	<0.00020	<0.00020	0.0340 <0.0000050	0.0405 <0.0000050	<0.0000050	<0.0000050	<0.0000050	0.0841
molybdenum	10	0.25	<1		< 0.0010	< 0.0010	0.0010	< 0.0010	< 0.0010	<0.00020	<0.00020	<0.00020	0.00020	<0.00020	<0.00020	0.0000050	0.0000050	<0.0000050	<0.0000030	0.0000050	<0.000089
nickel	0.250 - 1.5	н	0.15	H ≥ 180 mg/L CaCO3; W	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	<0.0050	<0.0010	<0.0013	< 0.0050	<0.0010	0.0016	0.0019	0.0014	0.0017	0.0021	<0.0010
phosphorus			0.005 to 0.015	see note 1	<0.30	-	-	-	-	< 0.30	-	-	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
potassium					41.7	-	-	-	-	40.9	-	-	46.6	43.6	32.6	39.2	37.7	40.4	41.1	44.5	46.2
selenium	0.01	0.01	0.002	see note 2	<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00020	0.00011	<0.00010	<0.00010	0.00016	<0.00025
silicon					2.24	-	-	-	-	3.80	-	-	4.69	1.76	1.25	0.461	0.340	1.05	1.46	1.61	1.63
silver	0.0005 - 0.015	H ACC	<u>0.0015</u>	H > 100 mg/L	< 0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000020	<0.000020	<0.000020	<0.000020	<0.000020	<0.000050
sodium		200 S			539 0.664	540	561	529	446	514	542	567	537 0.707	546	397	494	487	481	520	561	596
strontium thallium	0.003		0.0008	W	< 0.00020	- <0.00020	- <0.00020	- <0.00020	- <0.00020	0.690 <0.00020	- <0.00020	- <0.00020	0.797 <0.00020	0.775 <0.00020	0.648 <0.0020	0.773 <0.00020	0.779 <0.00020	0.783 <0.00020	0.832 <0.00020	0.772 <0.00020	0.784 <0.00020
titanium	0.003		0.0000	v v	< 0.050	<0.050	<0.050	<0.050	< 0.050	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.0020	<0.00020	0.0020	<0.00020	<0.00020	<0.00020	<0.00020
tin	· · · · · ·	22 S			<0.030	-	-	-	-	< 0.030	-0.000	-0.000	<0.030	< 0.030	< 0.030	< 0.00050	< 0.0012	<0.00050	<0.00050	<0.00050	<0.00050
uranium	3	0.02	0.0085	W	0.00396	0.00415	0.00462	0.00527	0.00564	0.00505	0.00492	0.00498	0.00640	0.00585	0.00516	0.00590	0.00611	0.00540	0.00583	0.00623	0.00481
vanadium					<0.030	<0.060	<0.030	<0.030	<0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.0010	<0.0010	< 0.0010	<0.0010	< 0.0010	< 0.0025
zinc	0.075 - > 2.4	Н 5	calculation	H; H > 90 mg/L	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0050
									8												

Lo	cation							T							Da	vidson Pond								
	SCN	Aquatic Life		Drinking		BC Water Quality		L1502217-2	L1515479-2	L1532630-2	L1547862-2	L1625288-2	L1645255-2	L1656492-2	L1669705-2	L1684336-2	L1698669-2	L1742616-2	L1752610-2	L1763882-2	L1777367-2	L1794599-2	L1811981-2	L1832582-2
	Date	ĊSR-AW	fes	Water	tes	Aquatic Life	es	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	8-Mar-16	5-Apr-16	3-May-16	1-Jun-16	5-Jul-16	10-Aug-16	21-Sep-16
		(freshwater)	Ŷ	CSR-DW	^o N	(freshwater)	Ô	, in the second s						•									•	
Dissolved Metals		· · ·																						-
aluminum				9.5		<u>0.05 (dis)</u>	pH >6.5	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
antimony		0.2		0.006				<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	< 0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
arsenic		0.05		0.01				0.0031	0.0031	0.0028	0.0031	0.0032	0.0029	0.0028	0.0032	0.0039	0.0037	0.0024	0.00289	0.00328	0.00333	0.00316	0.00340	0.00338
barium		10		1				<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
beryllium		0.053						<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
bismuth					_			<0.20	-	-	-	-	<0.20	-	-	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
boron		50		5				<0.10	<0.20	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
cadmium		0.0001 - > 0.0006	н	0.005		calculation (dis)	Н	<0.00010	<0.00010	<0.00010	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010	<0.000010
calcium			-		_			60.0	60.5	58.7	60.1	65.9	60.4	55.1	58.2	60.0	60.9	61.0	66.9	70.6	66.5	58.3	54.2	53.6
chromium		0.010", 0.090"	V	0.05				< 0.0010	< 0.0010	< 0.0010	< 0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cobalt		0.04						< 0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030	<0.00030
copper		0.020 - 0.090	н	1		0.051 (11)	Н	<0.0010 <0.030	<0.0010 <0.060	<0.0010 <0.030	<0.0010 <0.030	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	< 0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
iron			.	6.5		<u>0.35* (dis)</u>		<0.0010	<0.000	<0.030	<0.030	< 0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
lead		0.040 - 0.160	н	0.01				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010 <0.050	<0.0010	< 0.0010	< 0.0010	<0.0010	< 0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
lithium				0.73	5			92.8	91.1	93.3	95.9	90.9	<0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.0386	0.0427	0.0444	0.0453	0.0467	0.0434
magnesium manganese				0.55	-			<0.010	<0.010	0.094	0.089	<0.010	91.4	94.1	96.7	97.0	100 <0.010	75.0	89.0 0.00123	94.6	95.8 0.0302	95.8 0.00362	104	105 0.0273
0		0.001	7	0.001	-			<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	0.011	<0.010	<0.010	<0.010		< 0.010	<0.000123	0.0343		<0.00362	0.00863	<0.000050
mercury molybdenum		10	-	0.001				< 0.0010	< 0.00020	< 0.0010	< 0.00020	< 0.0010	<0.00020 <0.0010	< 0.00020	<0.00020 <0.0010	<0.00020 0.0012	<0.00020 <0.0010	<0.00020 <0.0010	<0.0000050 <0.0010	<0.0000050 0.0011	<0.0000050 <0.0010	<0.000050	<0.0000050 <0.0010	<0.0000050 <0.0010
nickel		0.250 - 1.5	н	0.23				< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0010	<0.0010 <0.0050	<0.0010	<0.0012	<0.0010	<0.0010	<0.0010 0.0017	0.0011	0.0010	<0.0010 0.0016	0.0021	0.0010
phosphorus	-	0.230 - 1.3	_ ''					< 0.30	-	-	-	-	<0.0000	<0.0050	<0.0050	<0.0000	<0.30	<0.0000	<0.30	< 0.30	<0.30	<0.30	<0.30	<0.30
potassium								41.3	-	-	-	-	42.8	-	-	44.3	43.2	31.6	35.9	39.1	40.4	40.1	43.3	43.9
selenium		0.01		0.01				<0.0020	<0.0020	<0.0020	<0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	< 0.0010	< 0.0010	0.00019	0.00012	0.00012	0.00012	<0.00010	0.00016
silicon	-							2.22	-	-	-	-	3.93	-	-	4.28	1.40	0.437	0.417	0.261	1.06	1.40	1.50	1.51
silver		0.0005 - 0.015	н					< 0.000050	<0.000050	<0.000050	<0.000050	<0.000050	< 0.000050	<0.000050	<0.000050	< 0.000050	< 0.000050	< 0.000050	<0.000020	0.000025	< 0.000020	< 0.000020	< 0.000020	<0.000020
sodium				200	S			536	524	532	531	449	537	530	561	524	546	392	464	510	488	506	551	560
strontium				22				0.660	-	-	-	-	0.717	-	-	0.775	0.775	0.636	0.730	0.820	0.803	0.808	0.764	0.761
thallium		0.003						<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.000020	<0.00020	<0.00020	<0.000050	<0.000020	<0.000020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
tin		1						<0.030	-	-	-	-	<0.030	-	-	<0.030	<0.030	< 0.030	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
titanium			_	22	S			<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	< 0.050	<0.010	0.013	<0.010	<0.010	<0.010	<0.010
uranium		3		0.02				0.00374	0.00421	0.00427	0.00516	0.00593	0.00534	0.00499	0.00485	0.00641	0.00572	0.00516	0.00588	0.00627	0.00537	0.00538	0.00553	0.00526
vanadium			_					<0.030	<0.060	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	< 0.030	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
zinc		0.075 - > 2.4	Н	5				<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050

Notes:

All concentrations in milligrams per litre (mg/L), unless otherwise noted.

Standards from the Contaminated Sites Regulation (CSR), updated July 2016. Land Use abbreviations: AW (Aquatic Life); and DW (Drinking Water).

BCWQG = British Columbia Approved (updated January 2017) and Working (updated January 2017) Water Quality Guidelines. Approved WQG provided, unless otherwise noted (as W: Working WQG).

H = standard is Hardness dependent; pH = standard is pH dependent; CI = standard is chloride dependent; S = refer to CSR Schedule 10; V = standard is valence dependent, VI=chromium VI and III=chromium III; T = standard varies with temperature (10 deg C assumed for ammonia criteria). Note 1: the guidelines provided for ortho-phosphate are the BCWQG for total phosphorus (as P), and are applicable for lakes where salmonids are the predominant

fish species. Guidelines are for reference only, and may not be applicable to Davidson Pond or Rose's Pond. + = long-term average BCWQG AW guideline; * = short-term maximum BCWQG AW guideline. Long-term average BCWQG provided, unless otherwise noted.

(dis) = BCWQG AW guideline is for dissolved concentration.

Calculation = of W guideline for this dissolved concentration. calculation = indicates that a calculation is required to determine BCWQG. No exceedences were identified for those parameters where BCWQG was calculated. Note 2: the guideline of 0.001 mg/L is an alert concentration; the guideline of 0.002 mg/L is the BCWQG.

310 indicates parameter concentration exceeds applicable CSR AW or DW standards

<u>0.957</u> 340 indcates parameter concentration exceeds applicable BCWQG guideline

indicates parameter concentration exceeds applicable CSR DW standard and long-term average BCWQG guideline

645 indicates parameter concentration exceeds applicable CSR DW standard and short-term maximum BCWQG guideline

<0.0050 indicates that the reported detection limit is greater than the applicable criteria

Location					I								Rose's Pond								
SCN	Aquatic Life	Drinking	BC Water Quality	1	L1502217-3	L1515479-3	L1532630-3	L1547862-1	L1625288-3	L1645255-3	L1656492-3	L1669705-3	L1684336-3	L1698669-3	L1742616-3	L1752610-3	L1763882-3	L1777367-3	L1794599-3	L1811981-3	L1832582-3
Date	CSR-AW	e Water	Aquatic Life	otes	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	08-Mar-16	05-Apr-16	03-May-16	01-Jun-16	05-Jul-16	10-Aug-16	21-Sep-16
	(freshwater)	^o CSR-DW	ĕ (freshwater)	ž																	
Parameters																					I
pH (laboratory)			<u>6.5 - 9.0</u>		8.94	8.86	8.75	8.58	8.80	8.71	8.88	8.85	8.82	8.55	8.47	8.60	8.62	8.57	8.72	8.76	8.56
conductivity (laboratory)					7350	7310	7270	7350	6030	6860	7240	6990	7520	7400	5490	5790	5940	6350	6050	6800	7030
total suspended solids (TSS)					10.2 <2.0	9.4 <2.0	27.3	17.3	9.5	8.0	6.7	<3.0	6.9	9.4	10.4	7.6	5.8	5.5	4.6	3.8	4.8
biochemical oxygen demand (5-day BOD)					<2.0 70	<2.0	<2.0 83	2.2 91	<2.0	<2.0 75	<2.0	<2.0	<2.0 78	<2.0 69	4.9 58	2.0 66	<2.0 56	<2.0 61	<2.0 59	<2.0 69	<2.0 76
chemical oxygen demand (COD) hardness as CaCO3					1790	1780	1830	1840	1550	1680	1690	1750	1650	1700	1310	1410	1440	1460	1440	1570	1620
Inorganics					1750	1700	1000	1040	1550	1000	1090	1750	1030	1700	1010	1410	1440	1400	1440	1370	1020
ammonia (total; as N)	1.31 - 18.4	nH/T	0 131 - 1 84+	pH/T	0.0188	0.0231	0.0181	0.0132	0.0131	0.0266	0.0089	0.0194	0.0167	0.0441	0.0117	0.0129	0.0321	0.0210	0.0184	0.0520	0.0237
nitrate (as N)	400	10	<u>0.131 - 1.84</u> ⁺ <u>3.0⁺</u>	prof	0.28	<0.25	<0.25	<0.25	<0.25	<0.25	0.31	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
nitrite (as N)	0.2 - 2	CI 3.2	0.02 - 0.20	CI	<0.050	<0.050	< 0.050	< 0.050	< 0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	< 0.050	<0.050	< 0.050	< 0.050	< 0.050	<0.050
total nitrogen					1.79	1.91	1.77	2.04	1.70	1.72	1.67	1.74	1.85	1.99	1.67	1.78	1.55	1.54	1.64	1.66	1.55
chloride	1500	250	<u>150⁺, 600*</u>		549	584	645	634	532	578	530	573	613	596	468	482	479	515	533	632	537
ortho-phosphate (dissolved; as P)			0.005 to 0.015	see note 1	0.010	0.0013	<0.0010	0.0011	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010	0.0023	< 0.0010	0.0011	< 0.0010	< 0.0010	0.0020	<0.0010
Total Kjeldahl Nitrogen			0.000 10 0.010		-	-	-	-	-	-0.0010	-0.0010	-0.0010	-		-	1.74	1.53	1.54	1.64	1.61	1.55
Microbiological Analyses																					
total coliforms (mpn/100mL)					43500	29900	1960	57	24200	41100	19900	7270	236	225	65	205	387	921	>2419.6	<1	2480
Escherichia coli (mpn/100mL)					7	<1	1	<1	6	82	16	52	5	<1	3	43	42	11	326	<1	<10
Total Metals																					
aluminum		9.5	See Dis	ssolved Metals	<0.015	0.029	<0.015	<0.030	0.021	0.016	<0.015	<0.015	<0.015	0.080	0.022	0.030	<0.015	<0.015	0.021	0.024	0.015
antimony	0.2	0.006	0.009	W	0.00071	0.00086	0.00082	<0.0010	0.00066	0.00074	0.00070	0.00079	0.00085	0.00074	0.00059	0.00060	0.00071	0.00054	0.00063	0.00060	0.00063
arsenic	0.05	0.01	0.005		<u>0.0058</u>	0.0063	<u>0.0067</u>	<u>0.0058</u>	<u>0.0068</u>	0.0060	0.0056	0.0061	0.0062	0.0058	0.0045	0.00405	0.00475	0.00441	<u>0.00519</u>	<u>0.00501</u>	0.00525
barium	10	1	<u>1</u>	W	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
beryllium	0.053		<u>0.00013</u>	W	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
bismuth					< 0.40	-	-	-	-	<0.40	-	-	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<0.40
boron	50	5	<u>1.2</u>		<0.20	< 0.20	< 0.20	< 0.20	0.10	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.20	<0.10	<0.10	<0.10	<0.20	<0.20
cadmium	0.0001 - > 0.0006	H 0.005	See Dis	ssolved Metals	<0.00025	< 0.00025	<0.00025	< 0.00050	< 0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	< 0.000050	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	< 0.000025
calcium					36.9	48.7	41.5	44.4	57.2	53.3	46.1	47.6	47.2	47.8	65.4	71.6	70.9	62.2	59.1	52.8	52.5
chromium	0.010 ^v , 0.090 ^m	V 0.05	<u>0.001^{VI}, 0.0089^{III}</u>	W	< 0.0025	< 0.0025	<0.0025	<0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cobalt	0.04		0.004		<0.00050	<0.00050 <0.0025	<0.00050	<0.0010 <0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	< 0.00050	< 0.00050	<0.00050	< 0.00050	< 0.00050	< 0.00050	< 0.00050
copper	0.020 - 0.090	H 1	calculation	Н	<0.0025 <0.060	< 0.0025	<0.0025 <0.060	< 0.0050	<0.0025 <0.030	< 0.0025	< 0.0025	<0.0025	< 0.0025	<0.0025	< 0.0025	< 0.0025	< 0.0025	<0.0025	<0.0025	<0.0025	< 0.0025
iron lead	0.040 - 0.160	6.5 H 0.01	<u>1*</u>	н	< 0.000	<0.000	<0.000	<0.000	<0.0010	< 0.060	<0.060	< 0.060	< 0.060	0.130	0.039 <0.0010	<0.060 <0.00050	<0.030 <0.00050	<0.030 <0.00050	<0.030 <0.00050	<0.060 <0.00050	<0.060 <0.00050
lithium	0.040 - 0.160	0.73	calculation	п	0.073	0.078	0.076	0.076	0.063	<0.0010 0.066	<0.0010 0.068	<0.0010 0.073	<0.0010 0.073	<0.0010 0.073	<0.0010 0.054	<0.00050	<0.00050 0.0592	<0.00050 0.0601	<0.00050 0.0647	<0.00050	<0.00050 0.0752
magnesium		100	3		393	403	422	419	336	0.066 377	389	0.073 392	0.073 393	0.073 384	0.054 280	0.0540 306	0.0592 308	0.0601 300	0.0647 314	0.0622 354	0.0752 370
magnesiam		0.55	calculation	н	0.030	0.043	0.015	< 0.010	0.036	0.096	0.012	0.035	0.026	0.063	0.201	0.113	0.0511	0.0312	0.0355	0.0356	0.0426
mercury	0.001	0.001	<u></u>		<0.00020	< 0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	< 0.00020	<0.00020	<0.00020	<0.0000050	<0.0000050	< 0.0000050	<0.0000050	<0.0000050	<0.0000050
molybdenum	10	0.25	<1		< 0.0010	0.0012	< 0.0010	0.0012	0.0013	0.0012	0.0012	0.0011	0.00020	<0.00020	0.0016	0.0017	0.0019	0.0014	0.0014	0.0011	<0.0010
nickel	0.250 - 1.5	н	0.15	H ≥ 180 mg/L CaCO3; W	< 0.0050	< 0.0050	<0.0050	<0.0050	< 0.0050	< 0.0050	< 0.0050	<0.0050	< 0.0050	<0.0050	< 0.0050	< 0.0025	< 0.0025	<0.0025	<0.0025	0.0026	<0.0025
phosphorus			0.005 to 0.015	see note 1	<0.60	-	-	-	-	<0.60	-	-	< 0.60	<0.60	< 0.30	< 0.60	< 0.30	< 0.30	< 0.30	< 0.60	< 0.60
potassium					119	-	-	-	-	108	-	-	118	115	84.6	89.9	91.6	83.8	92.7	103	105
selenium	0.01	0.01	0.002	see note 2	<0.0050	<0.0050	<0.0050	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00051	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
silicon					0.24	-	-	-	-	0.32	-	-	0.12	0.26	1.49	0.15	0.253	0.129	0.348	0.38	0.43
silver	0.0005 - 0.015	н	<u>0.0015</u>	H > 100 mg/L	<0.000050	<0.000050	<0.000050	<0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
sodium		200	S		1200	1240	1230	1290	942	1080	1150	1200	1200	1170	847	935	969	935	991	1050	1090
strontium		22			0.293	-	-	-	-	0.485	-	-	0.410	0.434	0.620	0.711	0.693	0.600	0.580	0.480	0.483
thallium	0.003		<u>0.0008</u>	W	<0.00050	< 0.00050	<0.00050	<0.0010	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
titanium	1		_		< 0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.030	<0.020	0.013	<0.010	<0.010	<0.020	<0.020
tin .		22	S		< 0.060	-	-	0.00404	-	<0.060	-	-	<0.060	<0.060	<.050	<0.00050	<0.00050	< 0.00050	< 0.00050	<0.00050	<0.00050
uranium	3	0.02	<u>0.0085</u>	W	0.00403	0.00462	0.00461	0.00481	0.00486	0.00485	0.00459	0.00452	0.00495	0.00456	0.00466	0.00514	0.00574	0.00486	0.00518	0.00483	0.00434
vanadium					< 0.060	< 0.060	< 0.060	< 0.060	< 0.030	<0.060	<0.060	<0.060	<0.060	<0.060	<0.030	< 0.0025	<0.0025	<0.0025	<0.0025	<0.0025	< 0.0025
zinc	0.075 - > 2.4	H 5	calculation	H; H > 90 mg/L	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.010	<0.010

Location														Rose's Pond								
SCN	Aquatic Life	Drinking		BC Water Quality		L1502217-3	L1515479-3	L1532630-3	L1547862-1	L1625288-3	L1645255-3	L1656492-3	L1669705-3	L1684336-3	L1698669-3	L1742616-3	L1752610-3	L1763882-3	L1777367-3	L1794599-3	L1811981-3	L1832582-3
Date	CSR-AW	မ္ခ် Water	tes	Aquatic Life	tes	13-Aug-14	09-Sep-14	14-Oct-14	17-Nov-14	10-Jun-15	20-Jul-15	11-Aug-15	7-Sep-15	6-Oct-15	4-Nov-15	08-Mar-16	05-Apr-16	03-May-16	01-Jun-16	05-Jul-16	10-Aug-16	21-Sep-16
	(freshwater)	^O Z CSR-DW	Ň	(freshwater)	Ž																	
Dissolved Metals																						
aluminum		9.5		<u>0.05[*] (dis)</u>	pH >6.5	<0.015	<0.015	<0.015	<0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0050	<0.0050	<0.0050	0.0086	0.0073
antimony	0.2	0.006				0.00070	0.00078	0.00075	<0.0010	0.00070	0.00074	0.00072	0.00075	0.00077	0.00075	0.00053	0.00052	0.00062	0.00051	0.00057	0.00062	0.00066
arsenic	0.05	0.01				0.0057	0.0058	0.0063	0.0062	0.0068	0.0056	0.0055	0.0060	0.0060	0.0057	0.0046	0.00416	0.00463	0.00442	0.00502	0.00523	0.00521
barium	10	1				<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
beryllium	0.053		-			<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
bismuth			_			<0.40	-	-	-	-	<0.40	-	-	<0.40	<0.40	<0.20	<0.40	<0.20	<0.20	<0.20	<0.40	<0.40
boron	50	5				<0.20	<0.20	<0.20	<0.20	0.12	<0.20	<0.20	<0.20	<0.20	<0.20	<0.10	<0.20	<0.10	<0.10	0.11	<0.20	<0.20
cadmium	0.0001 - > 0.0006	H 0.005		calculation (dis)	Н	<0.00025	<0.00025	<0.00025	<0.00050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025	<0.000025
calcium						37.5	47.0	41.9	43.0	58.2	53.7	45.6	45.9	44.6	47.7	65.6	70.6	72.5	65.9	59.0	51.8	51.1
chromium	0.010 ^{**} , 0.090 ^{***}	V 0.05				<0.0025	<0.0025	<0.0025	<0.0050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
cobalt	0.04	-				<0.00050	<0.00050	<0.00050	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
copper	0.020 - 0.090	H 1			Н	<0.0025	<0.0025	<0.0025	<0.0050	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.0012	<0.0010
iron		6.5		<u>0.35* (dis)</u>		<0.060	<0.060	<0.060	<0.060	<0.030	<0.060	<0.060	<0.060	<0.060	<0.060	<0.030	<0.060	<0.030	<0.030	<0.030	<0.060	<0.060
lead	0.040 - 0.160	H 0.01				<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050	<0.00050
lithium		0.73	S			0.072	0.076	0.076	0.077	0.062	0.066	0.064	0.072	0.071	0.072	0.052	0.0530	0.0614	0.0615	0.0625	0.0648	0.0645
magnesium		100				411	403	418	419	342	376	382	398	372	383	278	300	307	315	314	349	362
manganese		0.55				0.027	<0.010	< 0.010	0.021	<0.010	0.079	<0.010	<0.010	<0.010	<0.010	0.168	0.0464	0.0373	0.00671	0.0208	0.00583	0.0257
mercury	0.001	0.001				<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.000050	<0.0000050	<0.000050	<0.000050	<0.000050	<0.0000050
molybdenum	10	0.25				<0.0010	0.0011	<0.0010	0.0012	0.0014	0.0014	0.0011	<0.0010	0.0011	0.0011	0.0011	0.0014	0.0018	0.0014	0.0014	0.0012	<0.0010
nickel	0.250 - 1.5	н				<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0025	<0.0025	<0.0025	<0.0025	0.0028	<0.0025
phosphorus						< 0.60	-	-	-	-	<0.60	-	-	<0.60	<0.60	< 0.30	<0.60	<0.30	<0.30	<0.30	<0.60	<0.60
potassium						122	-	-	-	-	107	-	-	110	114	83.0	85.9	92.7	86.7	92.9	99.4	108
selenium	0.01	0.01				< 0.0050	<0.0050	<0.0050	<0.010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.00033	<0.00025	<0.00025	<0.00025	<0.00025	<0.00025
silicon						0.25	-	-	-	-	0.33	-	-	<0.10	<0.10	1.41	<0.10	0.248	0.104	0.301	0.34	0.39
silver	0.0005 - 0.015	Н				<0.000050	<0.000050	<0.000050	< 0.00010	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050	<0.000050
sodium		200	s			1220	1200	1240	1250	950	1070	1120	1150	1130	1170	841	908	983	968	990	1020	1140
strontium		22				0.301 <0.00050	- <0.00050	- <0.00050	- <0.0010	-	0.487	-	-	0.388	0.429	0.615	0.691	0.707	0.623	0.578	0.469	0.521
thallium	0.003						×0.00050	<0.00050	<0.0010	<0.00020	< 0.000050	<0.00020	<0.00020	< 0.000050	<0.000050	< 0.00050	<0.00020	< 0.00020	<0.00020	<0.00020	<0.00020	< 0.00020
tin Aita a isaan	1					<0.060 <0.050	- <0.050	- <0.050	- <0.050	- <0.050	<0.060	-	-	<0.060	<0.060	< 0.030	< 0.00050	<0.00050	< 0.00050	< 0.00050	<0.00050	< 0.00050
titanium		22	S			<0.050 0.00426	<0.050 0.00443	<0.050 0.00445	<0.050 0.00478	<0.050 0.00512	<0.050	<0.050	<0.050	<0.050	<0.050	< 0.050	< 0.020	0.012	< 0.010	< 0.010	< 0.020	< 0.020
uranium	3	0.02									0.00478	0.00468	0.00438	0.00479	0.00455	0.00472	0.00510	0.00586	0.00483	0.00505	0.00490	0.00436
vanadium						< 0.060	<0.060	<0.060	< 0.060	< 0.030	<0.060	<0.060	<0.060	<0.060	<0.060	<0.030	<0.0025	< 0.0025	<0.0025	< 0.0025	< 0.0025	< 0.0025
zinc	0.075 - > 2.4	H 5				<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.010	<0.010	<0.010	<0.010	<0.0050	<0.010	<0.0050	<0.0050	<0.0050	<0.010	<0.010

Notes:

All concentrations in milligrams per litre (mg/L), unless otherwise noted.

Standards from the Contaminated Sites Regulation (CSR), updated July 2016. Land Use abbreviations: AW (Aquatic Life); and DW (Drinking Water).

BCWQG = British Columbia Approved (updated January 2017) and Working (updated January 2017) Water Quality Guidelines. Approved WQG provided, unless otherwise noted (as W: Working WQG). H = standard is Hardness dependent; pH = standard is pH dependent; CI = standard is chloride dependent; S = refer to CSR Schedule 10; V = standard is valence

About the standard is hardness dependent, or standard is proceeded in the standard is dependent, or standard is control to the standard is dependent, or standard is control to the standard is dependent. The standard is dependent, or standard is depende

(dis) = BCWQG AW guideline is for dissolved concentration.

Calculation = indicates that a calculation is required to determine BCWQG. No exceedences were identified for those parameters where BCWQG was calculated. Note 2: the guideline of 0.001 mg/L is an alert concentration; the guideline of 0.002 mg/L is the BCWQG.

310 indicates parameter concentration exceeds applicable CSR AW or DW standards

<u>0.957</u> 340 indcates parameter concentration exceeds applicable BCWQG guideline

indicates parameter concentration exceeds applicable CSR DW standard and long-term average BCWQG guideline

645 indicates parameter concentration exceeds applicable CSR DW standard and short-term maximum BCWQG guideline

<0.0050 indicates that the reported detection limit is greater than the applicable criteria



APPENDIX A

ALS Laboratory Certificates of Analysis (2016)





CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5 Date Received: 09-MAR-16 Report Date: 16-MAR-16 16:15 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1742616 Project P.O. #: 520747 Job Reference: 1186-202 EX-B C of C Numbers: Legal Site Desc:

Dean Watt, B.Sc. Account Manager

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L1742616 CONTD.... PAGE 2 of 7 16-MAR-16 16:15 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1742616-1 Surface water 08-MAR-16 11:05 COMMONAGE DRAINAGE POND	L1742616-2 Surface water 08-MAR-16 12:10 DAVIDSON POND	L1742616-3 Surface water 08-MAR-16 12:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	1670	2480	5490	
	Hardness (as CaCO3) (mg/L)	575	461	1310	
	рН (рН)	7.82	8.75	8.47	
	Total Suspended Solids (mg/L)	21.5	12.8	10.4	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	13.9	0.0111	0.0117	
	Chloride (Cl) (mg/L)	112	254 DLDS	468 DLDS	
	Nitrate (as N) (mg/L)	6.84	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.513	<0.020	<0.050	
	Total Nitrogen (mg/L)	25.1	1.69	1.67	
	Orthophosphate-Dissolved (as P) (mg/L)	2.98	<0.0010	0.0023	
Bacteriological Tests	E. coli (MPN/100mL)	2000	48	3	
	Coliform Bacteria - Total (MPN/100mL)	37200	88	65	
Total Metals	Aluminum (Al)-Total (mg/L)	0.225	0.056	0.022	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00059	
	Arsenic (As)-Total (mg/L)	0.0033	0.0026	0.0045	
	Barium (Ba)-Total (mg/L)	0.048	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0050	<0.0050	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Total (mg/L)	0.13	<0.10	<0.10	
	Cadmium (Cd)-Total (mg/L)	0.000146	<0.000050	<0.000050	
	Calcium (Ca)-Total (mg/L)	123	61.7	65.4	
	Chromium (Cr)-Total (mg/L)	0.00104	<0.00050	<0.00050	
	Cobalt (Co)-Total (mg/L)	0.00076	<0.00050	<0.00050	
	Copper (Cu)-Total (mg/L)	0.0234	<0.0010	<0.0025	
	Iron (Fe)-Total (mg/L)	0.472	0.094	0.039	
	Lead (Pb)-Total (mg/L)	<0.0010	<0.0010	<0.0010	
	Lithium (Li)-Total (mg/L)	<0.050	<0.050	0.054	
	Magnesium (Mg)-Total (mg/L)	66.1	75.9	280	
	Manganese (Mn)-Total (mg/L)	0.265	0.111	0.201	
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Molybdenum (Mo)-Total (mg/L)	0.0067	<0.0010	0.0016	
	Nickel (Ni)-Total (mg/L)	<0.0050	<0.0050	<0.0050	
	Phosphorus (P)-Total (mg/L)	3.85	<0.30	<0.30	
	Potassium (K)-Total (mg/L)	33.3	32.6	84.6	
	Selenium (Se)-Total (mg/L)	0.0042	<0.0010	<0.0010	
	Silicon (Si)-Total (mg/L)	5.98	1.25	1.49	

L1742616 CONTD.... PAGE 3 of 7 16-MAR-16 16:15 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1742616-1 Surface water 08-MAR-16 11:05 COMMONAGE DRAINAGE POND	L1742616-2 Surface water 08-MAR-16 12:10 DAVIDSON POND	L1742616-3 Surface water 08-MAR-16 12:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Total Metals	Silver (Ag)-Total (mg/L)	0.000093	<0.000050	<0.000050	
	Sodium (Na)-Total (mg/L)	131	397	847	
	Strontium (Sr)-Total (mg/L)	1.16	0.648	0.620	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.030	<0.030	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.050	<0.050	
	Uranium (U)-Total (mg/L)	0.00615	0.00516	0.00466	
	Vanadium (V)-Total (mg/L)	< 0.030	< 0.030	<0.030	
	Zinc (Zn)-Total (mg/L)	0.0715	<0.0050	<0.0050	
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	
	Dissolved Metals Filtration Location	LAB	LAB	LAB	
	Aluminum (AI)-Dissolved (mg/L)	0.045	<0.010	<0.010	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00053	
	Arsenic (As)-Dissolved (mg/L)	0.0031	0.0024	0.0046	
	Barium (Ba)-Dissolved (mg/L)	0.032	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	0.13	<0.10	<0.10	
	Cadmium (Cd)-Dissolved (mg/L)	0.000088	<0.000050	<0.000050	
	Calcium (Ca)-Dissolved (mg/L)	120	61.0	65.6	
	Chromium (Cr)-Dissolved (mg/L)	0.00058	<0.00050	<0.00050	
	Cobalt (Co)-Dissolved (mg/L)	0.00067	<0.00050	<0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0147	<0.0010	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	0.162	<0.030	<0.030	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	
	Lithium (Li)-Dissolved (mg/L)	<0.050	<0.050	0.052	
	Magnesium (Mg)-Dissolved (mg/L)	66.8	75.0	278	
	Manganese (Mn)-Dissolved (mg/L)	0.144	<0.010	0.168	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0065	<0.0010	0.0011	
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050	
	Phosphorus (P)-Dissolved (mg/L)	3.31	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	31.3	31.6	83.0	
	Selenium (Se)-Dissolved (mg/L)	0.0039	<0.0010	<0.0010	
	Silicon (Si)-Dissolved (mg/L)	5.50	0.437	1.41	
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000050	<0.000050	
	Sodium (Na)-Dissolved (mg/L)	125	392	841	

L1742616 CONTD.... PAGE 4 of 7 16-MAR-16 16:15 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1742616-1 Surface water 08-MAR-16 11:05 COMMONAGE DRAINAGE POND	L1742616-2 Surface water 08-MAR-16 12:10 DAVIDSON POND	L1742616-3 Surface water 08-MAR-16 12:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Strontium (Sr)-Dissolved (mg/L)	1.10	0.636	0.615	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.000020	<0.000050	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.030	<0.030	
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.050	<0.050	
	Uranium (U)-Dissolved (mg/L)	0.00602	0.00516	0.00472	
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.030	<0.030	
	Zinc (Zn)-Dissolved (mg/L)	0.0549	<0.0050	<0.0050	
Aggregate	BOD (mg/L)	12.8	5.7	4.9	
Organics	COD (mg/L)	158	1050	58	

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCI preservative. Results may be biased low.
WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCI preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Cadmium (Cd)-Total	DLA	L1742616-1, -2, -3
Duplicate	Chromium (Cr)-Total	DLA	L1742616-1, -2, -3
Duplicate	Cobalt (Co)-Total	DLA	L1742616-1, -2, -3
Duplicate	Copper (Cu)-Total	DLA	L1742616-1, -2, -3
Duplicate	Lead (Pb)-Total	DLA	L1742616-1, -2, -3
Duplicate	Nickel (Ni)-Total	DLA	L1742616-1, -2, -3
Duplicate	Selenium (Se)-Total	DLA	L1742616-1, -2, -3
Duplicate	Silver (Ag)-Total	DLA	L1742616-1, -2, -3
Duplicate	Thallium (TI)-Total	DLA	L1742616-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1742616-1, -2, -3
Duplicate	Nitrate (as N)	DLDS	L1742616-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1742616-1, -2, -3
Duplicate	Nitrate (as N)	DLDS	L1742616-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1742616-1, -2, -3
Certified Reference Material	Conductivity	LCS-H	L1742616-3
Matrix Spike	Calcium (Ca)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L1742616-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1742616-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1742616-1, -2, -3
Matrix Spike	Ammonia, Total (as N)	MS-B	L1742616-1

Qualifiers for Invividual Parameters Listed: Qualifier Description DLA Detection Limit adjusted for required dilution DLS Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity. LCS-H Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified. MS-B Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

This analysis is carried out usin oxygen demand (BOD) are dete	g procedures ad	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
oxygen demand (BOD) are dete		depted from ADUA Method 5210 P "Piechamies	
	ved BOD (SOLL	ing and incubating a sample for a specified time p	I Oxygen Demand (BOD)". All forms of biochemical period, and measuring the oxygen depletion using a gh a glass fibre filter prior to dilution. Carbonaceous ation.
BOD5-VA Wa	ater Bioch	emical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) are dete dissolved oxygen meter. Dissolv	ermined by diluti ved BOD (SOLL	ing and incubating a sample for a specified time p	I Oxygen Demand (BOD)". All forms of biochemical period, and measuring the oxygen depletion using a gh a glass fibre filter prior to dilution. Carbonaceous ation.
CL-IC-N-VA Wa	ater Chlori	ide in Water by IC	EPA 300.1 (mod)

COD-COL-VA Water Chemical Oxygen Demand by Colorimetric APHA 5220 D. CHEMICAL OXYGEN DEMAND This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method. EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto, Conduc, This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode. **ECOLI-COLI-ENV-VA** Water E.coli by Colilert APHA METHOD 9223 This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. HARDNESS-CALC-VA Water Hardness APHA 2340B Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation. Dissolved Hg in Water by CVAFS LOR=50ppt APHA 3030B/EPA 1631E (mod) **HG-DIS-CVAFS-VA** Water This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). **HG-TOT-CVAFS-VA** Water Total Hg in Water by CVAFS LOR=50ppt EPA 1631E (mod) This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). APHA 3030B/6020A (mod) Water Dissolved Metals in Water by CRC ICPMS **MET-D-CCMS-VA** Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-DIS-ICP-VA** Water **Dissolved Metals in Water by ICPOES** EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). **MET-T-CCMS-VA** Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-TOT-ICP-VA** Total Metals in Water by ICPOES EPA SW-846 3005A/6010B Water This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). N-T-COL-VA Water Total Nitrogen in water by Colour APHA Method 4500-P (J) / NEMI 5735 This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735. NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA) This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al. NH3-F-VA Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC Water This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et

NO2-L-IC-N-VA

aL

EPA 300.1 (mod)

Inorganic anions are analyze	d by Ion Cl	hromatography with conductivity and/or UV detection.	
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyze	d by Ion Cl	hromatography with conductivity and/or UV detection.	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out us electrode	sing proce	dures adapted from APHA Method 4500-H "pH Value'	'. The pH is determined in the laboratory using a pH
It is recommended that this a	inalysis be	conducted in the field.	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out us electrode	sing proce	dures adapted from APHA Method 4500-H "pH Value'	'. The pH is determined in the laboratory using a pH
It is recommended that this a	nalysis be	conducted in the field.	
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
		dures adapted from APHA Method 4500-P "Phosphor been lab or field filtered through a 0.45 micron membra	
TCOLI-COLI-ENV-VA	Water	Total coliform by Colilert	APHA METHOD 9223
determined simultaneously. T	The sample and then th	dures adapted from APHA Method 9223 "Enzyme Sub e is mixed with a mixture hydrolyzable substrates and ne number of wells exhibiting a positive response are bable number).	then sealed in a multi-well packet. The packet is
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
Solids (TSS) are determined	by filtering dissolved		
* ALS test methods may incorp	orate mod	ifications from specified reference methods to improv	e performance.
The last two letters of the above	/e test cod	e(s) indicate the laboratory that performed analytical a	analysis for that test. Refer to the list below:
Laboratory Definition Code	Labora	ntory Location	
VA	ALS EN	VIRONMENTAL - VANCOUVER, BRITISH COLUME	BIA, CANADA
Chain of Custody Numbers:			

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. mg/kg - milligrams per kilogram based on dry weight of sample. mg/kg wwt - milligrams per kilogram based on wet weight of sample. mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample. mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878 www.alsglobal.com

COC #

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	Commonage Draina	ge Pond			08-Mar-16	11:05	Surface Water	X	X	X	X	Х	Х	Х	Χ	X	X	X	Xe
	Davidson Pond			··	08-Mar-16	12:10	Surface Water	X	X	x	X	X	Х	X	X	Х	X	X	Xe
	Rose's Pond			···	08-Mar-16	12:20	Surface Water	X	X	X	Х	Х	Х	Х	Х	X	X	X	XE
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CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5

Date Received: 06-APR-16 Report Date: 13-APR-16 17:59 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1752610 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

520747 1186-202 POND

Dean Watt, B.Sc. Account Manager

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L1752610 CONTD.... PAGE 2 of 7 13-APR-16 17:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1752610-1 SURFACE WATE 05-APR-16 11:15 COMMONAGE DRAINAGE POND	L1752610-2 SURFACE WATE 05-APR-16 09:00 DAVIDSON POND	L1752610-3 SURFACE WATE 05-APR-16 11:30 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	1710	2980	5790	
	Hardness (as CaCO3) (mg/L)	592	533	1410	
	рН (рН)	8.19	8.73	8.60	
	Total Suspended Solids (mg/L)	32.1	<3.0	7.6	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	4.98	0.0283	0.0129	
	Chloride (Cl) (mg/L)	129	296	482	
	Nitrate (as N) (mg/L)	5.82	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.229	<0.020	old states = 0.050	
	Total Kjeldahl Nitrogen (mg/L)	9.06	1.66	1.74	
	Total Nitrogen (mg/L)	15.6	1.70	1.78	
	Orthophosphate-Dissolved (as P) (mg/L)	1.19	<0.0010	<0.0010	
Bacteriological Tests	E. coli (MPN/100mL)	30	6	43	
	Coliform Bacteria - Total (MPN/100mL)	1780	71	205	
Total Metals	Aluminum (Al)-Total (mg/L)	0.182	0.0107	0.030	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00060	
	Arsenic (As)-Total (mg/L)	0.0019	0.00312	0.00405	
	Barium (Ba)-Total (mg/L)	0.039	0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.40	
	Boron (B)-Total (mg/L)	0.14	<0.10	<0.20	
	Cadmium (Cd)-Total (mg/L)	0.000071	<0.000010	<0.000025	
	Calcium (Ca)-Total (mg/L)	122	67.5	71.6	
	Chromium (Cr)-Total (mg/L)	0.00090	<0.0010	<0.0010 _{DLA}	
	Cobalt (Co)-Total (mg/L)	0.00076	<0.00030	<0.00050 DLA	
	Copper (Cu)-Total (mg/L)	0.0118	<0.0010	<0.0025	
	Iron (Fe)-Total (mg/L)	0.409	<0.030	<0.060	
	Lead (Pb)-Total (mg/L)	<0.0010	<0.00050	<0.00050	
	Lithium (Li)-Total (mg/L)	<0.050	0.0392	0.0540	
	Magnesium (Mg)-Total (mg/L)	68.6	91.1	306	
	Manganese (Mn)-Total (mg/L)	0.208	0.0340	0.113	
	Mercury (Hg)-Total (mg/L)	<0.00020	<0.000050	<0.0000050	
	Molybdenum (Mo)-Total (mg/L)	0.0056	0.0011	0.0017 DLA	
	Nickel (Ni)-Total (mg/L)	<0.0050	0.0016	<0.0025	
	Phosphorus (P)-Total (mg/L)	1.88	<0.30	<0.60	
	Potassium (K)-Total (mg/L)	26.7	39.2	89.9	
	Selenium (Se)-Total (mg/L)	0.0035	0.00020	0.00051	

L1752610 CONTD.... PAGE 3 of 7 13-APR-16 17:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1752610-1 SURFACE WATE 05-APR-16 11:15 COMMONAGE DRAINAGE POND	L1752610-2 SURFACE WATE 05-APR-16 09:00 DAVIDSON POND	L1752610-3 SURFACE WATE 05-APR-16 11:30 ROSE'S POND	
Grouping	Analyte				
WATER					
Total Metals	Silicon (Si)-Total (mg/L)	5.81	0.461	0.15	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000020	DLA <0.000050	
	Sodium (Na)-Total (mg/L)	146	494	935	
	Strontium (Sr)-Total (mg/L)	1.23	0.773	0.711	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.010	DLHC <0.020	
	Uranium (U)-Total (mg/L)	0.00592	0.00590	0.00514	
	Vanadium (V)-Total (mg/L)	<0.030	DLA <0.0010	DLA <0.0025	
	Zinc (Zn)-Total (mg/L)	0.0539	<0.0050	DLHC <0.010	
Dissolved Metals	Dissolved Mercury Filtration Location	LAB	LAB	LAB	
	Dissolved Metals Filtration Location	LAB	LAB	LAB	
	Aluminum (AI)-Dissolved (mg/L)	0.025	<0.0050	<0.0050	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00052	
	Arsenic (As)-Dissolved (mg/L)	0.0018	0.00289	0.00416	
	Barium (Ba)-Dissolved (mg/L)	0.032	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	OLHC <0.40	
	Boron (B)-Dissolved (mg/L)	0.14	<0.10	OLHC <0.20	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	DLA <0.000010	DLA <0.000025	
	Calcium (Ca)-Dissolved (mg/L)	123	66.9	70.6	
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	0.00069	<0.00030	DLA <0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0057	<0.0010	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	0.064	<0.030	DLHC <0.060	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	<0.050	0.0386	0.0530	
	Magnesium (Mg)-Dissolved (mg/L)	69.0	89.0	300	
	Manganese (Mn)-Dissolved (mg/L)	0.102	0.00123	0.0464	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0056	<0.0010	0.0014	
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0017	DLA <0.0025	
	Phosphorus (P)-Dissolved (mg/L)	1.34	<0.30	OLHC <0.60	
	Potassium (K)-Dissolved (mg/L)	24.9	35.9	85.9	
	Selenium (Se)-Dissolved (mg/L)	0.0034	0.00019	0.00033	
	Silicon (Si)-Dissolved (mg/L)	5.73	0.417	OLHC <0.10	
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000020	DLA <0.000050	

L1752610 CONTD.... PAGE 4 of 7 13-APR-16 17:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1752610-1 SURFACE WATE 05-APR-16 11:15 COMMONAGE DRAINAGE POND	L1752610-2 SURFACE WATE 05-APR-16 09:00 DAVIDSON POND	L1752610-3 SURFACE WATE 05-APR-16 11:30 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	148	464	908	
	Strontium (Sr)-Dissolved (mg/L)	1.27	0.730	0.691	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.010	DLHC <0.020	
	Uranium (U)-Dissolved (mg/L)	0.00606	0.00588	0.00510	
	Vanadium (V)-Dissolved (mg/L)	<0.030	DLA <0.0010	<0.0025	
	Zinc (Zn)-Dissolved (mg/L)	0.0423	<0.0050	DLHC <0.010	
Aggregate	BOD (mg/L)	13.6	<2.0	2.0	
Organics	COD (mg/L)	86	57	66	

Qualifiers for Sample Submission Listed:

 Qualifier
 Description

 WSMD
 Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)	
Duplicate	Nitrite (as N)	DLDS	L1752610-1, -2, -3	
Duplicate	Nitrite (as N)	DLDS	L1752610-1, -2, -3	
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1752610-1, -2, -3	
Matrix Spike	Total Nitrogen	MS-B	L1752610-1, -2, -3	
Matrix Spike	Total Nitrogen	MS-B	L1752610-1, -2, -3	
Matrix Spike	Total Nitrogen	MS-B	L1752610-1, -2, -3	
Matrix Spike	Total Nitrogen	MS-B	L1752610-1, -2, -3	
Matrix Spike	Total Nitrogen	MS-B	L1752610-1, -2, -3	

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) a dissolved oxygen meter.	are determined Dissolved BO	by diluting and incubating a sample for a specified t	mical Oxygen Demand (BOD)". All forms of biochemical ime period, and measuring the oxygen depletion using a hrough a glass fibre filter prior to dilution. Carbonaceous ncubation.
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) a dissolved oxygen meter.	are determined Dissolved BO	by diluting and incubating a sample for a specified t	mical Oxygen Demand (BOD)". All forms of biochemical ime period, and measuring the oxygen depletion using a hrough a glass fibre filter prior to dilution. Carbonaceous neubation.
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are and	alyzed by Ion C	hromatography with conductivity and/or UV detection	n.
OD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried of determined using the clo			Oxygen Demand (COD)". Chemical oxygen demand is
C-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried of electrode.	out using proce	dures adapted from APHA Method 2510 "Conductivi	ty". Conductivity is determined using a conductivity
COLI-COLI-ENV-VA	Water	E.coli by Colilert	APHA METHOD 9223
determined simultaneou	sly. The sampl ours and then t	e is mixed with a mixture hydrolyzable substrates an he number of wells exhibiting a positive response an	ubstrate Coliform Test". E. coli and Total Coliform are d then sealed in a multi-well packet. The packet is e counted. The final result is obtained by comparing the
IARDNESS-CALC-VA	Water	Hardness	APHA 2340B
		ess) is calculated from the sum of Calcium and Magn incentrations are preferentially used for the hardness	esium concentrations, expressed in CaCO3 equivalents. calculation.
IG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filter with stannous chloride, a			d-oxidation using bromine monochloride prior to reduction
IG-DIS-CVAFS-VA	Water	Dissolved Hg in Water by CVAFS LOR=50ppt	APHA 3030B/EPA 1631E (mod)

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United

States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). **HG-T-CVAA-VA** Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod) Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS. **HG-TOT-CVAFS-VA** Water Total Hg in Water by CVAFS LOR=50ppt EPA 1631E (mod) This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod) Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-DIS-ICP-VA** Water Dissolved Metals in Water by ICPOES EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). Total Metals in Water by CRC ICPMS MET-T-CCMS-VA Water EPA 200.2/6020A (mod) Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. EPA SW-846 3005A/6010B **MET-TOT-ICP-VA** Water Total Metals in Water by ICPOES This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). N-T-COL-VA Water Total Nitrogen in water by Colour APHA Method 4500-P (J) / NEMI 5735 This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735. NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA) This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al. NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al EPA 300.1 (mod) NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H "pH Value" This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field. PH-PCT-VA Water pH by Meter (Automated) APHA 4500-H pH Value This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode

It is recommended that this analysis be conducted in the field.

PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried of	out using proc	edures adapted from APHA Method 4500-P "Phosp been lab or field filtered through a 0.45 micron me	, ohorus". Dissolved Orthophosphate is determined
TCOLI-COLI-ENV-VA	Water	Total coliform by Colilert	APHA METHOD 9223
determined simultaneou	isly. The samp ours and then	ble is mixed with a mixture hydrolyzable substrates a the number of wells exhibiting a positive response	Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is are counted. The final result is quantified by a statistical
TKN-F-VA	Water	TKN in Water by Fluorescence	APHA 4500-NORG D.
		edures adapted from APHA Method 4500-Norg D. ' gestion followed by Flow-injection analysis with fluor	Block Digestion and Flow Injection Analysis". Total Kjeldahl rescence detection.
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
Solids (TSS) are determ	ined by filterin high dissolve	g a sample through a glass fibre filter, TSS is deten ad solid content (i.e. seawaters, brackish waters) ma	Solids are determined gravimetrically. Total Suspended rmined by drying the filter at 104 degrees celsius. ay produce a positive bias by this method. Alternate analysis
** ALS test methods may in	ncorporate mo	difications from specified reference methods to imp	prove performance.
The last two letters of the	above test co	de(s) indicate the laboratory that performed analytic	cal analysis for that test. Refer to the list below:
Laboratory Definition Co	ode Labo	ratory Location	
VA	ALSE	ENVIRONMENTAL - VANCOUVER, BRITISH COLI	

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878 www.alsglobal.com

COC #

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	Commonage Drainage Pond				05-Apr-16	11:15	Surface Water	X	X	X	X	X	X	X	X	X	X	X	Х	5
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GENF 20.00 Front



CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5

Date Received: 04-MAY-16 Report Date: 12-MAY-16 17:05 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1763882 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

520747 1186-202 POND

Dean Watt, B.Sc. Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700 ALS CANADA LTD Part of the ALS Group A Campbell Brothers Limited Company

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L1763882 CONTD.... PAGE 2 of 7 12-MAY-16 17:05 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1763882-1 SURFACE WATE 03-MAY-16 12:05 COMMONAGE DRAINAGE POND	L1763882-2 SURFACE WATE 03-MAY-16 11:05 DAVIDSON POND	L1763882-3 SURFACE WATE 03-MAY-16 12:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	1050	3100	5940	
	Hardness (as CaCO3) (mg/L)	305	566	1440	
	рН (рН)	9.11	8.81	8.62	
	Total Suspended Solids (mg/L)	22.4	3.4	5.8	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.0232	0.0238	0.0321	
	Chloride (Cl) (mg/L)	105	304 DLDS	479	
	Nitrate (as N) (mg/L)	0.029	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.0886	<0.020	<0.050	
	Total Kjeldahl Nitrogen (mg/L)	2.39	1.54	1.53	
	Total Nitrogen (mg/L)	2.98	1.55	1.55	
	Orthophosphate-Dissolved (as P) (mg/L)	0.464	<0.0010	0.0011	
Bacteriological Tests	E. coli (MPN/100mL)	<10	1	42	
	Coliform Bacteria - Total (MPN/100mL)	100	365 DLA	387 DLA	
Total Metals	Aluminum (Al)-Total (mg/L)	0.066	<0.0060	<0.015	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00071	
	Arsenic (As)-Total (mg/L)	0.0013	0.00298	0.00475	
	Barium (Ba)-Total (mg/L)	0.027	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Total (mg/L)	0.15	<0.10 DLA	<0.10 _{DLA}	
	Cadmium (Cd)-Total (mg/L) Calcium (Ca)-Total (mg/L)	<0.000050	<0.000010	<0.000025	
		65.5	66.4	70.9	
	Chromium (Cr)-Total (mg/L) Cobalt (Co)-Total (mg/L)	<0.00050	<0.0010	<0.0010	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00030	<0.00050 DLA	
	Iron (Fe)-Total (mg/L)	0.0039	0.0012	<0.0025	
	Lead (Pb)-Total (mg/L)	0.130	< 0.030	<0.030	
	Lithium (Li)-Total (mg/L)	<0.0010	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	<0.050	0.0402	0.0592	
	Magnesium (Mg)-Total (Mg/L) Manganese (Mn)-Total (mg/L)	30.4	89.8	308	
	Manganese (Min)-Total (mg/L) Mercury (Hg)-Total (mg/L)	0.109	0.0405	0.0511	
	Molybdenum (Mo)-Total (mg/L)	<0.00020	<0.000050	<0.0000050	
	Nickel (Ni)-Total (mg/L)	0.0052	0.0017	0.0019	
	Phosphorus (P)-Total (mg/L)	<0.0050	0.0019	<0.0025	
	Potassium (K)-Total (mg/L)	0.93	<0.30	<0.30	
	Selenium (Se)-Total (mg/L)	19.9 <0.0010	37.7 0.00011	91.6 _{DLA} <0.00025	

L1763882 CONTD.... PAGE 3 of 7 12-MAY-16 17:05 (MT) Version: FINAL

	Sample ID	L1763882-1	L1763882-2	L1763882-3
	Description		SURFACE WATE	SURFACE WATE
	Sampled Date	03-MAY-16	03-MAY-16	03-MAY-16
	Sampled Time Client ID	12:05 COMMONAGE	11:05 DAVIDSON POND	12:20 ROSE'S POND
		DRAINAGE POND		
Grouping	Analyte			
WATER				
Total Metals	Silicon (Si)-Total (mg/L)	3.56	0.340	0.253
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000020	<0.000050
	Sodium (Na)-Total (mg/L)	110	487	969
	Strontium (Sr)-Total (mg/L)	0.642	0.779	0.693
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020
	Tin (Sn)-Total (mg/L)	<0.030	<0.00050	<0.00050
	Titanium (Ti)-Total (mg/L)	<0.050	0.012	0.013
	Uranium (U)-Total (mg/L)	0.00265	0.00611	0.00574
	Vanadium (V)-Total (mg/L)	<0.030	DLA <0.0010	ol.0025
	Zinc (Zn)-Total (mg/L)	0.0240	<0.0050	<0.0050
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD
	Aluminum (AI)-Dissolved (mg/L)	0.015	<0.0050	<0.0050
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00062
	Arsenic (As)-Dissolved (mg/L)	0.0012	0.00328	0.00463
	Barium (Ba)-Dissolved (mg/L)	0.026	<0.020	<0.020
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0010	<0.0010
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20
	Boron (B)-Dissolved (mg/L)	0.15	<0.10	<0.10
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	DLA <0.000010	DLA <0.000025
	Calcium (Ca)-Dissolved (mg/L)	70.2	70.6	72.5
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010
	Cobalt (Co)-Dissolved (mg/L)	<0.00050	<0.00030	DLA <0.00050
	Copper (Cu)-Dissolved (mg/L)	0.0024	<0.0010	<0.0010
	Iron (Fe)-Dissolved (mg/L)	<0.030	<0.030	<0.030
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00050
	Lithium (Li)-Dissolved (mg/L)	<0.050	0.0427	0.0614
	Magnesium (Mg)-Dissolved (mg/L)	31.4	94.6	307
	Manganese (Mn)-Dissolved (mg/L)	<0.010	0.0343	0.0373
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.0000050	<0.0000050
	Molybdenum (Mo)-Dissolved (mg/L)	0.0049	0.0011	0.0018
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0016	<0.0010 DLA <0.0025
	Phosphorus (P)-Dissolved (mg/L)	0.64	< 0.30	<0.30
	Potassium (K)-Dissolved (mg/L)	21.1	39.1	92.7
	Selenium (Se)-Dissolved (mg/L)	<0.0010	0.00012	0.00025
	Silicon (Si)-Dissolved (mg/L)	3.61	0.261	0.248
	Silver (Ag)-Dissolved (mg/L)	<0.000050		DLA
	(), ···································	<0.000000	0.000025	<0.000050

L1763882 CONTD.... PAGE 4 of 7 12-MAY-16 17:05 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1763882-1 SURFACE WATE 03-MAY-16 12:05 COMMONAGE DRAINAGE POND	L1763882-2 SURFACE WATE 03-MAY-16 11:05 DAVIDSON POND	L1763882-3 SURFACE WATE 03-MAY-16 12:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	110	E10	000	
	Strontium (Sr)-Dissolved (mg/L)	118 0.682	510 0.820	983 0.707	
	Thallium (TI)-Dissolved (mg/L)				
	Tin (Sn)-Dissolved (mg/L)	<0.000010	<0.00020	<0.00020	
	Titanium (Ti)-Dissolved (mg/L)	<0.030	<0.00050	<0.00050	
	Uranium (U)-Dissolved (mg/L)	<0.050	0.013	0.012	
	Vanadium (V)-Dissolved (mg/L)	0.00185	0.00627	0.00586	
	Zinc (Zn)-Dissolved (mg/L)	<0.030	<0.0010	<0.0025	
Aggregate	BOD (mg/L)	0.0194	<0.0050	<0.0050	
Aggregate Organics		7.3	<2.0	<2.0	
	COD (mg/L)	60	56	56	

Qualifiers for Sample Submission Listed:

Qualifier	Description
LPML	Lab-Preserved for Total Metals. Sample received with pH > 2 and preserved at the lab. Total Metals results may be biased low.
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLDS	L1763882-1, -2, -3
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1763882-1, -2, -3
Method Blank	Chromium (Cr)-Total	MB-LOR	L1763882-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1763882-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1763882-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1763882-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1763882-1, -2, -3
Matrix Spike	Total Nitrogen	MS-B	L1763882-2, -3
Matrix Spike	Total Nitrogen	MS-B	L1763882-2, -3
Matrix Spike	Calcium (Ca)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Strontium (Sr)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Total Nitrogen	MS-B	L1763882-1
Matrix Spike	Total Nitrogen	MS-B	L1763882-1
Matrix Spike	Antimony (Sb)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Arsenic (As)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Manganese (Mn)-Total	MS-B	L1763882-1, -2, -3
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1763882-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1763882-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLM	Detection Limit Adjusted due to sample matrix effects.
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
oxygen demand (BOD) a dissolved oxygen meter.	re determined Dissolved BO	by diluting and incubating a sample for a specified t	mical Oxygen Demand (BOD)". All forms of biochemical ime period, and measuring the oxygen depletion using a hrough a glass fibre filter prior to dilution. Carbonaceous ncubation.
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) a dissolved oxygen meter.	re determined Dissolved BO	by diluting and incubating a sample for a specified t	mical Oxygen Demand (BOD)". All forms of biochemical ime period, and measuring the oxygen depletion using a hrough a glass fibre filter prior to dilution. Carbonaceous ncubation.
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are ana	lyzed by Ion C	hromatography with conductivity and/or UV detection	n.
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried o determined using the close			Oxygen Demand (COD)". Chemical oxygen demand is
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried o electrode.	ut using proce	dures adapted from APHA Method 2510 "Conductivi	ty". Conductivity is determined using a conductivity

incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. APHA 2340B HARDNESS-CALC-VA Water Hardness Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation. **HG-D-CVAA-VA** Water Diss. Mercurv in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod) Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS. Water Dissolved Hg in Water by CVAFS LOR=50ppt APHA 3030B/EPA 1631E (mod) HG-DIS-CVAES-VA This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod) Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS. **HG-TOT-CVAFS-VA** Water Total Hg in Water by CVAFS LOR=50ppt EPA 1631E (mod) This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). MET-D-CCMS-VA APHA 3030B/6020A (mod) Water Dissolved Metals in Water by CRC ICPMS Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-DIS-ICP-VA** Water **Dissolved Metals in Water by ICPOES** EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). MET-T-CCMS-VA Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. MET-TOT-ICP-VA Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). Water Total Nitrogen in water by Colour APHA Method 4500-P (J) / NEMI 5735 N-T-COL-VA This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735. NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA) This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater". Roslyn J. Waston et al. NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Roval Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

ECOLI-COLI-ENV-VA Water E.coli by Colilert

This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is

NO2-L-IC-N-VA

EPA 300.1 (mod)

APHA METHOD 9223

NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are an	nalyzed by Ion	Chromatography with conductivity and/or UV deter	ction.
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried electrode	out using proc	edures adapted from APHA Method 4500-H "pH \	'alue". The pH is determined in the laboratory using a pH
It is recommended that	this analysis b	e conducted in the field.	
РН-РСТ-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried electrode	out using proc	edures adapted from APHA Method 4500-H "pH \	′alue". The pH is determined in the laboratory using a pH
It is recommended that	this analysis b	e conducted in the field.	
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
		edures adapted from APHA Method 4500-P "Phos been lab or field filtered through a 0.45 micron me	sphorus". Dissolved Orthophosphate is determined embrane filter.
		8	
COLI-COLI-ENV-VA	Water	Total coliform by Colilert	APHA METHOD 9223
This analysis is carried determined simultaneou	out using proc usly. The samp hours and then	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response	APHA METHOD 9223 e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is are counted. The final result is quantified by a statistical
This analysis is carried determined simultaneou incubated for 18 or 24 h estimation of bacteria d	out using proc usly. The samp hours and then	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is
This analysis is carried determined simultaneou incubated for 18 or 24 h estimation of bacteria d 'KN-F-VA This analysis is carried	out using proc usly. The samp hours and then density (most p Water out using proc	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response robable number). TKN in Water by Fluorescence	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is a re counted. The final result is quantified by a statistical APHA 4500-NORG D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl
This analysis is carried determined simultaneou incubated for 18 or 24 h estimation of bacteria d TKN-F-VA This analysis is carried Nitrogen is determined	out using proc usly. The samp hours and then density (most p Water out using proc	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response robable number). TKN in Water by Fluorescence edures adapted from APHA Method 4500-Norg D.	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is a re counted. The final result is quantified by a statistical APHA 4500-NORG D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl
determined simultaneou incubated for 18 or 24 h estimation of bacteria d TKN-F-VA This analysis is carried TSS-VA This analysis is carried Solids (TSS) are determ	out using proc usly. The samp hours and then density (most p Water out using proc using block dig Water out using proc mined by filterir ry high dissolve	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response robable number). TKN in Water by Fluorescence edures adapted from APHA Method 4500-Norg D. gestion followed by Flow-injection analysis with fluo Total Suspended Solids by Gravimetric edures adapted from APHA Method 2540 "Solids" ing a sample through a glass fibre filter, TSS is det ed solid content (i.e. seawaters, brackish waters) r	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is are counted. The final result is quantified by a statistical APHA 4500-NORG D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl prescence detection.
This analysis is carried determined simultaneou incubated for 18 or 24 h estimation of bacteria d TKN-F-VA This analysis is carried Nitrogen is determined TSS-VA This analysis is carried Solids (TSS) are determ Samples containing ver methods are available f	out using proc usly. The samp hours and then density (most pro- Water out using proc using block dig Water out using proc mined by filterin ry high dissolve for these types	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response robable number). TKN in Water by Fluorescence edures adapted from APHA Method 4500-Norg D. gestion followed by Flow-injection analysis with fluo Total Suspended Solids by Gravimetric edures adapted from APHA Method 2540 "Solids" ing a sample through a glass fibre filter, TSS is det ed solid content (i.e. seawaters, brackish waters) r	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is a re counted. The final result is quantified by a statistical APHA 4500-NORG D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl prescence detection. APHA 2540 D - GRAVIMETRIC . Solids are determined gravimetrically. Total Suspended ermined by drying the filter at 104 degrees celsius. nay produce a positive bias by this method. Alternate analysis
This analysis is carried determined simultaneou incubated for 18 or 24 h estimation of bacteria d TKN-F-VA This analysis is carried Nitrogen is determined TSS-VA This analysis is carried Solids (TSS) are determ Samples containing ver methods are available f ALS test methods may	out using proc usly. The samp hours and then density (most p Water out using proc using block dig Water out using proc mined by filterin ry high dissolve for these types incorporate mo	edures adapted from APHA Method 9223 "Enzym ole is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response robable number). TKN in Water by Fluorescence edures adapted from APHA Method 4500-Norg D. gestion followed by Flow-injection analysis with fluo Total Suspended Solids by Gravimetric edures adapted from APHA Method 2540 "Solids" ing a sample through a glass fibre filter, TSS is dete ad solid content (i.e. seawaters, brackish waters) r of samples.	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is a re counted. The final result is quantified by a statistical APHA 4500-NORG D. "Block Digestion and Flow Injection Analysis". Total Kjeldahl prescence detection. APHA 2540 D - GRAVIMETRIC . Solids are determined gravimetrically. Total Suspended ermined by drying the filter at 104 degrees celsius. nay produce a positive bias by this method. Alternate analysis
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GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878 <u>www.alsglobal.com</u>

COC#

Page ____of

Report To				Report F	ormat / Distribu	tion		Serv	ice R	Reque	sted	(Rush	for ro	utine	analys	ais sub	viect to	avail	ability)
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Contact:	Marcia Browne	· ·			Excel	Digital		-		(2-4 Bu					-		ALS to	Confir	m TAŤ	
Address:	1595 Glenmore Ro	ad N. Kelowna I	3C V1V2C5	Email 1:	mbrowne@kek			<u> </u>		ncy (1-2										
Auuress.				Email 2:	mlewis@kelow			-		ay or W		_								
 Phone:	250-469-8796	Eav:	250-862-3342	Email 3:	igordon@kelow					-,					eques					
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Sample #		Sample lo is description wi	dentification	report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total metals	Dissolved metals	BOD,COD	T. Coliforn,	TSS, A	0-P04-P	Total N	NO2-N,	Total h	ы	Chloride	Ha	Number of Containers
	Commonage Drain	nage Pond			03-May-16	12:05	Surface Water	X	X	X	X	X	Х	X	X	X	X	X	X	5
	Davidson Pond		03-May-16 11:05			11:05	Surface Water	X	x	X	X	X	x	x	X	X	X	x	x	5
The second s	Rose's Pond		··		03-May-16	12:20	Surface Water	X	X	X	х	X	X	X	X	Х	Х	x	X	5
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		lucions / riego											,				•			
Please use	CCME/ BC WQG gu	idelines for both	Davidson Pond	and Rose's Pond for	Total Metals Ana	ilysis and contin	ue using BC CSR	guide	lines	for Co	ommo	nage	Drai	nage	Pond				_	
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CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5 Date Received: 02-JUN-16 Report Date: 15-JUN-16 18:29 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1777367 Project P.O. #: 520747 Job Reference: 1186-202 POND C of C Numbers: Legal Site Desc:

Dean Watt, B.Sc. Account Manager

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L1777367 CONTD.... PAGE 2 of 8 15-JUN-16 18:29 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1777367-1 Surface Water 01-JUN-16 11:30 COMMONAGE DRAINAGE POND	L1777367-2 Surface Water 01-JUN-16 10:45 DAVIDSON POND	L1777367-3 Surface Water 01-JUN-16 10:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	992	3250	6350	
	Hardness (as CaCO3) (mg/L)	247	561	1460	
	рН (рН)	8.17	8.66	8.57	
	Total Suspended Solids (mg/L)	7.5	<3.0	5.5	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	1.55	0.0208	0.0210	
	Chloride (Cl) (mg/L)	98.7	312	515	
	Nitrate (as N) (mg/L)	0.521	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.0606	<0.020	old states = 0.050	
	Total Kjeldahl Nitrogen (mg/L)	3.08	2.49	1.54	
	Total Nitrogen (mg/L)	3.66	2.49	1.54	
	Orthophosphate-Dissolved (as P) (mg/L)	0.968	<0.0010	<0.0010	
Bacteriological Tests	E. coli (MPN/100mL)	70	<1	11	
	Coliform Bacteria - Total (MPN/100mL)	>24196	387	921 DLA	
Total Metals	Aluminum (Al)-Total (mg/L)	0.116	0.0063	<0.015	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00054	
	Arsenic (As)-Total (mg/L)	0.0011	0.00317	0.00441	
	Barium (Ba)-Total (mg/L)	0.029	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Total (mg/L)	0.16	<0.10 DLA	<0.10 _{DLA}	
	Cadmium (Cd)-Total (mg/L) Calcium (Ca)-Total (mg/L)	<0.000050	<0.000010	<0.000025	
		58.9	64.1	62.2	
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.0010	<0.0010 DLA	
	Cobalt (Co)-Total (mg/L) Copper (Cu)-Total (mg/L)	<0.00050	<0.00030	<0.00050 DLA	
	Iron (Fe)-Total (mg/L)	0.0036	0.0010	<0.0025	
	Lead (Pb)-Total (mg/L)	0.225	< 0.030	< 0.030	
	Lithium (Li)-Total (mg/L)	<0.0010	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	<0.050	0.0423	0.0601	
	Magnese (Mn)-Total (mg/L)	23.8	93.1	300	
	Manganese (Min)-Total (mg/L)	0.158	0.0415	0.0312	
	Molybdenum (Mo)-Total (mg/L)	<0.00020	<0.000050	<0.0000050	
	Nickel (Ni)-Total (mg/L)	0.0045	<0.0010	0.0014	
	Phosphorus (P)-Total (mg/L)	<0.0050	0.0014	<0.0025	
	Potassium (K)-Total (mg/L)	1.20	<0.30	<0.30	
	Selenium (Se)-Total (mg/L)	22.0 <0.0010	40.4 DLA <0.00010	83.8 	

L1777367 CONTD.... PAGE 3 of 8 15-JUN-16 18:29 (MT) Version: FINAL

	Sample ID	L1777367-1	L1777367-2	L1777367-3	
	Description	Surface Water	Surface Water	Surface Water	
	Sampled Date Sampled Time	01-JUN-16 11:30	01-JUN-16 10:45	01-JUN-16 10:20	
	Client ID	COMMONAGE DRAINAGE POND	DAVIDSON POND	ROSE'S POND	
Grouping	Analyte				
WATER	-				
Total Metals	Silicon (Si)-Total (mg/L)	3.54	1.05	0.129	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000020	0.129 DLA <0.000050	
	Sodium (Na)-Total (mg/L)	103	481	935	
	Strontium (Sr)-Total (mg/L)	0.566	0.783	0.600	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.00020	<0.00020	
	Titanium (Ti)-Total (mg/L)				
	Uranium (U)-Total (mg/L)	<0.050 0.00204	<0.010	<0.010 0.00486	
	Vanadium (V)-Total (mg/L)		DLA	DLA	
	Zinc (Zn)-Total (mg/L)	<0.030 0.0229	<0.0010 <0.0050	<0.0025 <0.0050	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	<0.0050 FIELD	<0.0050 FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (Al)-Dissolved (mg/L)	0.013	<0.0050	<0.0050	
	Antimony (Sb)-Dissolved (mg/L)	<0.0050	<0.0050	<0.0050 0.00051	
	Arsenic (As)-Dissolved (mg/L)	0.0010	0.00333	0.00031	
	Barium (Ba)-Dissolved (mg/L)	0.026	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.026	<0.020	<0.020	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	0.16	<0.20	<0.20	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	<0.10 DLA <0.000010	<0.10 DLA <0.000025	
	Calcium (Ca)-Dissolved (mg/L)	<0.000050	66.5	<0.000025 65.9	
	Chromium (Cr)-Dissolved (mg/L)				
	Cobalt (Co)-Dissolved (mg/L)	<0.00050 <0.00050	<0.0010 <0.00030	<0.0010 _{DLA} <0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0021	<0.0010	<0.00000	
	Iron (Fe)-Dissolved (mg/L)	0.053	<0.030	<0.030	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	<0.050	0.0444	<0.00050	
	Magnesium (Mg)-Dissolved (mg/L)	23.9	95.8	315	
	Manganese (Mn)-Dissolved (mg/L)	0.139	0.0302	0.00671	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.000050	<0.00001	
	Molybdenum (Mo)-Dissolved (mg/L)	<0.00020	<0.000050	<0.0000050	
	Nickel (Ni)-Dissolved (mg/L)	< 0.0041	0.0013	0.0014 DLA <0.0025	
	Phosphorus (P)-Dissolved (mg/L)	1.15	<0.30	<0.0025	
	Potassium (K)-Dissolved (mg/L)	21.7	40.4	<0.30 86.7	
	Selenium (Se)-Dissolved (mg/L)	<0.0010	0.00012	DLA <0.00025	
	Silicon (Si)-Dissolved (mg/L)	3.35	1.06	0.104	
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000020	0.104 DLA <0.000050	

L1777367 CONTD.... PAGE 4 of 8 15-JUN-16 18:29 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1777367-1 Surface Water 01-JUN-16 11:30 COMMONAGE DRAINAGE POND	L1777367-2 Surface Water 01-JUN-16 10:45 DAVIDSON POND	L1777367-3 Surface Water 01-JUN-16 10:20 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	103	488	968	
	Strontium (Sr)-Dissolved (mg/L)	0.568	0.803	0.623	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00173	0.00537	0.00483	
	Vanadium (V)-Dissolved (mg/L)	<0.030	ola <0.0010	ol.0025	
	Zinc (Zn)-Dissolved (mg/L)	0.0248	<0.0050	<0.0050	
Aggregate	BOD (mg/L)	3.7	<2.0	<2.0	
Organics	COD (mg/L)	37	61	61	

Qualifiers for Sample Submission Listed:

Qualifier	Description
LPML	Lab-Preserved for Total Metals. Sample received with pH > 2 and preserved at the lab. Total Metals results may be biased low.
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCI preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Aluminum (AI)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Antimony (Sb)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Cobalt (Co)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Lead (Pb)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Nickel (Ni)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Thallium (TI)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Aluminum (AI)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Cadmium (Cd)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Cobalt (Co)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Copper (Cu)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Lead (Pb)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Nickel (Ni)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Selenium (Se)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Thallium (TI)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1777367-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1777367-1, -2, -3
Duplicate	Nitrate (as N)	DLDS	L1777367-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1777367-1, -2, -3
Duplicate	Nitrate (as N)	DLDS	L1777367-1, -2, -3
Duplicate	Cadmium (Cd)-Dissolved	DLM	L1777367-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Copper (Cu)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Molybdenum (Mo)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1777367-1, -2, -3
Matrix Spike	Aluminum (AI)-Total	MS-B	L1777367-1, -2, -3
Matrix Spike	Aluminum (AI)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1777367-1, -2, -3
Matrix Spike	Nickel (Ni)-Dissolved	MS-B	L1777367-1, -2, -3

Qualifiers for Individual Parameters Listed: Description

Qualifier

Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.

Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

DLA DLDS

DLM

MS-B

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
oxygen demand (BOD) are dissolved oxygen meter. Di	determined ssolved BOE	dures adapted from APHA Method 5210 B - "Biochemic by diluting and incubating a sample for a specified time 0 (SOLUBLE) is determined by filtering the sample thro a nitrification inhibitor to the diluted sample prior to incu	e period, and measuring the oxygen depletion using a hugh a glass fibre filter prior to dilution. Carbonaceous
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) are dissolved oxygen meter. Di	determined ssolved BOE	dures adapted from APHA Method 5210 B - "Biochemic by diluting and incubating a sample for a specified time 0 (SOLUBLE) is determined by filtering the sample thro a nitrification inhibitor to the diluted sample prior to incu	e period, and measuring the oxygen depletion using a hugh a glass fibre filter prior to dilution. Carbonaceous
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyz	ed by Ion Cl	nromatography with conductivity and/or UV detection.	
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried out determined using the close		dures adapted from APHA Method 5220 "Chemical Oxy urimetric method.	gen Demand (COD)". Chemical oxygen demand is
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out electrode.	using proced	dures adapted from APHA Method 2510 "Conductivity".	Conductivity is determined using a conductivity
ECOLI-COLI-ENV-VA	Water	E.coli by Colilert	APHA METHOD 9223
determined simultaneously	. The sample s and then th	dures adapted from APHA Method 9223 "Enzyme Subs a is mixed with a mixture hydrolyzable substrates and the ne number of wells exhibiting a positive response are co	nen sealed in a multi-well packet. The packet is
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
		ss) is calculated from the sum of Calcium and Magnesi centrations are preferentially used for the hardness cal	
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered with stannous chloride, and		reserved with hydrochloric acid, then undergo a cold-ox v CVAAS or CVAFS.	xidation using bromine monochloride prior to reduction
HG-DIS-CVAFS-VA	Water	Dissolved Hg in Water by CVAFS LOR=50ppt	APHA 3030B/EPA 1631E (mod)
American Public Health As States Environmental Prote involves a cold-oxidation of	sociation, an ection Agenc the acidified	dures adapted from "Standard Methods for the Examina d with procedures adapted from "Test Methods for Eva y (EPA). The procedures may involve preliminary sam sample using bromine monochloride prior to reduction scence spectrophotometry or atomic absorption spectro	luating Solid Waste" SW-846 published by the United ple treatment by filtration (EPA Method 3005A) and of the sample with stannous chloride. Instrumental
HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)
Water samples undergo a c	cold-oxidatio	n using bromine monochloride prior to reduction with st	annous chloride, and analyzed by CVAAS or CVAFS.
HG-TOT-CVAFS-VA	Water	Total Hg in Water by CVAFS LOR=50ppt	EPA 1631E (mod)
American Public Health As States Environmental Prote	sociation, an ection Agenc h stannous c	hloride. Instrumental analysis is by cold vapour atomic	
MET-D-CCMS-VA	Water	Dissolved Metals in Water by CRC ICPMS	APHA 3030B/6020A (mod)
Water samples are filtered	(0.45 um), p	reserved with nitric acid, and analyzed by CRC ICPMS	
Method Limitation (re: Sulfu	ır): Sulfide a	nd volatile sulfur species may not be recovered by this	method.
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). Total Metals in Water by CRC ICPMS **MET-T-CCMS-VA** Water EPA 200.2/6020A (mod) Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-TOT-ICP-VA** Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B). N-T-COL-VA Water Total Nitrogen in water by Colour APHA4500-P(J)/NEMI9171/USGS03-4174 This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735. NH3-F-VA Water Ammonia in Water by Fluorescence APHA 4500 NH3-NITROGEN (AMMONIA) This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al. NH3-F-VA Water Ammonia in Water by Fluorescence J. ENVIRON. MONIT., 2005, 7, 37-42, RSC This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al EPA 300.1 (mod) NO2-L-IC-N-VA Water Nitrite in Water by IC (Low Level) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. NO3-L-IC-N-VA Water Nitrate in Water by IC (Low Level) EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. PH-PCT-VA APHA 4500-H "pH Value" Water pH by Meter (Automated) This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field. PH-PCT-VA APHA 4500-H pH Value Water pH by Meter (Automated) This analysis is carried out using procedures adapted from APHA Method 4500-H "pH Value". The pH is determined in the laboratory using a pH electrode It is recommended that this analysis be conducted in the field. PO4-DO-COL-VA Water Diss. Orthophosphate in Water by Colour APHA 4500-P Phosphorus This analysis is carried out using procedures adapted from APHA Method 4500-P "Phosphorus". Dissolved Orthophosphate is determined colourimetrically on a sample that has been lab or field filtered through a 0.45 micron membrane filter. **TCOLI-COLI-ENV-VA** Water Total coliform by Colilert APHA METHOD 9223 This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is quantified by a statistical estimation of bacteria density (most probable number). TKN in Water (Calculation) **TKN-CALC-VA** Water BC MOE LABORATORY MANUAL (2005) Total Kjeldahl Nitrogen is a calculated parameter. Total Kjeldahl Nitrogen (calc) = Total Nitrogen - [Nitrite (as N) + Nitrate (as N)]. TSS-VA Total Suspended Solids by Gravimetric APHA 2540 D - GRAVIMETRIC Water This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review. Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878 www.alsglobal.com

COC #____

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(ALS) Environmental		www.a	Isglobal.com										Ра	ge _	(<u> </u>
Report To	Report Fo	rmat / Distribut	ion		Servi	ice Re	ques	sted (Rush	for ro	utine a	analys	is sub	ject to	availa	bility)
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Contact: Marcia Browne	PDF	Excel	Digital	Fax	OPric	ority (2-	4 Busi	ness Da	9ys) - 5	60% Si	urcharg	je - Co	ntact A	to Ç کا	Confirm	TAT
Address: 1595 Glenmore Road N. Kelowna BC V1V2C5	Email 1:	mbrowne@kelo	<u>wna.ca</u>		OEm	ergency	(1-2	Bus. Da	iys) - 1	00% 5	Surchar	ge - C	ontact	ALS to	Confirm	1 TAT
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Phone: 250-469-8796 Fax: 250-862-3342	Email 3:	igordon@kelow	na.ca			_			A	nalys	is Re	ques	st			
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# (This description with appear are a)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total me	Dissolved	BOD,COD	T. Coliform,	TSS, An	0-P04-P	Total Nitrogen, TKN	NO2-N, NO3-N	Total ha	ы	Chloride	PH Number of
Commonage Drainage Pond		01-Jun-16	11:30	Surface Water	X	X	X	X	X	Х	X	Х	X	X	X	X 5
Davidson Pond		01-Jun-16	10:45	Surface Water	X	X	x	X	x	X	X	Х	X	X	x	X 5
Rose's Pond		01-Jun-16	10:20	Surface Water	X	X	X	X	X	Х	X	Х	Х	X	X	X 5
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Short Holding Time																
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Please use CCME/ BC WQG guidelines for both Davidson Pond and Rose	e's Pond for T	otal Metals Ana	ysis and continue	e using BC CSR g	quidel	ines fo	or Co	mmoi	nage	Drain	iage F	Pond.				
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GENF 20.00 Front



CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5

Date Received: 07-JUL-16 Report Date: 15-JUL-16 12:59 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1794599 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

520747 1186-202 POND

Dean Watt, B.Sc. Account Manager

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L1794599 CONTD.... PAGE 2 of 7 15-JUL-16 12:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1794599-1 Surface Water 05-JUL-16 12:30 COMMONAGE DRAINAGE POND	L1794599-2 Surface Water 05-JUL-16 10:45 DAVIDSON POND	L1794599-3 Surface Water 05-JUL-16 13:00 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	919	3140	6050	
	Hardness (as CaCO3) (mg/L)	225	540	1440	
	рН (рН)	8.03	8.77	8.72	
	Total Suspended Solids (mg/L)	24.8	6.0	4.6	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	1.84	0.0143	0.0184	
	Chloride (Cl) (mg/L)	102	307 DLDS	533 DLDS	
	Nitrate (as N) (mg/L)	0.408	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.159	<0.020	old states = 0.050	
	Total Kjeldahl Nitrogen (mg/L)	2.81	1.72	1.64	
	Total Nitrogen (mg/L)	3.38	1.72	1.64	
	Orthophosphate-Dissolved (as P) (mg/L)	2.01	<0.0010	<0.0010 PEHR	
Bacteriological Tests	E. coli (MPN/100mL)	411 PEHR	<1 PEHR	326	
	Coliform Bacteria - Total (MPN/100mL)	64900	>2419.6	>2419.6	
Total Metals	Aluminum (Al)-Total (mg/L)	0.080	<0.0060	0.021	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00063	
	Arsenic (As)-Total (mg/L)	0.0023	0.00358	0.00519	
	Barium (Ba)-Total (mg/L)	0.027	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Total (mg/L)	0.17	<0.10	<0.10 _{DLA}	
	Cadmium (Cd)-Total (mg/L)	<0.000050	<0.000010	<0.000025	
	Calcium (Ca)-Total (mg/L)	54.4	59.9	59.1	
	Chromium (Cr)-Total (mg/L)	<0.00050	<0.0010	<0.0010 _{DLA}	
	Cobalt (Co)-Total (mg/L)	<0.00050	<0.00030	<0.00050 _{DLA}	
	Copper (Cu)-Total (mg/L)	0.0070	<0.0010	<0.0025	
	Iron (Fe)-Total (mg/L)	0.179	<0.030	<0.030	
	Lead (Pb)-Total (mg/L) Lithium (Li)-Total (mg/L)	<0.0010	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	<0.050	0.0474	0.0647	
	Magnesium (Mg)-Total (mg/L) Manganese (Mn)-Total (mg/L)	22.1	97.7	314	
	Manganese (Min)-Total (mg/L) Mercury (Hg)-Total (mg/L)	0.124	0.0110	0.0355	
	Molybdenum (Mo)-Total (mg/L)	<0.00020	<0.000050	<0.0000050	
	Nickel (Ni)-Total (mg/L)	0.0055	<0.0010	0.0014	
	Phosphorus (P)-Total (mg/L)	<0.0050	0.0017	<0.0025	
	Potassium (K)-Total (mg/L)	2.99	<0.30	<0.30	
	Selenium (Se)-Total (mg/L)	25.5 <0.0010	41.1 DLA <0.00010	92.7 _{DLA} <0.00025	

L1794599 CONTD.... PAGE 3 of 7 15-JUL-16 12:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1794599-1 Surface Water 05-JUL-16 12:30 COMMONAGE DRAINAGE POND	L1794599-2 Surface Water 05-JUL-16 10:45 DAVIDSON POND	L1794599-3 Surface Water 05-JUL-16 13:00 ROSE'S POND	
Grouping	Analyte				
WATER					
Total Metals	Silicon (Si)-Total (mg/L)	3.75	1.46	0.348	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000020	<0.000050	
	Sodium (Na)-Total (mg/L)	99.8	520	991	
	Strontium (Sr)-Total (mg/L)	0.549	0.832	0.580	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.010	<0.010	
	Uranium (U)-Total (mg/L)	0.00224	0.00583	0.00518	
	Vanadium (V)-Total (mg/L)	<0.030	DLA <0.0010	<0.0025	
	Zinc (Zn)-Total (mg/L)	0.0191	<0.0050	<0.0050	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (AI)-Dissolved (mg/L)	0.030	<0.0050	<0.0050	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00057	
	Arsenic (As)-Dissolved (mg/L)	0.0021	0.00316	0.00502	
	Barium (Ba)-Dissolved (mg/L)	0.020	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	<0.20	
	Boron (B)-Dissolved (mg/L)	0.16	<0.10	0.11	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	DLA <0.000010	DLA <0.000025	
	Calcium (Ca)-Dissolved (mg/L)	53.8	58.3	59.0	
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	<0.00050	<0.00030	DLA <0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0048	<0.0010	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	0.072	<0.030	<0.030	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	<0.050	0.0453	0.0625	
	Magnesium (Mg)-Dissolved (mg/L)	22.1	95.8	314	
	Manganese (Mn)-Dissolved (mg/L)	0.050	0.00362	0.0208	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0052	<0.0010	0.0014	
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0016	DLA <0.0025	
	Phosphorus (P)-Dissolved (mg/L)	2.58	<0.30	<0.30	
	Potassium (K)-Dissolved (mg/L)	25.4	40.1	92.9	
	Selenium (Se)-Dissolved (mg/L)	<0.0010	0.00012	DLA <0.00025	
	Silicon (Si)-Dissolved (mg/L)	3.62	1.40	0.301	
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000020	DLA <0.000050	

L1794599 CONTD.... PAGE 4 of 7 15-JUL-16 12:59 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1794599-1 Surface Water 05-JUL-16 12:30 COMMONAGE DRAINAGE POND	L1794599-2 Surface Water 05-JUL-16 10:45 DAVIDSON POND	L1794599-3 Surface Water 05-JUL-16 13:00 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	99.5	506	990	
	Strontium (Sr)-Dissolved (mg/L)	0.542	0.808	0.578	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.010	<0.010	
	Uranium (U)-Dissolved (mg/L)	0.00210	0.00538	0.00505	
	Vanadium (V)-Dissolved (mg/L)	<0.030	DLA <0.0010	DLA <0.0025	
	Zinc (Zn)-Dissolved (mg/L)	0.0181	<0.0050	<0.0050	
Aggregate	BOD (mg/L)	10.8	<2.0	<2.0	
Organics	COD (mg/L)	102	58	59	

Qualifiers for Sample Submission Listed:

Qualifier	Description
WSMT	Water sample(s) for total mercury analysis was not submitted in glass or PTFE container with HCl preservative. Results may be biased low.
WSMD	Water sample(s) for dissolved mercury analysis was not submitted in glass or PTFE container with HCI preservative. Results may be biased low.

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Nitrite (as N)	DLDS	L1794599-1, -2, -3
Duplicate	Nitrate (as N)	DLDS	L1794599-1, -2, -3
Matrix Spike	Barium (Ba)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Total Nitrogen	MS-B	L1794599-2, -3
Matrix Spike	Total Nitrogen	MS-B	L1794599-2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Uranium (U)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1794599-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1794599-1, -2, -3
Matrix Spike	Aluminum (AI)-Total	MS-B	L1794599-1, -2, -3
Matrix Spike	Copper (Cu)-Total	MS-B	L1794599-1, -2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description		
DLA	Detection Limit adjusted for required dilution		
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.		
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.		
PEHR	Parameter Exceeded Recommended Holding Time On Receipt: Proceed With Analysis As Requested.		

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
oxygen demand (BOD dissolved oxygen met) are determined er. Dissolved BC	by diluting and incubating a sample for a specified	emical Oxygen Demand (BOD)". All forms of biochemical time period, and measuring the oxygen depletion using a through a glass fibre filter prior to dilution. Carbonaceous incubation.
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD dissolved oxygen met) are determined er. Dissolved BC	by diluting and incubating a sample for a specified	emical Oxygen Demand (BOD)". All forms of biochemical time period, and measuring the oxygen depletion using a through a glass fibre filter prior to dilution. Carbonaceous incubation.
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are a	analyzed by Ion (Chromatography with conductivity and/or UV detection	on.
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried determined using the			Oxygen Demand (COD)". Chemical oxygen demand is

EC-PCT-VA

APHA 2510 Auto. Conduc.

This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode.

E.coli by Colilert **ECOLI-COLI-ENV-VA** Water

APHA METHOD 9223

APHA 3030B/6020A (mod)

EPA SW-846 3005A/6010B

EPA 200.2/6020A (mod)

EPA SW-846 3005A/6010B

APHA 2340B

This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table.

HARDNESS-CALC-VA Water Hardness

Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation.

HG-D-CVAA-VA Water

Diss. Mercury in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod)

Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

APHA 3030B/EPA 1631E (mod) **HG-DIS-CVAFS-VA** Water Dissolved Hg in Water by CVAFS LOR=50ppt

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

HG-T-CVAA-VA Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod)

Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS.

Total Hg in Water by CVAFS LOR=50ppt **HG-TOT-CVAFS-VA** Water EPA 1631E (mod)

Dissolved Metals in Water by ICPOES

Total Metals in Water by CRC ICPMS

Ammonia in Water by Fluorescence

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7).

MET-D-CCMS-VA Water Dissolved Metals in Water by CRC ICPMS

Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-DIS-ICP-VA Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B).

MET-T-CCMS-VA

Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS.

Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method.

MET-TOT-ICP-VA Water Total Metals in Water by ICPOES

Water

This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).

N-T-COL-VA

Water Total Nitrogen in water by Colour

This analysis is carried out using procedures adapted from APHA Method 4500-P (J) "Persulphate Method for Simultaneous Determination of Total Nitrogen and Total Phosphorus" and National Environmental Methods Index - Nemi method 5735.

NH3-F-VA

APHA 4500 NH3-NITROGEN (AMMONIA)

APHA4500-P(J)/NEMI9171/USGS03-4174

This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et al.

NH3-F-VA Ammonia in Water by Fluorescence Water

Water

J. ENVIRON. MONIT., 2005, 7, 37-42, RSC This analysis is carried out, on sulfuric acid preserved samples, using procedures modified from J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society of Chemistry, "Flow-injection analysis with fluorescence detection for the determination of trace levels of ammonium in seawater", Roslyn J. Waston et

NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
inorganic anions are analy	zed by Ion (Chromatography with conductivity and/or UV detection	ction.
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analy	zed by lon (Chromatography with conductivity and/or UV detection	ction.
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried out electrode	t using proc	edures adapted from APHA Method 4500-H "pH \lor	′alue". The pH is determined in the laboratory using a pH
It is recommended that this	s analysis b	e conducted in the field.	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried out electrode	t using proc	edures adapted from APHA Method 4500-H "pH ∨	'alue". The pH is determined in the laboratory using a pH
It is recommended that this	s analysis b	e conducted in the field.	
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
This analysis is carried out colourimetrically on a sam	t using proce ple that has	edures adapted from APHA Method 4500-P "Phos been lab or field filtered through a 0.45 micron me	phorus". Dissolved Orthophosphate is determined embrane filter.
TCOLI-COLI-ENV-VA	Water	Total coliform by Colilert	APHA METHOD 9223
determined simultaneously	I. The samp rs and then	le is mixed with a mixture hydrolyzable substrates the number of wells exhibiting a positive response	e Substrate Coliform Test". E. coli and Total Coliform are and then sealed in a multi-well packet. The packet is are counted. The final result is quantified by a statistical
TKN-CALC-VA	Water	TKN in Water (Calculation)	BC MOE LABORATORY MANUAL (2005)
Total Kjeldahl Nitrogen is a	a calculated	parameter. Total Kjeldahl Nitrogen (calc) = Total I	Nitrogen - [Nitrite (as N) + Nitrate (as N)].
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
Solids (TSS) are determine	ed by filterin igh dissolve	g a sample through a glass fibre filter, TSS is dete ad solid content (i.e. seawaters, brackish waters) n	. Solids are determined gravimetrically. Total Suspended ermined by drying the filter at 104 degrees celsius. nay produce a positive bias by this method. Alternate analysis
** ALS test methods may inco	orporate mo	difications from specified reference methods to im	nprove performance.
The last two letters of the al	bove test co	de(s) indicate the laboratory that performed analy	tical analysis for that test. Refer to the list below:
Laboratory Definition Cod	e Labo	ratory Location	
VA	ALS E	ENVIRONMENTAL - VANCOUVER, BRITISH COI	LUMBIA, CANADA
Chain of Custody Numbers	:		
GLOSSARY OF REPORT T Surrogate - A compound that	-	in behaviour to target analyte(s), but that does not	occur naturally in environmental samples. For

applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory. UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION. Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878 <u>www.alsglobal.com</u>

COC#

Page ____of ____

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Report To		Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)							1				
Company: City of Kelowna	Standard	Standard Other				Regular (Standard Turnaround Times - Business Days)											
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Address: 1595 Glenmore Road N. Kelowna BC V1V2C5	Email 1:	mbrowne@kelo	wna.ca		ЮЕт	ergenc	y (1-2	Bus. D	ays) - 1	00% \$	Surchar	ge - C	ontact	ALS to	Confir	m TAT	-
	Email 2:	mlewis@kelowr	<u>na.ça</u>		OSar	me Day	or We	ekend	Emerge	ency -	Contac	t ALS t	o Conf	lrm TA	г		
Phone: 250-469-8796 Fax: 250-862-3342	Email 3:	jgordon@kelow	<u>na.ca</u>						A	nalys	sis Re	ques	st				
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Lab Work Order # ((ab use only))	ALS Contact:	Dean Watt	Sampler:		letals	ed metals	Q	Caliform, E. C	Ammonia	<u>с</u> ,	Total Nitrogen, TKN	NO2-N, NO3-N	hardness		Φ		er of Container:
Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hb:mm)	Sample Type	Total metals	Dissolved	BOD,COD	T Coli	TSS, A	0-P04-P	Total N	NO2-N	Total h	ы Ш	Chloride	Hd	Number
Commonage Drainage Pond		05-Jul-16	12:30	Surface Water	X	X	Х	Х	X	X	X	X	X	X	X	Х	5
Davidson Pond		05-Jul-16	10:45	Surface Water	X	X	X	Х	X	X	X	X	Х	X	X	X	5
Rose's Pond		05-Jul-16	13:00	Surface Water	X	X	X	X	X	X	X	x	X	x	X	X	5
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Please use CCME/ BC WQG guidelines for both Davidson Pond and Ro	se's Pond for	To <u>tal Meta</u> ls Ana	lysis and continu	le using BC CSR	guide	lines f	for Co	ommo	nage	Drair	nage l	Pond.					
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GENF 20.00 Front



CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5

Date Received: 11-AUG-16 Report Date: 19-AUG-16 17:51 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1811981 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

520747 1186-202 POND

Dean Watt, B.Sc. Account Manager

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L1811981 CONTD.... PAGE 2 of 8 19-AUG-16 17:51 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1811981-1 SURFACE WATE 10-AUG-16 13:15 COMMONAGE DRAINAGE POND	L1811981-2 SURFACE WATE 10-AUG-16 13:00 DAVIDSON POND	L1811981-3 SURFACE WATE 10-AUG-16 12:45 ROSE'S POND	
Grouping	Analyte				
WATER					
Physical Tests	Conductivity (uS/cm)	961	3470	6800	
	Hardness (as CaCO3) (mg/L)	234	563	1570	
	pH (pH)	8.19	8.82	8.76	
	Total Suspended Solids (mg/L)	5.0	3.4	3.8	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	0.965	0.0455	0.0520	
	Chloride (Cl) (mg/L)	99.2	336	632 DLDS	
	Nitrate (as N) (mg/L)	0.533	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.127	<0.020	<0.050	
	Total Kjeldahl Nitrogen (mg/L)	2.77	1.73	1.61	
	Total Nitrogen (mg/L)	3.26	1.81	1.66	
	Orthophosphate-Dissolved (as P) (mg/L)	1.21	0.0010	0.0020	
Bacteriological Tests	E. coli (MPN/100mL)	130000	21	<1	
	Coliform Bacteria - Total (MPN/100mL)	>241960	>241960	<1	
Total Metals	Aluminum (Al)-Total (mg/L)	0.088	0.0435	0.024	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00060	
	Arsenic (As)-Total (mg/L)	0.0011	0.00347	0.00501	
	Barium (Ba)-Total (mg/L)	0.033	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0050	<0.0010	<0.0010 DLHC	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.40 DLHC	
	Boron (B)-Total (mg/L) Cadmium (Cd)-Total (mg/L)	0.14	<0.10 DLA	<0.20 DLA	
		<0.000050	<0.000010	<0.000025	
	Calcium (Ca)-Total (mg/L)	54.5	54.9	52.8	
	Chromium (Cr)-Total (mg/L) Cobalt (Co)-Total (mg/L)	0.00177	<0.0010	<0.0010	
	Copper (Cu)-Total (mg/L)	<0.00050	<0.00030	<0.00050 DLA	
	Iron (Fe)-Total (mg/L)	0.0047	<0.0010	<0.0025	
	Lead (Pb)-Total (mg/L)	0.141	0.054	<0.060	
	Lithium (Li)-Total (mg/L)	<0.0010	<0.00050	<0.00050	
	Magnesium (Mg)-Total (mg/L)	<0.050	0.0495	0.0622	
	Magnese (Mn)-Total (mg/L)	21.2	104	354	
	Manganese (Min-Fotal (mg/L)	0.126	0.0149	0.0356	
	Molybdenum (Mo)-Total (mg/L)	<0.00020	<0.0000050	<0.0000050	
	Nickel (Ni)-Total (mg/L)	0.0045	0.0011	0.0011	
	Phosphorus (P)-Total (mg/L)	<0.0050	0.0021	0.0026	
	Potassium (K)-Total (mg/L)	1.53	<0.30	<0.60	
	Selenium (Se)-Total (mg/L)	19.9	44.5	103 DLA	
		<0.0010	0.00016	<0.00025	

L1811981 CONTD.... PAGE 3 of 8 19-AUG-16 17:51 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1811981-1 SURFACE WATE 10-AUG-16 13:15 COMMONAGE DRAINAGE POND	L1811981-2 SURFACE WATE 10-AUG-16 13:00 DAVIDSON POND	L1811981-3 SURFACE WATE 10-AUG-16 12:45 ROSE'S POND	
Grouping	Analyte				
WATER	-				
Total Metals	Silicon (Si)-Total (mg/L)	3.46	1.61	0.38	
	Silver (Ag)-Total (mg/L)	<0.000050	<0.000020	<0.000 ^{DLA}	
	Sodium (Na)-Total (mg/L)	101	561	1050	
	Strontium (Sr)-Total (mg/L)	0.527	0.772	0.480	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Total (mg/L)	<0.050	<0.010	<0.020	
	Uranium (U)-Total (mg/L)	0.00210	0.00623	0.00483	
	Vanadium (V)-Total (mg/L)	<0.030	0.00023 DLA <0.0010	<0.00405 DLA <0.0025	
	Zinc (Zn)-Total (mg/L)	0.0237	<0.0050	<0.010 DLHC	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (AI)-Dissolved (mg/L)	0.010	<0.0050	0.0086	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00062	
	Arsenic (As)-Dissolved (mg/L)	0.0012	0.00340	0.00523	
	Barium (Ba)-Dissolved (mg/L)	0.033	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.0050	<0.0010	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	OLHC <0.40	
	Boron (B)-Dissolved (mg/L)	0.16	<0.10	O.20	
	Cadmium (Cd)-Dissolved (mg/L)	<0.000050	DLA <0.000010	ol.000025	
	Calcium (Ca)-Dissolved (mg/L)	57.2	54.2	51.8	
	Chromium (Cr)-Dissolved (mg/L)	<0.00050	<0.0010	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	<0.00050	<0.00030	DLA <0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0031	<0.0010	0.0012	
	Iron (Fe)-Dissolved (mg/L)	0.037	<0.030	DLHC <0.060	
	Lead (Pb)-Dissolved (mg/L)	<0.0010	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	<0.050	0.0467	0.0648	
	Magnesium (Mg)-Dissolved (mg/L)	22.1	104	349	
	Manganese (Mn)-Dissolved (mg/L)	0.102	0.00863	0.00583	
	Mercury (Hg)-Dissolved (mg/L)	<0.00020	<0.000050	<0.000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0042	<0.0010	0.0012	
	Nickel (Ni)-Dissolved (mg/L)	<0.0050	0.0021	0.0028	
	Phosphorus (P)-Dissolved (mg/L)	1.48	<0.30	O.60	
	Potassium (K)-Dissolved (mg/L)	20.5	43.3	99.4	
	Selenium (Se)-Dissolved (mg/L)	<0.0010	DLA <0.00010	ol.00025	
	Silicon (Si)-Dissolved (mg/L)	3.45	1.50	0.34	
	Silver (Ag)-Dissolved (mg/L)	<0.000050	<0.000020	<0.000050	

L1811981 CONTD.... PAGE 4 of 8 19-AUG-16 17:51 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1811981-1 SURFACE WATE 10-AUG-16 13:15 COMMONAGE DRAINAGE POND	L1811981-2 SURFACE WATE 10-AUG-16 13:00 DAVIDSON POND	L1811981-3 SURFACE WATE 10-AUG-16 12:45 ROSE'S POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	105	551	1020	
	Strontium (Sr)-Dissolved (mg/L)	0.549	0.764	0.469	
	Thallium (TI)-Dissolved (mg/L)	<0.000010	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.030	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	<0.050	<0.010	DLHC <0.020	
	Uranium (U)-Dissolved (mg/L)	0.00194	0.00553	0.00490	
	Vanadium (V)-Dissolved (mg/L)	<0.030	<0.0010	<0.0025	
	Zinc (Zn)-Dissolved (mg/L)	0.0238	<0.0050	DLHC <0.010	
Aggregate Organics	BOD (mg/L)	<2.0	<2.0	<2.0	
-	COD (mg/L)	55	101	69	

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Antimony (Sb)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Lead (Pb)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Aluminum (Al)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Beryllium (Be)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Chromium (Cr)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Copper (Cu)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Selenium (Se)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Silver (Ag)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Thallium (TI)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Tin (Sn)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Vanadium (V)-Dissolved	DLA	L1811981-1, -2, -3
Duplicate	Chloride (Cl)	DLDS	L1811981-1, -2, -3
Duplicate	Nitrite (as N)	DLDS	L1811981-1, -2, -3
Method Blank	Copper (Cu)-Total	MB-LOR	L1811981-1, -2, -3
Matrix Spike	Iron (Fe)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Total Nitrogen	MS-B	L1811981-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-2, -3
Matrix Spike	Silicon (Si)-Total	MS-B	L1811981-1, -2, -3
Matrix Spike	Calcium (Ca)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Strontium (Sr)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-1, -2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-2, -3
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1811981-2, -3

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DLA	Detection Limit adjusted for required dilution
DLDS	Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).
MB-LOR	Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**		
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"		
This analysis is carried out using precedures adopted from APHA Method 5210 R. "Piechamical Owgon Demand (ROD)" All forms of hischemical					

This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

BOD5-VA

Water Biochemical Oxygen Demand- 5 day

APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND

This analysis is carried out using procedures adapted from APHA Method 5210 B - "Biochemical Oxygen Demand (BOD)". All forms of biochemical oxygen demand (BOD) are determined by diluting and incubating a sample for a specified time period, and measuring the oxygen depletion using a dissolved oxygen meter. Dissolved BOD (SOLUBLE) is determined by filtering the sample through a glass fibre filter prior to dilution. Carbonaceous

BOD (CBOD) is determined by adding a nitrification inhibitor to the diluted sample prior to incubation.

CL-IC-N-VA Water Chloride in Water by IC EPA 300.1 (mod) Inorganic anions are analyzed by Ion Chromatography with conductivity and/or UV detection. COD-COL-VA Water Chemical Oxygen Demand by Colorimetric APHA 5220 D. CHEMICAL OXYGEN DEMAND This analysis is carried out using procedures adapted from APHA Method 5220 "Chemical Oxygen Demand (COD)". Chemical oxygen demand is determined using the closed reflux colourimetric method. EC-PCT-VA Water Conductivity (Automated) APHA 2510 Auto. Conduc. This analysis is carried out using procedures adapted from APHA Method 2510 "Conductivity". Conductivity is determined using a conductivity electrode. **ECOLI-COLI-ENV-VA** Water E.coli by Colilert APHA METHOD 9223 This analysis is carried out using procedures adapted from APHA Method 9223 "Enzyme Substrate Coliform Test". E. coli and Total Coliform are determined simultaneously. The sample is mixed with a mixture hydrolyzable substrates and then sealed in a multi-well packet. The packet is incubated for 18 or 24 hours and then the number of wells exhibiting a positive response are counted. The final result is obtained by comparing the positive responses to a probability table. Water APHA 2340B HARDNESS-CALC-VA Hardness Hardness (also known as Total Hardness) is calculated from the sum of Calcium and Magnesium concentrations, expressed in CaCO3 equivalents. Dissolved Calcium and Magnesium concentrations are preferentially used for the hardness calculation. **HG-D-CVAA-VA** Water Diss. Mercurv in Water by CVAAS or CVAFS APHA 3030B/EPA 1631E (mod) Water samples are filtered (0.45 um), preserved with hydrochloric acid, then undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS. **HG-DIS-CVAFS-VA** Water Dissolved Hg in Water by CVAFS LOR=50ppt APHA 3030B/EPA 1631E (mod) This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by filtration (EPA Method 3005A) and involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). Water Total Mercury in Water by CVAAS or CVAFS EPA 1631E (mod) **HG-T-CVAA-VA** Water samples undergo a cold-oxidation using bromine monochloride prior to reduction with stannous chloride, and analyzed by CVAAS or CVAFS. **HG-TOT-CVAFS-VA** Water Total Hg in Water by CVAFS LOR=50ppt EPA 1631E (mod) This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves a cold-oxidation of the acidified sample using bromine monochloride prior to reduction of the sample with stannous chloride. Instrumental analysis is by cold vapour atomic fluorescence spectrophotometry or atomic absorption spectrophotometry (EPA Method 245.7). Dissolved Metals in Water by CRC ICPMS APHA 3030B/6020A (mod) **MET-D-CCMS-VA** Water Water samples are filtered (0.45 um), preserved with nitric acid, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-DIS-ICP-VA** Water **Dissolved Metals in Water by ICPOES** EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedure involves filtration (EPA Method 3005A) and analysis by inductively coupled plasma optical emission spectrophotometry (EPA Method 6010B). **MET-T-CCMS-VA** Water Total Metals in Water by CRC ICPMS EPA 200.2/6020A (mod) Water samples are digested with nitric and hydrochloric acids, and analyzed by CRC ICPMS. Method Limitation (re: Sulfur): Sulfide and volatile sulfur species may not be recovered by this method. **MET-TOT-ICP-VA** Water Total Metals in Water by ICPOES EPA SW-846 3005A/6010B This analysis is carried out using procedures adapted from "Standard Methods for the Examination of Water and Wastewater" published by the American Public Health Association, and with procedures adapted from "Test Methods for Evaluating Solid Waste" SW-846 published by the United States Environmental Protection Agency (EPA). The procedures may involve preliminary sample treatment by acid digestion, using either hotblock or microwave oven (EPA Method 3005A). Instrumental analysis is by inductively coupled plasma - optical emission spectrophotometry (EPA Method

6010B). **N-T-COL-VA**

Water Total Nitrogen in water by Colour

APHA4500-P(J)/NEMI9171/USGS03-4174

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		rom APHA Method 4500-P (J) "Persulph mental Methods Index - Nemi method 57	ate Method for Simultaneous Determination of Total 35.
NH3-F-VA Wa	ater Ammonia in \	Nater by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
			n J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society levels of ammonium in seawater", Roslyn J. Waston et
NH3-F-VA Wa	ater Ammonia in \	Nater by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
			n J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society levels of ammonium in seawater", Roslyn J. Waston et
NO2-L-IC-N-VA Wa	ater Nitrite in Wat	er by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed b	by Ion Chromatography	with conductivity and/or UV detection.	
NO3-L-IC-N-VA Wa	ater Nitrate in Wa	ter by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analyzed b	by Ion Chromatography	with conductivity and/or UV detection.	
PH-PCT-VA Wa	ater pH by Meter	(Automated)	APHA 4500-H "pH Value"
This analysis is carried out usin electrode	g procedures adapted f	rom APHA Method 4500-H "pH Value". 1	The pH is determined in the laboratory using a pH
It is recommended that this ana	lysis be conducted in th	ne field.	
PH-PCT-VA Wa	ater pH by Meter	(Automated)	APHA 4500-H pH Value
This analysis is carried out usin electrode	g procedures adapted f	rom APHA Method 4500-H "pH Value". 1	Γhe pH is determined in the laboratory using a pH
It is recommended that this ana	lysis be conducted in th	ne field.	
PO4-DO-COL-VA Wa	ater Diss. Orthoph	nosphate in Water by Colour	APHA 4500-P Phosphorus
		rom APHA Method 4500-P "Phosphorus filtered through a 0.45 micron membran	". Dissolved Orthophosphate is determined e filter.
TCOLI-COLI-ENV-VA Wa	ater Total coliform	n by Colilert	APHA METHOD 9223
determined simultaneously. The	e sample is mixed with a d then the number of w	a mixture hydrolyzable substrates and the ells exhibiting a positive response are co	trate Coliform Test". E. coli and Total Coliform are en sealed in a multi-well packet. The packet is unted. The final result is quantified by a statistical
TKN-F-VA Wa	ater TKN in Water	r by Fluorescence	APHA 4500-NORG D.
		from APHA Method 4500-Norg D. "Block by Flow-injection analysis with fluorescen	Digestion and Flow Injection Analysis". Total Kjeldahl ce detection.
TSS-VA Wa	ater Total Suspen	ded Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC
Solids (TSS) are determined by	filtering a sample throu issolved solid content (i	ugh a glass fibre filter, TSS is determined	are determined gravimetrically. Total Suspended I by drying the filter at 104 degrees celsius. duce a positive bias by this method. Alternate analysis
** ALS test methods may incorport	ate modifications from	specified reference methods to improve p	performance.
The last two letters of the above	test code(s) indicate the	e laboratory that performed analytical and	alysis for that test. Refer to the list below:
Laboratory Definition Code	Laboratory Location		
VA	ALS ENVIRONMENT	AL - VANCOUVER, BRITISH COLUMBIA	A, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. *mg/kg* - *milligrams per kilogram based on dry weight of sample.*

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

Short Holding Time

1

Chain of Custody / Analytical Request Form Canada Toll Free: 1 800 668 9878

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Address:	1595 Glenmore Road	N. Kelowna	BC V1V2C5	Em	Email 1: mbrowne@kelowna.ca OEmergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm							Confirm	I TAT								
				Em	ail 2:	mlewis@kelow	na.ca		Same Day or Weekend Emergency - Contact ALS to Confirm TAT												
Phone:	250-469-8796	Fax:	250-862-3342	Em	ail 3:	igordon@kelov	vna.ca		Analysis Request												
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	Davidson Pond				10-Aug-16	1:00	Surface Water	X	X	Х	X	X	X	X	X	X	X	X	x 6		
an da V	Rose's Pond					10-Aug-16	12:45	Surface Water	X	X	X	X	X	X	X	X	X	X	X	X L	
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CITY OF KELOWNA ATTN: Marcia Browne 1595 Glenmore Road N. Kelowna BC V1V 2C5

Date Received: 22-SEP-16 Report Date: 29-SEP-16 18:50 (MT) Version: FINAL

Client Phone: 250-469-8796

Certificate of Analysis

Lab Work Order #: L1832582 Project P.O. #: Job Reference: C of C Numbers: Legal Site Desc:

520747 1186-202 POND

Dean Watt, B.Sc. Account Manager

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L1832582 CONTD.... PAGE 2 of 7 29-SEP-16 18:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1832582-1 Surface Water 21-SEP-16 11:20 COMMONAGE DRAINAGE POND	L1832582-2 Surface Water 21-SEP-16 12:20 DAVIDSON POND	L1832582-3 Surface Water 21-SEP-16 11:00 ROSES POND	
Grouping	Analyte				
VATER					
Physical Tests	Conductivity (uS/cm)	962	3550	7030	
	Hardness (as CaCO3) (mg/L)	222	565	1620	
	рН (рН)	8.24	8.62	8.56	
	Total Suspended Solids (mg/L)	<3.0	<3.0	4.8	
Anions and Nutrients	Ammonia, Total (as N) (mg/L)	2.33	0.0278	0.0237	
	Chloride (Cl) (mg/L)	99.4	347 DLDS	537 DLDS	
	Nitrate (as N) (mg/L)	0.336	<0.10	<0.25	
	Nitrite (as N) (mg/L)	0.211	<0.020	<0.050	
	Total Kjeldahl Nitrogen (mg/L)	4.16	1.72	1.55	
	Total Nitrogen (mg/L)	4.71	1.72	1.55	
	Orthophosphate-Dissolved (as P) (mg/L)	1.36	<0.0010	<0.0010	
Bacteriological Tests	E. coli (MPN/100mL)	<10	2720	<10	
	Coliform Bacteria - Total (MPN/100mL)	1660	488000	2480	
otal Metals	Aluminum (Al)-Total (mg/L)	0.116	<0.015	0.015	
	Antimony (Sb)-Total (mg/L)	<0.00050	<0.00050	0.00063	
	Arsenic (As)-Total (mg/L)	0.00136	0.00358	0.00525	
	Barium (Ba)-Total (mg/L)	0.034	<0.020	<0.020	
	Beryllium (Be)-Total (mg/L)	<0.0010	<0.0010	<0.0010	
	Bismuth (Bi)-Total (mg/L)	<0.20	<0.20	<0.40	
	Boron (B)-Total (mg/L)	0.16	<0.10	<0.20	
	Cadmium (Cd)-Total (mg/L)	0.0000468	<0.000025	<0.000025	
	Calcium (Ca)-Total (mg/L)	53.1	52.4	52.5	
	Chromium (Cr)-Total (mg/L)	<0.0010	<0.0010	<0.0010 _{DLA}	
	Cobalt (Co)-Total (mg/L)	0.00042	<0.00050 DLA	<0.00050 DLA	
	Copper (Cu)-Total (mg/L)	0.0117	<0.0025	<0.0025	
	Iron (Fe)-Total (mg/L)	0.206	<0.030	<0.060	
	Lead (Pb)-Total (mg/L)	<0.00050	<0.00050	<0.00050	
	Lithium (Li)-Total (mg/L)	0.0107	0.0501	0.0752	
	Magnesium (Mg)-Total (mg/L)	22.0	110	370	
	Manganese (Mn)-Total (mg/L)	0.147	0.0841	0.0426	
	Mercury (Hg)-Total (mg/L)	<0.000050	0.0000089	<0.0000050	
	Molybdenum (Mo)-Total (mg/L)	0.0044	<0.0010	<0.0010	
	Nickel (Ni)-Total (mg/L)	ol.0025	O.0025	O.0025	
	Phosphorus (P)-Total (mg/L)	1.66	<0.30	<0.60	
	Potassium (K)-Total (mg/L)	22.1	46.2	105	
	Selenium (Se)-Total (mg/L)	0.000534	DLA <0.00025	DLA <0.00025	

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	Sample ID	L1832582-1	L1832582-2	L1832582-3	
	Description	Surface Water	Surface Water	Surface Water	
	Sampled Date	21-SEP-16	21-SEP-16	21-SEP-16	
	Sampled Time	11:20 COMMONAGE	12:20 DAVIDSON POND	11:00 ROSES POND	
	Client ID	DRAINAGE POND			
Grouping	Analyte				
WATER					
Total Metals	Silicon (Si)-Total (mg/L)	3.96	1.63	0.43	
	Silver (Ag)-Total (mg/L)	0.000063	DLA <0.000050	DLA <0.000050	
	Sodium (Na)-Total (mg/L)	108	596	1090	
	Strontium (Sr)-Total (mg/L)	0.558	0.784	0.483	
	Thallium (TI)-Total (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Total (mg/L)	<0.00050	<0.00050	<0.00050	
	Titanium (Ti)-Total (mg/L)	<0.010	<0.010	DLHC <0.020	
	Uranium (U)-Total (mg/L)	0.00193	0.00481	0.00434	
	Vanadium (V)-Total (mg/L)	0.00126	DLA <0.0025	ol.0025	
	Zinc (Zn)-Total (mg/L)	0.0284	<0.0050	DLHC <0.010	
Dissolved Metals	Dissolved Mercury Filtration Location	FIELD	FIELD	FIELD	
	Dissolved Metals Filtration Location	FIELD	FIELD	FIELD	
	Aluminum (AI)-Dissolved (mg/L)	0.0185	<0.0050	0.0073	
	Antimony (Sb)-Dissolved (mg/L)	<0.00050	<0.00050	0.00066	
	Arsenic (As)-Dissolved (mg/L)	0.00114	0.00338	0.00521	
	Barium (Ba)-Dissolved (mg/L)	0.030	<0.020	<0.020	
	Beryllium (Be)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	
	Bismuth (Bi)-Dissolved (mg/L)	<0.20	<0.20	DLA <0.40	
	Boron (B)-Dissolved (mg/L)	0.17	<0.10	DLA <0.20	
	Cadmium (Cd)-Dissolved (mg/L)	0.0000229	<0.000010	DLA <0.000025	
	Calcium (Ca)-Dissolved (mg/L)	53.9	53.6	51.1	
	Chromium (Cr)-Dissolved (mg/L)	<0.0010	<0.0010	<0.0010	
	Cobalt (Co)-Dissolved (mg/L)	0.00032	<0.00030	DLA <0.00050	
	Copper (Cu)-Dissolved (mg/L)	0.0036	<0.0010	<0.0010	
	Iron (Fe)-Dissolved (mg/L)	0.043	<0.030	DLA <0.060	
	Lead (Pb)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	
	Lithium (Li)-Dissolved (mg/L)	0.0095	0.0434	0.0645	
	Magnesium (Mg)-Dissolved (mg/L)	21.2	105	362	
	Manganese (Mn)-Dissolved (mg/L)	0.0596	0.0273	0.0257	
	Mercury (Hg)-Dissolved (mg/L)	_{DLM}	<0.0000050	<0.0000050	
	Molybdenum (Mo)-Dissolved (mg/L)	0.0040	<0.0010	<0.0010	
	Nickel (Ni)-Dissolved (mg/L)	0.0016	0.0012	DLA <0.0025	
	Phosphorus (P)-Dissolved (mg/L)	1.49	<0.30	<0.60	
	Potassium (K)-Dissolved (mg/L)	20.3	43.9	108	
	Selenium (Se)-Dissolved (mg/L)	0.000507	0.00016	DLA <0.00025	
	Silicon (Si)-Dissolved (mg/L)	3.71	1.51	0.39	
	Silver (Ag)-Dissolved (mg/L)	<0.000020	<0.000020	DLA <0.000050	

L1832582 CONTD.... PAGE 4 of 7 29-SEP-16 18:50 (MT) Version: FINAL

	Sample ID Description Sampled Date Sampled Time Client ID	L1832582-1 Surface Water 21-SEP-16 11:20 COMMONAGE DRAINAGE POND	L1832582-2 Surface Water 21-SEP-16 12:20 DAVIDSON POND	L1832582-3 Surface Water 21-SEP-16 11:00 ROSES POND	
Grouping	Analyte				
WATER					
Dissolved Metals	Sodium (Na)-Dissolved (mg/L)	101	560	1140	
	Strontium (Sr)-Dissolved (mg/L)	0.539	0.761	0.521	
	Thallium (TI)-Dissolved (mg/L)	<0.00020	<0.00020	<0.00020	
	Tin (Sn)-Dissolved (mg/L)	<0.00050	<0.00050	<0.00050	
	Titanium (Ti)-Dissolved (mg/L)	<0.010	<0.010	DLA <0.020	
	Uranium (U)-Dissolved (mg/L)	0.00173	0.00526	0.00436	
	Vanadium (V)-Dissolved (mg/L)	0.00097	DLA <0.0010	ol.0025	
	Zinc (Zn)-Dissolved (mg/L)	0.0212	<0.0050	DLA <0.010	
Aggregate	BOD (mg/L)	6.2	2.1	<2.0	
Organics	COD (mg/L)	75	75	76	

L1832582 CONTD.... PAGE 5 of 7 29-SEP-16 18:50 (MT) Version: FINAL

QC Samples with Qualifiers & Comments:

QC Type Descript	ion Parameter	Qualifier	Applies to Sample Number(s)							
Method Blank	Chromium (Cr)-Total	MB-LOR	L1832582-1, -2, -3							
Method Blank	Copper (Cu)-Total	MB-LOR	L1832582-1, -2, -3							
Method Blank	Manganese (Mn)-Total	MB-LOR	L1832582-1, -2, -3							
Method Blank	Nickel (Ni)-Total	MB-LOR	L1832582-1, -2, -3							
Matrix Spike	Manganese (Mn)-Dissolved	MS-B	L1832582-1, -2, -3							
Matrix Spike	Magnesium (Mg)-Dissolved	MS-B	L1832582-1, -2, -3							
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1832582-1, -2, -3							
Matrix Spike	Silicon (Si)-Dissolved	MS-B	L1832582-1, -2, -3							
Matrix Spike	Sodium (Na)-Dissolved	MS-B	L1832582-1, -2, -3							
Qualifiers for Inc	lividual Parameters Listed:									
Qualifier [Description									
DLA [Detection Limit adjusted for required dilution									
DLB [Detection Limit Raised. Analyte detected at comparabl	e level in Method Blan	k.							
DLDS [Detection Limit Raised: Dilution required due to high Dissolved Solids / Electrical Conductivity.									

DLHC Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

DLM Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).

MB-LOR Method Blank exceeds ALS DQO. Limits of Reporting have been adjusted for samples with positive hits below 5x blank level.

MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- "BIOCHEMICAL OXYGEN DEMAND"
oxygen demand (BOD) are dissolved oxygen meter. Di	determined ssolved BOE	dures adapted from APHA Method 5210 B - "Biochemic by diluting and incubating a sample for a specified time 0 (SOLUBLE) is determined by filtering the sample thro a nitrification inhibitor to the diluted sample prior to incul	period, and measuring the oxygen depletion using a ugh a glass fibre filter prior to dilution. Carbonaceous
BOD5-VA	Water	Biochemical Oxygen Demand- 5 day	APHA 5210 B- BIOCHEMICAL OXYGEN DEMAND
oxygen demand (BOD) are dissolved oxygen meter. Di	determined ssolved BOE	dures adapted from APHA Method 5210 B - "Biochemic by diluting and incubating a sample for a specified time 0 (SOLUBLE) is determined by filtering the sample thro a nitrification inhibitor to the diluted sample prior to incul	period, and measuring the oxygen depletion using a ugh a glass fibre filter prior to dilution. Carbonaceous
CL-IC-N-VA	Water	Chloride in Water by IC	EPA 300.1 (mod)
Inorganic anions are analyz	zed by Ion Ch	nromatography with conductivity and/or UV detection.	
COD-COL-VA	Water	Chemical Oxygen Demand by Colorimetric	APHA 5220 D. CHEMICAL OXYGEN DEMAND
This analysis is carried out determined using the close		dures adapted from APHA Method 5220 "Chemical Oxy urimetric method.	gen Demand (COD)". Chemical oxygen demand is
EC-PCT-VA	Water	Conductivity (Automated)	APHA 2510 Auto. Conduc.
This analysis is carried out electrode.	using proced	dures adapted from APHA Method 2510 "Conductivity".	Conductivity is determined using a conductivity
ECOLI-COLI-ENV-VA	Water	E.coli by Colilert	APHA METHOD 9223
determined simultaneously	. The sample s and then th	dures adapted from APHA Method 9223 "Enzyme Subs a is mixed with a mixture hydrolyzable substrates and the ne number of wells exhibiting a positive response are co	nen sealed in a multi-well packet. The packet is
HARDNESS-CALC-VA	Water	Hardness	APHA 2340B
		ss) is calculated from the sum of Calcium and Magnesic centrations are preferentially used for the hardness cal	
HG-D-CVAA-VA	Water	Diss. Mercury in Water by CVAAS or CVAFS	APHA 3030B/EPA 1631E (mod)
Water samples are filtered with stannous chloride, and		reserved with hydrochloric acid, then undergo a cold-ox v CVAAS or CVAFS.	vidation using bromine monochloride prior to reduction
HG-T-CVAA-VA	Water	Total Mercury in Water by CVAAS or CVAFS	EPA 1631E (mod)
Water samples undergo a o	cold-oxidation	n using bromine monochloride prior to reduction with sta	annous chloride, and analyzed by CVAAS or CVAFS.

MET-D-CCMS-VA

APHA 3030B/6020A (mod)

Water samples are filtered	l (0.45 um), p	reserved with nitric acid, and analyzed by CRC ICPM	IS.
Method Limitation (re: Sulf	ur): Sulfide a	nd volatile sulfur species may not be recovered by thi	is method.
MET-DIS-ICP-VA	Water	Dissolved Metals in Water by ICPOES	EPA SW-846 3005A/6010B
American Public Health As	ssociation, ar ection Agence	y (EPA). The procedure involves filtration (EPA Meth	ination of Water and Wastewater" published by the valuating Solid Waste" SW-846 published by the United nod 3005A) and analysis by inductively coupled plasma -
MET-T-CCMS-VA	Water	Total Metals in Water by CRC ICPMS	EPA 200.2/6020A (mod)
Water samples are digeste	ed with nitric	and hydrochloric acids, and analyzed by CRC ICPMS).
Method Limitation (re: Sulf	ur): Sulfide a	nd volatile sulfur species may not be recovered by thi	is method.
MET-TOT-ICP-VA	Water	Total Metals in Water by ICPOES	EPA SW-846 3005A/6010B
American Public Health As States Environmental Prot	ssociation, ar ection Agence	y (EPA). The procedures may involve preliminary sa	ination of Water and Wastewater" published by the valuating Solid Waste" SW-846 published by the United mple treatment by acid digestion, using either hotblock or na - optical emission spectrophotometry (EPA Method
N-T-COL-VA	Water	Total Nitrogen in water by Colour	APHA4500-P(J)/NEMI9171/USGS03-4174
		dures adapted from APHA Method 4500-P (J) "Persu lational Environmental Methods Index - Nemi method	Iphate Method for Simultaneous Determination of Total 5735.
NH3-F-VA	Water	Ammonia in Water by Fluorescence	APHA 4500 NH3-NITROGEN (AMMONIA)
			rom J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society ace levels of ammonium in seawater", Roslyn J. Waston et
NH3-F-VA	Water	Ammonia in Water by Fluorescence	J. ENVIRON. MONIT., 2005, 7, 37-42, RSC
			rom J. Environ. Monit., 2005, 7, 37 - 42, The Royal Society ace levels of ammonium in seawater", Roslyn J. Waston et
NO2-L-IC-N-VA	Water	Nitrite in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analy	zed by Ion C	hromatography with conductivity and/or UV detection.	
NO3-L-IC-N-VA	Water	Nitrate in Water by IC (Low Level)	EPA 300.1 (mod)
Inorganic anions are analy	zed by Ion C	hromatography with conductivity and/or UV detection	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H "pH Value"
This analysis is carried our electrode	t using proce	dures adapted from APHA Method 4500-H "pH Value	". The pH is determined in the laboratory using a pH
It is recommended that thi	s analysis be	conducted in the field.	
PH-PCT-VA	Water	pH by Meter (Automated)	APHA 4500-H pH Value
This analysis is carried our electrode	t using proce	dures adapted from APHA Method 4500-H "pH Value	". The pH is determined in the laboratory using a pH
It is recommended that thi	s analysis be	conducted in the field.	
PO4-DO-COL-VA	Water	Diss. Orthophosphate in Water by Colour	APHA 4500-P Phosphorus
		dures adapted from APHA Method 4500-P "Phosphor been lab or field filtered through a 0.45 micron membr	
TCOLI-COLI-ENV-VA	Water	Total coliform by Colilert	APHA METHOD 9223
determined simultaneously	/. The samplers and then t	dures adapted from APHA Method 9223 "Enzyme Su e is mixed with a mixture hydrolyzable substrates and he number of wells exhibiting a positive response are bbable number).	then sealed in a multi-well packet. The packet is
TKN-CALC-VA	Water	TKN in Water (Calculation)	BC MOE LABORATORY MANUAL (2005)
Total Kjeldahl Nitrogen is a	a calculated p	parameter. Total Kjeldahl Nitrogen (calc) = Total Nitro	gen - [Nitrite (as N) + Nitrate (as N)].
TSS-VA	Water	Total Suspended Solids by Gravimetric	APHA 2540 D - GRAVIMETRIC

This analysis is carried out using procedures adapted from APHA Method 2540 "Solids". Solids are determined gravimetrically. Total Suspended Solids (TSS) are determined by filtering a sample through a glass fibre filter, TSS is determined by drying the filter at 104 degrees celsius. Samples containing very high dissolved solid content (i.e. seawaters, brackish waters) may produce a positive bias by this method. Alternate analysis methods are available for these types of samples.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code Laboratory Location

VA

ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

GLOSSARY OF REPORT TERMS

Surrogate - A compound that is similar in behaviour to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. mg/kg - milligrams per kilogram based on dry weight of sample.

mg/kg wwt - milligrams per kilogram based on wet weight of sample.

mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.

mg/L - milligrams per litre.

< - Less than.

D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.

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Report To							equie	sted	(Rush	for ro	utine	analys	is sub	viect to	vavailr	ability	<u></u>
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Address: 1595 Glenmore Road N. Kelowna BC V1V2C5					-					-							
Address. 1999 Glerinnole Hold H. Roldmin BO V 17205		mbrowne@kelo			OEmergency (1-2 Bus, Days) - 100% Surcharge - Contact ALS to Confirm TAT OSame Day or Weekend Emergency - Contact ALS to Confirm TAT												
Phone: 250-469-8796 Fax: 250-862-3342		mlewis@kelowr			Analysis Request												
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(lab use only)	LS Jontact:	Dean Watt	Sampler:		etals	ed meta	g	ш	Ammonia	a	Nitrogen,	NO3-N	rdness				r of Containers
Sample Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Total metals	Dissolved metals	BOD,COD	T. Coliform,	TSS, An	0-P04-P	Total Ni	NO2-N, NO3-N	Total hardness	ы Ш	Chloride	Æ	Number
Commonage Drainage Pond		21-Sep-16	11:20am	Surface Water	X	x	x	X	X	X	X	X	X	x	X	X	5
		21-Sep-16	12:20 pm	Surface Water	X	X	x	X	x	X	X	X	X	X	x	x	5
		·															
Rose's Pond (RP)		21-Sep-16	11:00 am	Surface Water	X	X	X	X	X	Х	X	X	X	Х	X	X	5
Please return cooler and icepacks with replacement bottles	and preserva	-	ι ι														
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Please use CCME/ BC WQG guidelines for both Davidson Pond and Rose	e's Pond for T	otal Metals Ana	lysis and continu	e using BC CSR	guidel	lines f	or Co	mmo	nage	Drain	nage I	Pond.	Pleas	se ret	urn o	ooler	, ice
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As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa Asia Australasia Europe

+ 27 11 254 4800 + 86 21 6258 5522

+ 61 3 8862 3500 + 356 21 42 30 20

North America + 1 800 275 3281

South America + 56 2 2616 2000

solutions@golder.com www.golder.com

Golder Associates Ltd. 590 McKay Avenue, Suite 300 Kelowna, British Columbia, V1Y 5A8 Canada T: +1 (250) 860 8424

