



THURBER ENGINEERING LTD.

November 19, 2014

File: 17-971-21

Cowichan Valley Regional District
175 Ingram Street
Duncan, BC V9L 1N8

Attention: Emily Doyle-Yamaguchi

**2014 ANNUAL MONITORING WELL SAMPLING
FISHER ROAD GROUNDWATER INVESTIGATION**

Dear Emily:

Thurber Engineering Ltd. (Thurber) is pleased to submit to the Cowichan Valley Regional District (CVRD) this report summarizing the results of groundwater sampling near Fisher Road in Cobble Hill, BC.

All work has been undertaken according to our Statement of Limitations and Conditions, attached at the end of this letter.

1. BACKGROUND

At the request of the CVRD, Thurber initiated an investigation in 2012 into the source of elevated nitrates in a groundwater supply well located at 1355 Fisher Road.

Following the initial studies which evaluated potential sources of nitrates in the groundwater (Thurber, 2011a, 2011b), four monitoring wells were completed in the aquifer (Thurber, 2013; 2014). The first three wells, numbered MW12-1 to -3 were located downgradient from identified potential nitrates source(s), while MW13-4 was installed upgradient.

Historical sampling of the monitoring wells and the groundwater supply well at 1355 Fisher Road has shown that nitrate in the aquifer exceeds the BC Contaminated Sites Regulation (CSR) Drinking Water (DW) standards at wells MW12-1 to -3 and at the 1355 Fisher Road supply well. The ratios of nitrogen and oxygen isotopes in the water samples taken at MW12-1 and MW12-3 (downgradient of composting operations at 1345 and 1355 Fisher Rd) indicated an organic source of nitrates. The isotopic signature in groundwater at MW12-2 and the 1355 Fisher Road supply well (both downgradient of greenhouse operations at 1360 Fisher Road) was different and indicative of a synthetic-based fertilizer source.

As part of ongoing groundwater monitoring of the aquifer in the area of Fisher Road, the CVRD monitoring wells are to be sampled on an annual basis. This letter provides the result of sampling undertaken in September 2014.

The scope of work for this project was submitted in a letter dated December 5, 2013. Approval to proceed was provided by the CVRD in a June 24, 2014 email.



2. METHODOLOGY

Field procedures consisted of the following at each well:

- Measure depth to groundwater surface;
- Download hourly water level data from existing transducers;
- Extract a minimum 3 well volumes of groundwater using Waterra Hydrolift pump with dedicated tubing and foot valves ;
- Record the field parameters pH, temperature and electrical conductivity (EC) during well purging;
- Collect samples in pre-cleaned containers provided by the laboratory (Maxxam Analytics Inc.) for the specific analyte; and,
- Store containers in a cooler packed with ice and transport samples to the laboratory.

Groundwater levels were measured and water samples were collected from monitoring wells MW12-1 to -3 and MW13-4 on September 24, 2014. Drawing 17-971-21-1 in Appendix A shows the monitoring well locations and Figure 1 in Appendix A is a plot of the hourly groundwater elevations measured at the wells. The analytical results of sampling are summarized in Table 1 in Appendix B with laboratory data sheets included.

The following analyses were conducted on the groundwater samples:

- Routine parameters including major ions, pH, alkalinity, hardness, total dissolved solids, etc.
- Nitrogen species (nitrate, nitrite, ammonia, total nitrogen and total Kjeldahl nitrogen)
- Total metals

We understand that sampling of the on-site supply well at 1355 Fisher Road is conducted by the site owner on a quarterly basis and the resulting analytical data are provided to the CVRD. The CVRD's request of the owner to include the sampling results from this well in our report was denied.

3. RESULTS AND DISCUSSION

3.1 Groundwater Elevations

Hourly water level data are collected in three of the monitoring wells using transducers that automatically log pressure readings at set intervals. The data are converted to water levels by subtracting barometric pressure from the total pressure measured in the wells. Groundwater



elevations collected since the dataloggers were installed in the Fall of 2012 are shown in Figure 1. Originally the dataloggers were placed in wells MW12-1, MW12-2, and MW12-3. In November 2013, the datalogger from MW12-2 was removed and placed in MW13-4.

As observed in the past (Thurber, 2014), the hourly water level data show high frequency (daily scale) and lower frequency (monthly scale) water level fluctuations. The high frequency fluctuations in the data, are thought to result from the delay in barometric pressure changes through the thick sediments reaching the water table. Noise may be introduced into the dataset when barometric pressure at a given time is subtracted from total pressure in the wells since the total pressure is affected by earlier barometric changes. The result is an introduced error on the order of 0.1 to 0.5 m. As it appears to occur similarly at each of the wells, this error does not significantly affect the inferred flow gradient between locations.

The water levels in the monitoring wells also appear to fluctuate by about 0.5 m on a time scale of several months. During the period of monitoring, groundwater levels were generally decreasing from October to February 2013, then increasing until June 2013, and again decreasing to present (Fall 2014). The higher-scale trends in aquifer water levels are likely related to recharge through infiltration of precipitation. It is not clear, however, why a distinct increase in water levels is observed in the Spring of 2013 and not in the Spring of 2014.

The inferred groundwater flow gradient, as determined from the relative water elevations in the monitoring wells, has not changed significantly since monitoring began. Based on the current and historical measurements, the gradient is on the order of 0.004 toward the north-northwest.

3.2 Sampling Results

Table 1 in Appendix B provides the results of September 24, 2014 and historical water sampling at the Fisher Road monitoring wells. The values in the table are compared to CSR DW Standards and criteria from the Guidelines for Canadian Drinking Water Quality (Guidelines).

Major Ions and Indicator Parameters

Sulphate, fluoride, pH, and alkalinity at all the monitoring wells were generally consistent with previous measurements and remained below the respective limits in the CSR DW Standards and Guidelines.

TDS at MW12-2 (737 mg/L) and MW12-3 (797 mg/L) during recent sampling exceeded the Guideline Aesthetic Objective (AO) of 500 mg/L. TDS at MW12-2 was generally consistent with previous sampling results at this well, however, the TDS at MW12-3 has increased significantly in the two sampling events since February 2013 when it was measured to be 329 mg/L.

Chloride remained generally similar to historical values at all the wells and was below the CSR DW standard and Guidelines AO of 250 mg/L except at well MW12-3, where the recent concentration was measured to be 262 mg/L. Similar to TDS, chloride (which contributes to TDS) has increased at MW12-3 in the three sampling dates since September 2012 when a concentration of 69.5 mg/L was measured.



The TDS and chloride values at MW12-2 and MW12-3 can be compared to 124 mg/L and 4.24 mg/L respectively, which were measured at upgradient well MW13-4.

Nitrogen Species

Nitrate concentrations at MW12-1 (33.8 mg/L), MW12-2 (92.5 mg/L), and MW12-3 (19.7 mg/L) on September 24, 2014 were all above the CSR DW standard and Guidelines maximum acceptable concentration (MAC) of 10 mg/L as they have been in the past. Nitrate values increased at all the monitoring wells from previous sampling in November 2013. The concentration at MW12-2 during recent sampling was consistent with previous values and the concentrations at MW12-1 and MW12-3 were slightly higher than those measured in the past. The nitrate concentration measured at MW13-4 during recent sampling was 0.438 mg/L.

Due to a lab error, we understand that the water sample for MW12-1 was analyzed past the recommended holding time for nitrate. Given the similarity in nitrate concentrations between recent and previous sampling, we do not believe this has had a significant effect on the measured nitrate value in this well.

Ammonia (which is mostly present as ammonium at near-neutral pH) varied from <0.0050 mg-N/L at MW12-2 to 0.096 mg-N/L at MW12-1. The concentration in upgradient well MW13-4 was 0.0076 mg-N/L. These results were generally consistent with historical values

Nitrite concentrations in wells MW12-1 to -3 and MW13-4 were respectively: 0.036, 0.085, <0.010 and <0.010 mg-N/L. All nitrite concentrations were below the respective CSR DW standard (3.2 mg-N/L) and Guidelines MAC (1 mg-N/L).

Total metals

There is significant variability in total metal concentrations between monitoring wells and between sampling dates. As total metal concentration can be highly affected by suspended sediment in the water, the variability is thought to be caused by the inconsistency in turbidity between sampling events. The latter may be due to the mobilization of sediment in the wells during purging and sampling from the motion of Waterra pumping.

As in the past, several total metal concentrations in the monitoring wells exceeded the respective Guideline criteria (the CSR criteria are intended to be applied to dissolved and not total metals). These include total aluminum, iron and manganese in all the wells, total chromium at MW12-2, and total arsenic, total chromium and total lead at MW12-1. The high concentrations are thought to be largely present in the sediment load and therefore not indicative of the dissolved groundwater chemistry. This is supported by comparison to historical dissolved metals concentrations which are much lower than total metal concentrations. Since samples for dissolved metals are run through a 45 µm filter, they are not affected by turbidity.



4. SUMMARY AND CONCLUSIONS

From the data presented in this report, the groundwater flow gradient and sampling results are generally consistent with those of the past.

Groundwater elevations measured in the monitoring wells indicate the groundwater flow direction is toward the north-northwest as measured previously. Hourly readings recorded by the dataloggers show that, despite daily and seasonal fluctuations on the order of 0.5 m, the flow gradient remains generally consistent over time.

Nitrate has increased slightly at all monitoring wells from the previous sampling date (November 2013). Chloride has increased in monitoring well MW12-3 since sampling was initiated in 2012. The chloride concentration of 262 mg/L measured from the water sample obtained on September 24, 2014 exceeded the Guideline AO and CSR DW Standard of 250 mg/L.

Based on current and previous investigations, our interpretation of groundwater conditions in the area remains unchanged. The source of nitrate in MW12-2 is thought to be from the greenhouse operation at 1360 Fisher Road and the source(s) of nitrates in MW12-1 and MW12-3 from composting operations at 1355 and 1345 Fisher Rd. As previously indicated (Thurber, 2013), elevated chloride (ranging from 186 to 316 mg/L) has been observed in the compost leachate samples, which may be a source of chloride contamination in the aquifer upgradient from MW12-3.

The extent of groundwater contamination beyond wells MW12-1 and MW12-3 is not known. Additional wells would be required to delineate downgradient groundwater conditions to the north of these locations.

5. RECOMMENDATIONS

It is recommend that ongoing monitoring at Fisher Road be maintained in 2015 as it was conducted in 2014. This includes sampling of all the monitoring wells and reporting undertaken on an annual basis. Download of the dataloggers in the monitoring wells should be done at least once a year when the wells are sampled, however, it would be beneficial to increase the frequency of downloads (e.g. to 3 or 4 times per year) to reduce the amount of potential data loss in the event of equipment malfunction.



6. CLOSURE

We trust this provides the information you require at this time. If you have any questions regarding this document, please contact the undersigned at your earliest convenience.

Yours truly,
Thurber Engineering Ltd.
Kevin Sterne, P.Eng.
Review Principal

The seal is circular with a double-line border. The text inside the seal reads: 'PROFESSIONAL' at the top, 'PROVINCE OF' in the middle, 'G. W. PETERSMEYER' below that, '#32140' below that, 'BRITISH COLUMBIA' below that, and 'GEO SCIENTISTS' at the bottom. A handwritten signature in blue ink is written across the seal.

Chad Petersmeyer, P.Geo.
Hydrogeologist

Attachment



7. REFERENCES

Thurber Engineering Ltd., New Monitoring Well Construction and Well Sampling, Fisher Road Groundwater Investigation, report submitted to the CVRD, February 4, 2014.

Thurber Engineering Ltd., Fisher Road Groundwater Investigation, Cobble Hill, B.C., report submitted to the CVRD, April 30, 2013.

Thurber Engineering Ltd., Preliminary Environmental Assessment, 1355 Fisher Road, Cobble Hill, B.C., report submitted to the CVRD, December 5, 2011a.

Thurber Engineering Ltd., 1355 Fisher Road, Cobble Hill, BC, Groundwater Flow Assessment, report submitted to the CVRD, May 16, 2011b.



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This study and Report have been prepared in accordance with generally accepted engineering or environmental consulting practices in this area. No other warranty, expressed or implied, is made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report which is of a summary nature and is not intended to stand alone without reference to the instructions given to us by the Client, communications between us and the Client, and to any other reports, writings, proposals or documents prepared by us for the Client relative to the specific site described herein, all of which constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. WE CANNOT BE RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to us by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the document, subject to the limitations provided herein, are only valid to the extent that this Report expressly addresses proposed development, design objectives and purposes, and then only to the extent there has been no material alteration to or variation from any of the said descriptions provided to us unless we are specifically requested by the Client to review and revise the Report in light of such alteration or variation or to consider such representations, information and instructions.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT OUR WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS WE MAY EXPRESSLY APPROVE. The contents of the Report remain our copyright property. The Client may not give, lend or, sell the Report, or otherwise make the Report, or any portion thereof, available to any person without our prior written permission. Any use which a third party makes of the Report, are the sole responsibility of such third parties. Unless expressly permitted by us, no person other than the Client is entitled to rely on this Report. We accept no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without our express written permission.

5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel, may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and this report is delivered on the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. Where special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to us. We have relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, we cannot accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by us. We are entitled to rely on such representations, information and instructions and are not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

(see over ...)



INTERPRETATION OF THE REPORT *(continued. . .)*

- c) Design Services: The Report may form part of the design and construction documents for information purposes even though it may have been issued prior to the final design being completed. We should be retained to review the final design, project plans and documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the report recommendations and the final design detailed in the contract documents should be reported to us immediately so that we can address potential conflicts.
- d) Construction Services: During construction we must be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. RISK LIMITATION

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause an accidental release of those substances. In consideration of the provision of the services by us, which are for the Client's benefit, the Client agrees to hold harmless and to indemnify and defend us and our directors, officers, servants, agents, employees, workmen and contractors (hereinafter referred to as the "Company") from and against any and all claims, losses, damages, demands, disputes, liability and legal investigative costs of defence, whether for personal injury including death, or any other loss whatsoever, regardless of any action or omission on the part of the Company, that result from an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project. This indemnification shall extend to all Claims brought or threatened against the Company under any federal or provincial statute as a result of conducting work on this Project. In addition to the above indemnification, the Client further agrees not to bring any claims against the Company in connection with any of the aforementioned causes.

7. SERVICES OF SUBCONSULTANTS AND CONTRACTORS

The conduct of engineering and environmental studies frequently requires hiring the services of individuals and companies with special expertise and/or services which we do not provide. We may arrange the hiring of these services as a convenience to our Clients. As these services are for the Client's benefit, the Client agrees to hold the Company harmless and to indemnify and defend us from and against all claims arising through such hirings to the extent that the Client would incur had he hired those services directly. This includes responsibility for payment for services rendered and pursuit of damages for errors, omissions or negligence by those parties in carrying out their work. In particular, these conditions apply to the use of drilling, excavation and laboratory testing services.

8. CONTROL OF WORK AND JOBSITE SAFETY

We are responsible only for the activities of our employees on the jobsite. The presence of our personnel on the site shall not be construed in any way to relieve the Client or any contractors on site from their responsibilities for site safety. The Client acknowledges that he, his representatives, contractors or others retain control of the site and that we never occupy a position of control of the site. The Client undertakes to inform us of all hazardous conditions, or other relevant conditions of which the Client is aware. The Client also recognizes that our activities may uncover previously unknown hazardous conditions or materials and that such a discovery may result in the necessity to undertake emergency procedures to protect our employees as well as the public at large and the environment in general. These procedures may well involve additional costs outside of any budgets previously agreed to. The Client agrees to pay us for any expenses incurred as the result of such discoveries and to compensate us through payment of additional fees and expenses for time spent by us to deal with the consequences of such discoveries. The Client also acknowledges that in some cases the discovery of hazardous conditions and materials will require that certain regulatory bodies be informed and the Client agrees that notification to such bodies by us will not be a cause of action or dispute.

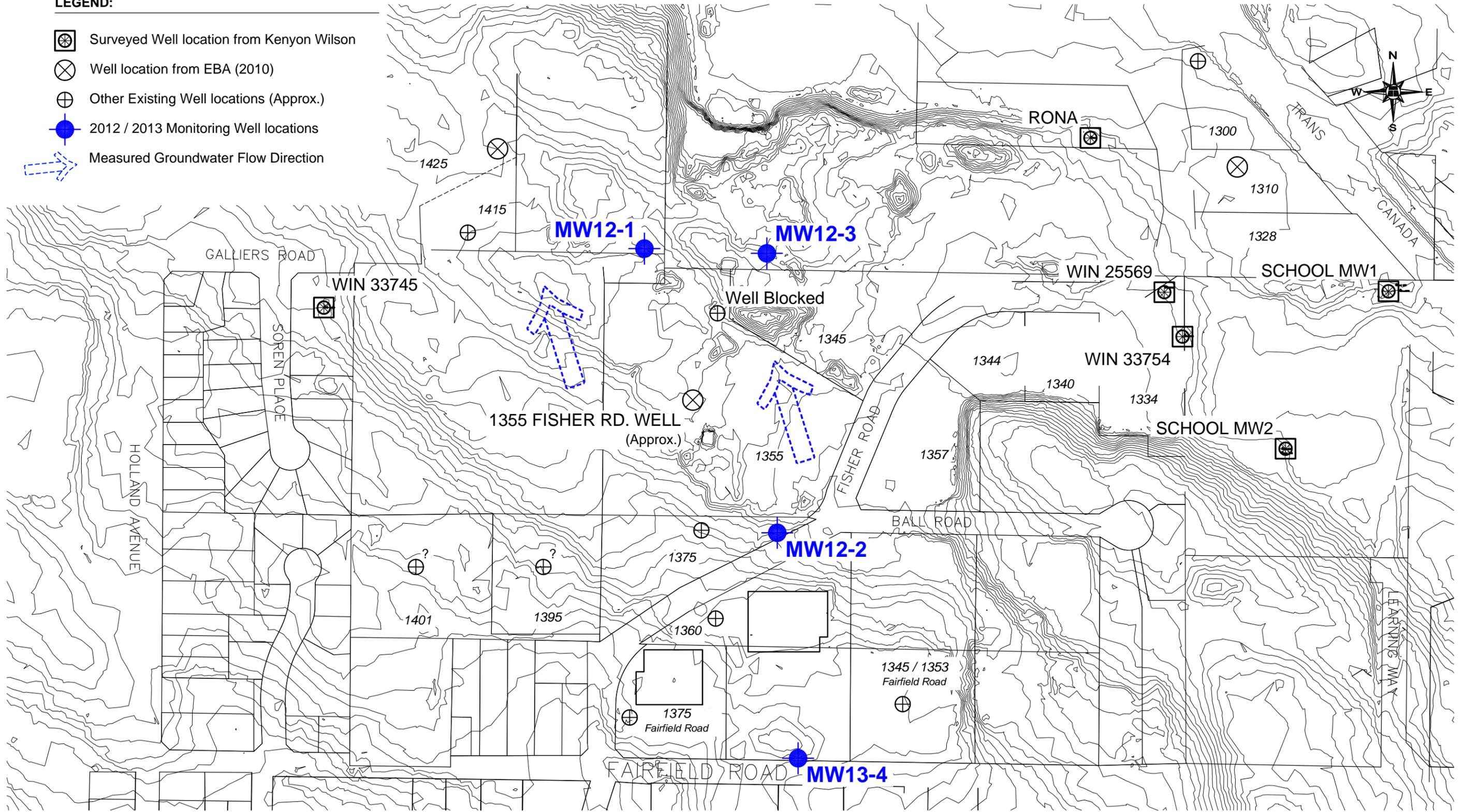
9. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on our interpretation of conditions revealed through limited investigation conducted within a defined scope of services. We cannot accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



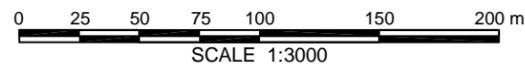
LEGEND:

-  Surveyed Well location from Kenyon Wilson
-  Well location from EBA (2010)
-  Other Existing Well locations (Approx.)
-  2012 / 2013 Monitoring Well locations
-  Measured Groundwater Flow Direction



NOTES:

1. Digital base plan provided by Kenyon Wilson, Land Surveyors.
2. Contours from C.V.R.D.; 1 m contour intervals.



THURBER ENGINEERING LTD.

DESIGNED CWP/PJW	DRAWN RRS	APPROVED CWP
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COWICHAN VALLEY REGIONAL DISTRICT		
FISHER ROAD AREA WELL LOCATIONS		
FISHER ROAD GROUNDWATER MONITORING		COBBLE HILL, B.C.
DATE NOVEMBER 19, 2014	SCALE 1:3000	PROJECT No. DWG. NO. REV. 17-971-21 -1 - -

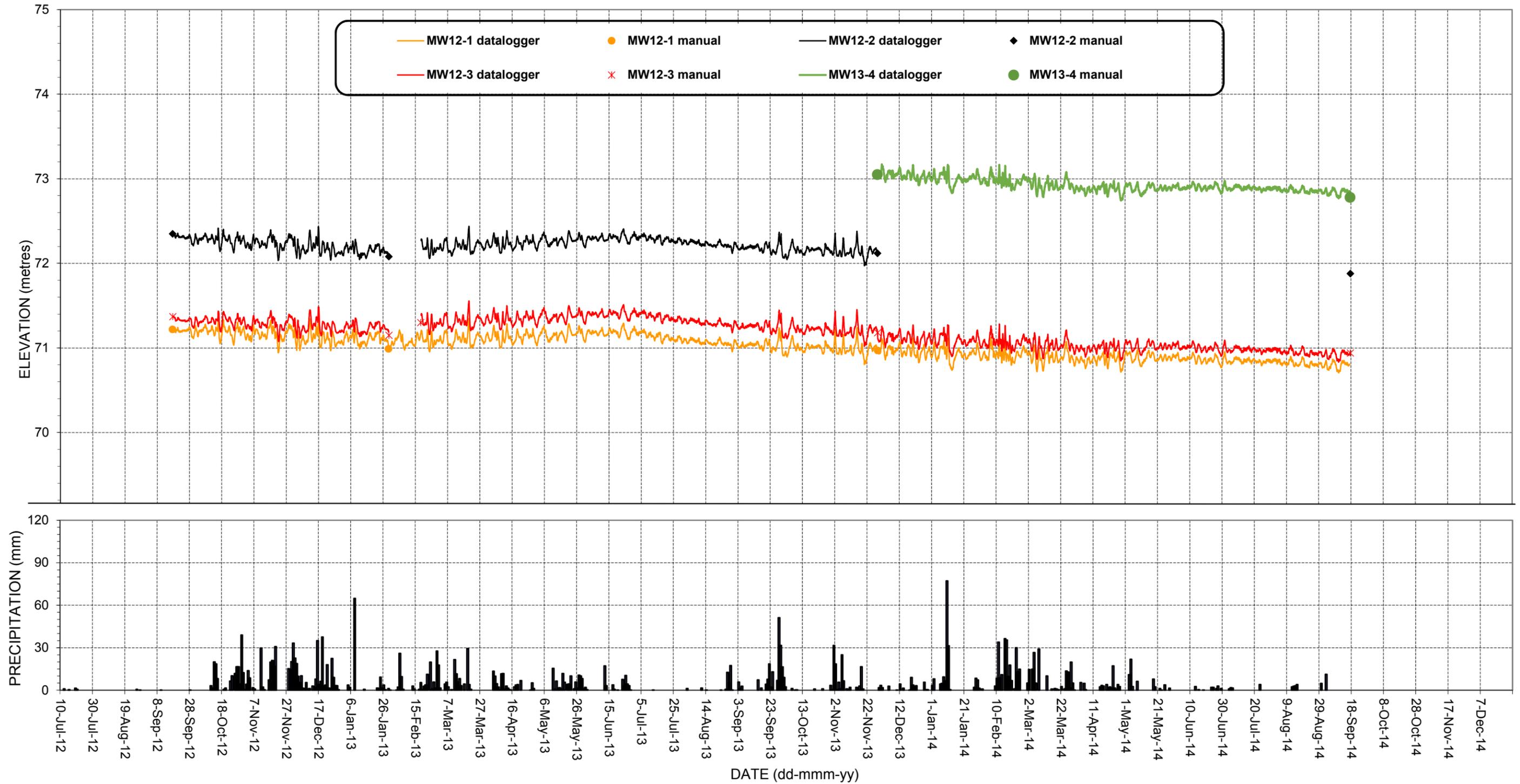


FIGURE 1





TABLE 1

FISHER ROAD 2014 ANNUAL REPORT
MONITORING WELL SAMPLING DATA

SAMPLE ID (Well)	MW12-1								MW12-2								MW12-3								MW13-4								Guidelines for Canadian Drinking Water Quality (GCDWQ)	British Columbia Contaminated Sites Regulation Numerical Standards (CSR)
	September 17, 2012		January 29, 2013		November 28, 2013		September 24, 2014		September 17, 2012		January 29, 2013		November 28, 2013		September 24, 2014		September 17, 2012		February 18, 2013		November 28, 2013		September 24, 2014		November 28, 2013		September 24, 2014							
WELL PREPARATION	Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged		Purged							
LABORATORY	Maxxam		AGAT		Maxxam		Maxxam		Maxxam		AGAT		Maxxam		Maxxam		Maxxam		AGAT		Maxxam		Maxxam		Maxxam		Maxxam							
SAMPLED BY	P/JW / CWP		CWP/RDM		CWP/TJS		CWP/EDY		P/JW / CWP		CWP/RDM		CWP/TJS		CWP/EDY		P/JW / CWP		CWP/RDM		CWP/TJS		CWP/EDY		P/JW / CWP		CWP/RDM		CWP/TJS		CWP/EDY			
SAMPLE PREP.	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS	TOTAL	DISS				
pH, Field	6.95		7.28		7.57		7.10		6.67		6.78		7.03		6.63		6.9		6.97		6.95		6.78		7.14		6.82		6.82					
pH, Laboratory	7.5		7.6		7.7		7.7		7.2		7.35		7.7		7.3		7.6		7.15		7.7		7.5		7.5		7.7		7.7					
Conductivity, Field	258		428		447		475		1024		1073		1135		1043		639		909		909		1120		599		169		169					
Conductivity, Laboratory	459		445		445		477		1100		1140		1140		1070		681		712		939		1140		435		172		172					
True Colour	9				5				9				<5		7				7		7				5				5					
Turbidity	6000				2000		6000		1200				110		280		1300				60.0		14.0		600		280		280					
Hardness CaCO ₃ (mg/L) ↓		183		172		183		627		480		482		497		500		257		280		385		405		528		119		100				
Total Dissolved Solids		318		173		293		323		814		444		780		737		457		329		591		797		314		124		124				
Total Alkalinity CaCO ₃	61.9		63		70.6		62.5		77		80		79.2		76.2		92.6		106		82.8		94.6		66.5		76.0		76.0					
Bicarbonate Alkalinity HCO ₃	75.5		63		88.1		76.2		93.9		80		96.6		92.9		113		106		101		115		81.2		92.7		92.7					
Carbonate Alkalinity CO ₃	<0.5		<1		<0.5		<0.5		<0.5		<1		<0.5		<0.5		<1		<1		<0.5		<0.5		<0.5		<0.5		<0.5					
Hydroxide Alkalinity OH	<0.5		<1		<0.5		<0.5		<0.5		<1		<0.5		<0.5		<1		<1		<0.5		<0.5		<0.5		<0.5		<0.5					
Fluoride F (dissolved)		0.1		0.07		0.055		0.039		0.067		0.03		0.033		0.031		0.084		0.13		0.039		<0.010		0.140		0.115		1.5 ^H				
Chloride Cl (dissolved)		31.5		29.2		26		26.8		36		35		38		43.0		69.5		114		180		262		23		4.24		250				
Sulphate SO ₄ (dissolved)		17.9		12.3		19.3		15.6		93.7		89.4		93.0		85.8		47.9		22.6		28.2		47.2		109		3.56		500				
Biological Oxygen Demand			<4																															
Caffeine (ug/L)	<1								<1								<1																	
Nitrogen (mg/L)																																		
Ammonia (as N)	0.11		<0.01		0.053		0.096		0.041		<0.01		0.019		<0.0050		0.057		0.02		0.028		0.02		0.039		0.0076		0.438					
Total Kjeldahl Nitrogen	5		4		<1.0		<1.0		<2		<1		<2.0		<2.0		<2		2.5		<0.40		<0.20		0.211		0.040		0.44					
Nitrate (as N)		28		23.7		23.2		33.8		98.1		92.5		91.7		92.5		15.3		16.3		16.9		19.7		0.252		0.285		10				
Nitrite (as N)		0.075		<0.005		0.0060		0.036		0.33		0.04		0.0211		0.085		<0.1		<0.005		0.0101		<0.010		0.0331		<0.010		1				
Nitrate plus Nitrite (as N)		28		23.7		23.2		33.8		98.5		92.5		91.7		92.6		15.3		16.3		16.9		19.7		0.285		0.44		10				
Total Nitrogen	33.1		26		22.8		29.8		92.4		99.4		84.7		84.0		13.9		17.9		17.0		17.9		0.495		0.479		0.44					
Nitrate Isotopes (‰)																																		
¹⁵ N	9.0 / 9.2		7.8		8.4				4.7 / 4.4		4.3		4.9				10.6 / 10.9		13.0		12.3				3.3									
¹⁸ O	3.6 / 4.2		4.2		5.9				20.3		22		23.7				3.2		-1.0		3.7				4.6									
Metals (ug/L)																																		
Aluminum Al	22200****	8.7	21200****	78	17400****	21.7	143000****	33600****	11	24100****	<1	1590****	11.5	11100****	4350****	25.1	17400****	7	916****	12.7	1410****	5250****	14.8	9670	200****	6	10	10	1,000	9,500				
Antimony Sb	<0.50	<0.50	<0.05	<0.05	<0.50	0.71	<0.50	0.71	<0.50	<0.05	<0.05	<0.50	<0.50	<0.50	<0.50	0.24	0.05	0.24	0.05	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	6				
Arsenic As	4.28	0.4	8.2	0.4	3.02	0.32	48.5****	3.64	0.19	7.2	0.2	1.16	0.21	4.92	3.49	0.48	9.2	0.4	1.11	0.33	0.78	1.71	0.24	2.60	10	10	10	10	10					
Barium Ba	580	22.1	159	15.2	277	13.3	816	479	36.8	199	29.4	51.7	30.7	93.9	223	49.9	289	36.9	51.2	40.8	49.8	115	16.8	82.7	1,000	1,000	1,000	1,000	1,000					
Beryllium Be	1.06	<0.10	0.96	0.01	1.23	<0.10	3.66	1.04	<0.10	0.65	<0.01	<0.10	<0.10	0.23	1	<0.10	2.06	<0.01	0.13	<0.10	<0.10	<0.10	1.09	<0.10	0.44	<0.10	<0.10	<0.10	<0.10	<0.10				
Bismuth Bi	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0				
Boron B	<50	<50	2	2	<50	<50	<50	<50	<50	29	29	<50	<50	<50	<50	<50	21	6	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	5,000				
Cadmium Cd	1.24	0.166	0.06	<0.01	0.530	0.219	2.02	1.2	0.419	0.48	0.4	0.368	0.389	0.381	1.05	0.148	1.14	0.15	0.272	0.161	0.145	0.294	0.209	0.105	5	5	5	5	5					
Chromium Cr	143****	<1.0	63****	1.2	79.4****	<1.0	629****	95.9****	<1.0	59.1****	0.7	13.1	<1.0	61.2****	30.8	<1.0	56.8****	0.9	5.8	1.1	12.9	17.8	<1.0	19.6	50 (Cr VI)	50	50	50	50					
Cobalt Co	90.6	2.49	27.2	0.92	45.7	0.84	192	67.7	5.4	28.2	3.9	5.90	3.29	12.2	30	2.9	59.8	0.58	2.79	<0.50	2.42	17.8	3.10	10.0	10.0	10.0	10.0	10.0	10.0					
Copper Cu	127	10.8	53.8	6.6	76.6	3.62	351	147	31.4	78.5	34.9	37.4	35.4	53.0	30.6	5.95	54.6	5.5	4.43	2.10	4.42	24.5	2.48	17.6	1,000 ^H	1,000	1,000	1,000						
Iron Fe	57600****	22.8	47900****	16	33600****	27.9	257000****	57200****	120	42400****	90	4180****	101	19100****	11600****	61.5	29500****	20	1720****	<5.0	2280	12900****	8.6	13000****	300 ^H	6,500	6,500	6,500	6,500					
Lead Pb	11.4****	0.26	6.48	0.79	11.7	<0.20	40.3****	12.1****	<0.20	4.7	0.02	1.04	<0.20	2.85	8.52	<0.20	14.9	0.13	1.07	<0.20	0.56	7.70	<0.20	3.47	10	10	10	10	10					
Lithium Li							86.1							6.4					<5.0						<5.0									
Manganese Mn	1760****	344	704****	43	919****	19.6	4040****	1990****	554	596****	94	84.7****	16.4	246****	754****	185	1150****	22	57.6****	3.2	54.8	988****	409	355****	50 ^H	550	550	550	550					
Mercury Hg																																		



TABLE 1: EXPLANATORY NOTES

All results expressed as milligrams per litre (mg/L)(ppm) or micrograms per litre (ug/L)(ppb) as noted except pH which is in pH units, conductivity which is in $\mu\text{S}/\text{cm}$ (microsiemens per centimetre), and turbidity which is in NTU (nephelometric turbidity units). Isotopes are measured in ‰ , which is per mille (per thousand).

The GCDWQ for organic and inorganic parameters are expressed as total concentrations, while the BC CSR standards are expressed as dissolved concentrations for inorganic parameters and total concentrations for organic parameters.

< Less than the detection limit (shown or various).

* Limit is for dissolved aluminum or magnesium

** GCDWQ standard inapplicable to untreated groundwater as they are intended to be applied to treated or municipal water supplied water.

*** Alert level of 20 mg/L for persons on sodium restricted diet.

**** It is suspected that the total metals results shown were impacted by the leaching of naturally occurring, silt-derived metals and are not representative of the actual groundwater conditions or indicative of concentrations anticipated to be found within a drinking water well.
H Aesthetic objective.

α Sample analyzed past recommended hold time.

7.32 Bold underline yellow indicates exceeds the federal Guidelines for Canadian Drinking Water Quality (total concentrations)

7.32 Bold underline tan indicates exceeds the B.C. Contaminated Sites Regulation Schedule 6 Numerical Water Standards (dissolved)

7.32 Bold underline rose indicates level exceeds both the GCDWQ and CSR

Your Project #: 17-971-21 FISHER RD. AN. MON.
Your C.O.C. #: V012255

Attention: Chad Petersmeyer

Thurber Engineering Ltd.
100-4396 West Saanich
Victoria, BC
Canada V8Z 3E9

Report Date: 2014/10/07

Report #: R1658151

Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B485772

Received: 2014/09/25, 11:05

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date	Date	Laboratory Method	Analytical Method
		Extracted	Analyzed		
Alkalinity - Water (1)	4	2014/09/30	2014/09/30	BBY6SOP-00026	SM2320B
Anions in Water by Ion Chromatography (1, 2)	1	N/A	2014/09/25	VIC SOP-00020	Based on SM-4110B
Anions in Water by Ion Chromatography (1, 2)	3	N/A	2014/09/30	VIC SOP-00020	Based on SM-4110B
Conductance - water (1)	4	N/A	2014/09/30	BBY6SOP-00026	SM-2510B
Hardness Total (calculated as CaCO3)	4	N/A	2014/09/30	BBY7SOP-00002	EPA 6020a R1 m
Mercury (Total) by CVAf	1	2014/10/01	2014/10/03	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Mercury (Total) by CVAf	3	2014/10/07	2014/10/07	BBY7SOP-00015	BCMOE BCLM Oct2013 m
Na, K, Ca, Mg, S by CRC ICPMS (total)	4	2014/09/26	2014/09/30	BBY7SOP-00002	EPA 6020A R1 m
Elements by CRC ICPMS (total)	4	2014/09/29	2014/09/29	BBY7SOP-00002	EPA 6020A R1 m
Nitrogen (Total)	4	2014/09/30	2014/10/01	BBY6SOP-00016	SM 22 4500-N C m
Ammonia-N (Preserved)	4	N/A	2014/09/30	BBY6SOP-00009	SM 22 4500-NH3- G m
Nitrate + Nitrite (N) (calculated) (1)	1	N/A	2014/09/30	VIC-SOP-00005	Based SM-4500 NO2 E
Nitrate + Nitrite (N) (calculated) (1)	3	N/A	2014/10/01	VIC-SOP-00005	Based SM-4500 NO2 E
pH Water (1, 3)	4	N/A	2014/09/30	BBY6SOP-00026	SM-4500H+B
Total Dissolved Solids (Filt. Residue) (1)	4	N/A	2014/09/29	VIC SOP-00008	Based on SM 2540C
Total coliform and E. by MF (Chromocult) (1)	4	N/A	2014/09/25	VIC SOP 00112	Based on SM-9222
TKN (Calc. TN, N/N) total	4	N/A	2014/10/01	BBY6SOP-00022	SM 4500N-C
Turbidity (1)	4	N/A	2014/09/25	VIC SOP-00011	Based on SM - 2130

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) This test was performed by Maxxam Victoria

(2) Anions in Water by Ion Chromatography: The samples were received and analyzed in Maxxam Victoria. The data was processed and approved in Maxxam Burnaby.

(3) The BC-MOE and APHA Standard Method require pH to be analysed within 15 minutes of sampling and therefore field analysis is required for compliance. All Laboratory pH analyses in this report are reported past the BC-MOE/APHA Standard Method holding time.

Your Project #: 17-971-21 FISHER RD. AN. MON.
Your C.O.C. #: V012255

Attention:Chad Petersmeyer

Thurber Engineering Ltd.
100-4396 West Saanich
Victoria, BC
Canada V8Z 3E9

Report Date: 2014/10/07
Report #: R1658151
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B485772

Received: 2014/09/25, 11:05

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Debbie Nordbruget, Project Manager
Email: DNordbruget@maxxam.ca
Phone# (250)385-6112

=====
This report has been generated and distributed using a secure automated process.

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					KR6749		KR6750		
Sampling Date					2014/09/24 10:40		2014/09/24 12:00		
COC Number					V012255		V012255		
	Units	Criteria A	Criteria B	Criteria C	MW12-1	RDL	MW12-2	RDL	QC Batch
CONVENTIONALS									
Dissolved Nitrate (N)	mg/L	10	-	-	33.8 (1)	0.50	92.5	0.50	7655713
Dissolved Nitrite (N)	mg/L	1	-	-	0.036	0.010	0.085	0.010	7655713
Misc. Inorganics									
Dissolved Chloride (Cl)	mg/L	-	250	-	26.8	0.50	43.0	0.50	7655713
Dissolved Fluoride (F)	mg/L	1.5	-	-	0.039	0.010	0.031	0.010	7655713
Dissolved Sulphate (SO4)	mg/L	-	500	-	15.6	0.50	85.8 (2)	5.0	7655713
Alkalinity (Total as CaCO3)	mg/L	-	-	-	62.5	0.5	76.2	0.5	7658854
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Bicarbonate (HCO3)	mg/L	-	-	-	76.2	0.5	92.9	0.5	7658854
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Nutrients									
Total Ammonia (N)	mg/L	-	-	-	0.096	0.0050	<0.0050	0.0050	7659985
Total Total Kjeldahl Nitrogen (Calc)	mg/L	-	-	-	<1.0	1.0	<2.0	2.0	7654845
Nitrate plus Nitrite (N)	mg/L	-	-	-	33.8	0.5	92.6	0.5	7654751
Total Nitrogen (N)	mg/L	-	-	-	29.8	1.0	84.0	2.0	7659356
Physical Properties									
Conductivity	uS/cm	-	-	-	477	1	1070	1	7658855
pH	pH	-	6.5:8.5	-	7.7	N/A	7.3	N/A	7658856
Physical Properties									
Total Dissolved Solids	mg/L	-	500	-	323	10	737	10	7654597
Turbidity	NTU	see remark	see remark	see remark	6000	0.1	280	0.1	7653551
RDL = Reportable Detection Limit N/A = Not Applicable (1) Sample analysed past recommended hold time. (2) RDL raised due to sample matrix interference.									

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID					KR6751		KR6752		
Sampling Date					2014/09/24 13:00		2014/09/24 15:15		
COC Number					V012255		V012255		
	Units	Criteria A	Criteria B	Criteria C	MW13-4	RDL	MW12-3	RDL	QC Batch
CONVENTIONALS									
Dissolved Nitrate (N)	mg/L	10	-	-	0.438	0.010	19.7	0.20	7655713
Dissolved Nitrite (N)	mg/L	1	-	-	<0.010	0.010	<0.010	0.010	7655713
Misc. Inorganics									
Dissolved Chloride (Cl)	mg/L	-	250	-	4.24	0.50	262	10	7655713
Dissolved Fluoride (F)	mg/L	1.5	-	-	0.115	0.010	<0.010	0.010	7655713
Dissolved Sulphate (SO4)	mg/L	-	500	-	3.56	0.50	47.2	0.50	7655713
Alkalinity (Total as CaCO3)	mg/L	-	-	-	76.0	0.5	94.6	0.5	7658854
Alkalinity (PP as CaCO3)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Bicarbonate (HCO3)	mg/L	-	-	-	92.7	0.5	115	0.5	7658854
Carbonate (CO3)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Hydroxide (OH)	mg/L	-	-	-	<0.5	0.5	<0.5	0.5	7658854
Nutrients									
Total Ammonia (N)	mg/L	-	-	-	0.0076	0.0050	0.020	0.0050	7659985
Total Total Kjeldahl Nitrogen (Calc)	mg/L	-	-	-	0.040	0.020	<0.20	0.20	7654845
Nitrate plus Nitrite (N)	mg/L	-	-	-	0.44	0.01	19.7	0.2	7654751
Total Nitrogen (N)	mg/L	-	-	-	0.479	0.020	17.9	0.20	7659356
Physical Properties									
Conductivity	uS/cm	-	-	-	172	1	1140	1	7658855
pH	pH	-	6.5:8.5	-	7.7	N/A	7.5	N/A	7658856
Physical Properties									
Total Dissolved Solids	mg/L	-	500	-	124	10	797	10	7654597
Turbidity	NTU	see remark	see remark	see remark	280	0.1	14.0	0.1	7653551
RDL = Reportable Detection Limit									
N/A = Not Applicable									

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

MICROBIOLOGY (WATER)

Maxxam ID			KR6749		KR6750	KR6751		KR6752		
Sampling Date			2014/09/24 10:40		2014/09/24 12:00	2014/09/24 13:00		2014/09/24 15:15		
COC Number			V012255		V012255	V012255		V012255		
	Units	Criteria	MW12-1	RDL	MW12-2	MW13-4	RDL	MW12-3	RDL	QC Batch
Microbiological Param.										
Total Coliforms	CFU/100mL	<1	330	10	16	270	4	6	1	7657510
E. coli	CFU/100mL	<1	20	10	<4 (1)	<4 (1)	4	1	1	7657510
RDL = Reportable Detection Limit										
(1) Due to elevated sediment levels the RDL was raised for this sample.										

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

CCME TOTAL METALS IN WATER (WATER)

Maxxam ID					KR6749	KR6750		KR6751		
Sampling Date					2014/09/24 10:40	2014/09/24 12:00		2014/09/24 13:00		
COC Number					V012255	V012255		V012255		
	Units	Criteria A	Criteria B	Criteria C	MW12-1	MW12-2	QC Batch	MW13-4	RDL	QC Batch
Calculated Parameters										
Total Hardness (CaCO3)	mg/L	-	-	-	627	500	7654495	100	0.50	7654495
Elements										
Total Mercury (Hg)	ug/L	1	-	-	<0.010	<0.010	7669838	<0.010	0.010	7660840
Total Metals by ICPMS										
Total Aluminum (Al)	ug/L	-	-	100	143000	11100	7657422	9670	3.0	7657422
Total Antimony (Sb)	ug/L	6	-	-	0.71	<0.50	7657422	<0.50	0.50	7657422
Total Arsenic (As)	ug/L	10	-	-	48.5	4.92	7657422	2.60	0.10	7657422
Total Barium (Ba)	ug/L	1000	-	-	816	93.9	7657422	82.7	1.0	7657422
Total Beryllium (Be)	ug/L	-	-	-	3.66	0.23	7657422	0.44	0.10	7657422
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	<1.0	7657422	<1.0	1.0	7657422
Total Boron (B)	ug/L	5000	-	-	<50	<50	7657422	<50	50	7657422
Total Cadmium (Cd)	ug/L	5	-	-	2.02	0.381	7657422	0.105	0.010	7657422
Total Chromium (Cr)	ug/L	50	-	-	629	61.2	7657422	19.6	1.0	7657422
Total Cobalt (Co)	ug/L	-	-	-	192	12.2	7657422	10.0	0.50	7657422
Total Copper (Cu)	ug/L	-	1000	-	351	53.0	7657422	17.6	0.50	7657422
Total Iron (Fe)	ug/L	-	300	-	257000	19100	7657422	13000	10	7657422
Total Lead (Pb)	ug/L	10	-	-	40.3	2.85	7657422	3.47	0.20	7657422
Total Lithium (Li)	ug/L	-	-	-	86.1	6.4	7657422	<5.0	5.0	7657422
Total Manganese (Mn)	ug/L	-	50	-	4040	246	7657422	355	1.0	7657422
Total Molybdenum (Mo)	ug/L	-	-	-	55.8	2.6	7657422	2.1	1.0	7657422
Total Nickel (Ni)	ug/L	-	-	-	418	97.3	7657422	18.2	1.0	7657422
Total Selenium (Se)	ug/L	10	-	-	1.38	0.67	7657422	0.25	0.10	7657422
Total Silicon (Si)	ug/L	-	-	-	113000	34700	7657422	30600	100	7657422
Total Silver (Ag)	ug/L	-	-	-	0.213	0.027	7657422	<0.020	0.020	7657422
Total Strontium (Sr)	ug/L	-	-	-	528	489	7657422	205	1.0	7657422
Total Thallium (Tl)	ug/L	-	-	-	0.792	0.091	7657422	0.083	0.050	7657422
Total Tin (Sn)	ug/L	-	-	-	14.3	<5.0	7657422	<5.0	5.0	7657422
Total Titanium (Ti)	ug/L	-	-	-	7330	759	7657422	448	5.0	7657422
Total Uranium (U)	ug/L	20	-	-	4.42	0.44	7657422	1.27	0.10	7657422
Total Vanadium (V)	ug/L	-	-	-	536	53.3	7657422	29.1	5.0	7657422
Total Zinc (Zn)	ug/L	-	5000	-	1280	31.4	7657422	23.3	5.0	7657422
Total Zirconium (Zr)	ug/L	-	-	-	13.6	8.80	7657422	2.15	0.50	7657422
Total Calcium (Ca)	mg/L	-	-	-	98.6	116	7654496	24.5	0.050	7654496
Total Magnesium (Mg)	mg/L	-	-	-	92.5	51.2	7654496	9.50	0.050	7654496
Total Potassium (K)	mg/L	-	-	-	8.26	2.25	7654496	1.74	0.050	7654496
RDL = Reportable Detection Limit										

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

CCME TOTAL METALS IN WATER (WATER)

Maxxam ID					KR6749	KR6750		KR6751		
Sampling Date					2014/09/24 10:40	2014/09/24 12:00		2014/09/24 13:00		
COC Number					V012255	V012255		V012255		
	Units	Criteria A	Criteria B	Criteria C	MW12-1	MW12-2	QC Batch	MW13-4	RDL	QC Batch
Total Sodium (Na)	mg/L	-	200	-	15.1	15.9	7654496	7.81	0.050	7654496
Total Sulphur (S)	mg/L	-	-	-	5.1	27.9	7654496	<3.0	3.0	7654496
RDL = Reportable Detection Limit										

Maxxam Job #: B485772
Report Date: 2014/10/07

Thurber Engineering Ltd.
Client Project #: 17-971-21 FISHER RD. AN. MON.
Sampler Initials: CWP

CCME TOTAL METALS IN WATER (WATER)

Maxxam ID					KR6752		
Sampling Date					2014/09/24 15:15		
COC Number					V012255		
	Units	Criteria A	Criteria B	Criteria C	MW12-3	RDL	QC Batch
Calculated Parameters							
Total Hardness (CaCO3)	mg/L	-	-	-	528	0.50	7654495
Elements							
Total Mercury (Hg)	ug/L	1	-	-	<0.010	0.010	7669838
Total Metals by ICPMS							
Total Aluminum (Al)	ug/L	-	-	100	1410	3.0	7657422
Total Antimony (Sb)	ug/L	6	-	-	<0.50	0.50	7657422
Total Arsenic (As)	ug/L	10	-	-	0.78	0.10	7657422
Total Barium (Ba)	ug/L	1000	-	-	49.8	1.0	7657422
Total Beryllium (Be)	ug/L	-	-	-	<0.10	0.10	7657422
Total Bismuth (Bi)	ug/L	-	-	-	<1.0	1.0	7657422
Total Boron (B)	ug/L	5000	-	-	<50	50	7657422
Total Cadmium (Cd)	ug/L	5	-	-	0.145	0.010	7657422
Total Chromium (Cr)	ug/L	50	-	-	12.9	1.0	7657422
Total Cobalt (Co)	ug/L	-	-	-	2.42	0.50	7657422
Total Copper (Cu)	ug/L	-	1000	-	4.42	0.50	7657422
Total Iron (Fe)	ug/L	-	300	-	2280	10	7657422
Total Lead (Pb)	ug/L	10	-	-	0.56	0.20	7657422
Total Lithium (Li)	ug/L	-	-	-	<5.0	5.0	7657422
Total Manganese (Mn)	ug/L	-	50	-	54.8	1.0	7657422
Total Molybdenum (Mo)	ug/L	-	-	-	1.3	1.0	7657422
Total Nickel (Ni)	ug/L	-	-	-	11.7	1.0	7657422
Total Selenium (Se)	ug/L	10	-	-	0.17	0.10	7657422
Total Silicon (Si)	ug/L	-	-	-	16900	100	7657422
Total Silver (Ag)	ug/L	-	-	-	<0.020	0.020	7657422
Total Strontium (Sr)	ug/L	-	-	-	483	1.0	7657422
Total Thallium (Tl)	ug/L	-	-	-	<0.050	0.050	7657422
Total Tin (Sn)	ug/L	-	-	-	<5.0	5.0	7657422
Total Titanium (Ti)	ug/L	-	-	-	93.9	5.0	7657422
Total Uranium (U)	ug/L	20	-	-	0.42	0.10	7657422
Total Vanadium (V)	ug/L	-	-	-	5.9	5.0	7657422
Total Zinc (Zn)	ug/L	-	5000	-	10.1	5.0	7657422
Total Zirconium (Zr)	ug/L	-	-	-	1.17	0.50	7657422
Total Calcium (Ca)	mg/L	-	-	-	119	0.050	7654496
Total Magnesium (Mg)	mg/L	-	-	-	56.4	0.050	7654496
Total Potassium (K)	mg/L	-	-	-	1.70	0.050	7654496
RDL = Reportable Detection Limit							

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CCME TOTAL METALS IN WATER (WATER)

Maxxam ID					KR6752		
Sampling Date					2014/09/24 15:15		
COC Number					V012255		
	Units	Criteria A	Criteria B	Criteria C	MW12-3	RDL	QC Batch
Total Sodium (Na)	mg/L	-	200	-	16.7	0.050	7654496
Total Sulphur (S)	mg/L	-	-	-	12.3	3.0	7654496
RDL = Reportable Detection Limit							

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C
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Criteria A, Criteria B, Criteria C: The guidelines that have been included in this report have been taken from the Canadian Drinking Water Quality Summary Table, August 2012.

Criteria A = Maximum Acceptable Concentration (MAC) / Criteria B = Aesthetic Objectives (AO) / Criteria C = Operational Guidance Values (OG)
It is recommended to consult these guidelines when interpreting your data since there are non-numerical guidelines that are not included on this report.

Turbidity Guidelines:

1. Chemically assisted filtration: less than or equal to 0.3 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 1.0 NTU at any time.
2. Slow sand / diatomaceous earth filtration: less than or equal to 1.0 NTU in 95% of the measurements or 95% of the time each month. Shall not exceed 3.0 NTU at any time.
3. Membrane filtration: less than or equal to 0.1 NTU in 99% of the measurements made or at least 99% of the time each calendar month. Shall not exceed 0.3 NTU at any time.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7653551	Turbidity	2014/09/25			97	80 - 120	<0.1	NTU	6.1	20
7654597	Total Dissolved Solids	2014/09/29			103	80 - 120	<10	mg/L	3.1	20
7655713	Dissolved Chloride (Cl)	2014/09/25	NC	80 - 120	98	80 - 120	<0.50	mg/L	0.61	20
7655713	Dissolved Fluoride (F)	2014/09/25	101	80 - 120	98	80 - 120	<0.010	mg/L	0.12	20
7655713	Dissolved Nitrate (N)	2014/09/25	89	80 - 120	96	80 - 120	<0.010	mg/L	0.32	20
7655713	Dissolved Nitrite (N)	2014/09/25	105	80 - 120	98	80 - 120	<0.010	mg/L	NC	20
7655713	Dissolved Sulphate (SO4)	2014/09/25	107	80 - 120	97	80 - 120	<0.50	mg/L	0.11	20
7657422	Total Aluminum (Al)	2014/09/29	NC	80 - 120	102	80 - 120	<3.0	ug/L	5.9	20
7657422	Total Antimony (Sb)	2014/09/29	112	80 - 120	106	80 - 120	<0.50	ug/L	NC	20
7657422	Total Arsenic (As)	2014/09/29	109	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
7657422	Total Barium (Ba)	2014/09/29	108	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
7657422	Total Beryllium (Be)	2014/09/29	107	80 - 120	100	80 - 120	<0.10	ug/L	NC	20
7657422	Total Bismuth (Bi)	2014/09/29	110	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
7657422	Total Boron (B)	2014/09/29					<50	ug/L	NC	20
7657422	Total Cadmium (Cd)	2014/09/29	104	80 - 120	96	80 - 120	<0.010	ug/L	NC	20
7657422	Total Chromium (Cr)	2014/09/29	107	80 - 120	97	80 - 120	<1.0	ug/L	NC	20
7657422	Total Cobalt (Co)	2014/09/29	105	80 - 120	95	80 - 120	<0.50	ug/L	NC	20
7657422	Total Copper (Cu)	2014/09/29	99	80 - 120	95	80 - 120	<0.50	ug/L	NC	20
7657422	Total Iron (Fe)	2014/09/29	111	80 - 120	103	80 - 120	<10	ug/L	NC	20
7657422	Total Lead (Pb)	2014/09/29	109	80 - 120	101	80 - 120	<0.20	ug/L	NC	20
7657422	Total Lithium (Li)	2014/09/29	102	80 - 120	102	80 - 120	<5.0	ug/L	NC	20
7657422	Total Manganese (Mn)	2014/09/29	NC	80 - 120	109	80 - 120	<1.0	ug/L	2.0	20
7657422	Total Molybdenum (Mo)	2014/09/29	110	80 - 120	93	80 - 120	<1.0	ug/L	NC	20
7657422	Total Nickel (Ni)	2014/09/29	97	80 - 120	92	80 - 120	<1.0	ug/L	NC	20
7657422	Total Selenium (Se)	2014/09/29	99	80 - 120	96	80 - 120	<0.10	ug/L	NC	20
7657422	Total Silicon (Si)	2014/09/29					<100	ug/L	NC	20
7657422	Total Silver (Ag)	2014/09/29	99	80 - 120	96	80 - 120	<0.020	ug/L	NC	20
7657422	Total Strontium (Sr)	2014/09/29	106	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
7657422	Total Thallium (Tl)	2014/09/29	104	80 - 120	92	80 - 120	<0.050	ug/L	NC	20
7657422	Total Tin (Sn)	2014/09/29	105	80 - 120	99	80 - 120	<5.0	ug/L	NC	20
7657422	Total Titanium (Ti)	2014/09/29	120	80 - 120	129 (1)	80 - 120	<5.0	ug/L	NC	20
7657422	Total Uranium (U)	2014/09/29	110	80 - 120	100	80 - 120	<0.10	ug/L	NC	20

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QUALITY ASSURANCE REPORT(CONT'D)

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QC Batch	Parameter	Date	Matrix Spike		Spiked Blank		Method Blank		RPD	
			% Recovery	QC Limits	% Recovery	QC Limits	Value	Units	Value (%)	QC Limits
7657422	Total Vanadium (V)	2014/09/29	107	80 - 120	103	80 - 120	<5.0	ug/L	NC	20
7657422	Total Zinc (Zn)	2014/09/29	96	80 - 120	90	80 - 120	<5.0	ug/L	NC	20
7657422	Total Zirconium (Zr)	2014/09/29					<0.50	ug/L	NC	20
7657510	E. coli	2014/09/25							NC	N/A
7657510	Total Coliforms	2014/09/25							139 (2)	N/A
7658854	Alkalinity (PP as CaCO3)	2014/09/30	15	N/A			<0.5	mg/L	NC	20
7658854	Alkalinity (Total as CaCO3)	2014/09/30	NC	80 - 120	89	80 - 120	<0.5	mg/L	0.84	20
7658854	Bicarbonate (HCO3)	2014/09/30					<0.5	mg/L	0.84	20
7658854	Carbonate (CO3)	2014/09/30					<0.5	mg/L	NC	20
7658854	Hydroxide (OH)	2014/09/30					<0.5	mg/L	NC	20
7658855	Conductivity	2014/09/30			102	90 - 110	1 ,RDL=1	uS/cm	0.29	20
7658856	pH	2014/09/30			102	96 - 104			0.13	N/A
7659356	Total Nitrogen (N)	2014/10/01			99	80 - 120	<0.020	mg/L	0.048	20
7659985	Total Ammonia (N)	2014/09/30	84	80 - 120	98	80 - 120	0.0058 ,RDL=0.0050	mg/L	NC	20
7660840	Total Mercury (Hg)	2014/10/03	106	80 - 120	101	80 - 120	<0.010	ug/L	NC	20
7669838	Total Mercury (Hg)	2014/10/07	109	80 - 120	99	80 - 120	<0.010	ug/L	NC	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) Blank Spike outside acceptance criteria (10% of analytes failure allowed).

(2) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Rob Reinert, Data Validation Coordinator

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.