



November 16, 2018

Mr. Ivano Cecchini
Coquitlam School District No. 43
550 Poirier Street
Coquitlam, BC V3J 6A7

Dear Mr. Cecchini:

**Re: Soil and Surface Water Analytical Results
Eagle Mountain Middle School
Anmore, BC
Project No. 10988-103C**

Keystone Environmental Ltd. (Keystone Environmental) is pleased to present this letter summarizing analytical results of soil and surface water samples collected down-gradient from a residential septic field between the Anmore Green Estates and the Eagle Mountain/Heritage Woods schools in Anmore and Port Moody, BC (the Site). The purpose of this sampling program was to characterize potential human health risk from areas immediately downgradient of the septic field discharge.

METHODOLOGY

On October 3, 2018, Keystone Environmental collected soil samples at seven locations on-Site and surface water samples at one location on-Site, following significant rainfall (29.2 mm in 24 hours) on October 1, 2018. An additional soil and surface water sample was collected at an off-Site background reference location located to the northwest of the septic field, which is not anticipated to be influenced by the Anmore Green Estates septic field. Soil samples were collected from the surface, at a depth of 0 – 5 cm. A total of nine soil samples (including one duplicate for lab purposes) and two surface water samples were collected. Samples were collected at locations similar to the previous sampling program conducted by Keystone Environmental in February 2018, with results provided in a letter dated March 2, 2018. Sample locations are presented in Figure 1, attached. Where surface water was not present, or at a sufficient quantity for sample collection, soil samples were collected from ground seeps and from drainage paths identified along the vegetated slope, downgradient and to the southwest of the septic field.

The samples were sent to Maxxam Analytics for analysis of Total Coliforms, Fecal Coliforms, and *Escherichia coli*. (*E. coli*). Total Coliforms can occur naturally in the environment and presence of *E. coli* or Fecal Coliforms can be present in both warm-blooded animals (wildlife and humans). Therefore, select samples were analyzed for Total *Bacteroides* and Human *Bacteroides* to determine if elevated coliforms were associated with wildlife/domesticated pets, or human, and potentially originating from the septic field. Total Coliforms, Fecal Coliforms and *E. coli* results from Maxxam Analytics, as well as sample locations, were used to select the soil samples that were submitted for Total *Bacteroides* and Human *Bacteroides*. Three soil samples (SS18-01, SS18-02, SS18-A) and one surface water samples (SW18-01) with elevated coliform levels were sent to EMSL Analytical Inc. for analysis of Total *Bacteroides* and Human *Bacteroides*. Sample results are presented in the attached analytical table.

RESULTS AND ANALYSIS

A human health benchmark for Fecal Coliforms in soil and sediment has not been formally established in Canada. The BC Organic Matter Recycling Regulation specifies a limit of 1,000 Most Probable Number MPN/100g, which is consistent with the Council of Ministers of the Environment (CCME) guideline for compost quality, but this value is specific to biosolids and compost, and is not applicable to soils alone (OMRR, 2018). CCME indicates the “use of *E. coli* content as a direct indicator of pathogen levels is not yet supported by all regulatory agencies in Canada, but it may be used to help verify the reason for the high Fecal Coliform levels” (CCME, 2005). As such, soil results in this report were used to infer presence/absence of Fecal Coliforms and Human *Bacteroides*. Soil samples submitted for analysis of these parameters were presented as quantity detected, either Most Probable Number (MPN/100g) or Cell Equivalents (CEs/g).

For the purposes of this report, data supporting a potential septic discharge was inferred if Human *Bacteroides* are detected in soil or surface water down-gradient to the septic field, as Total Coliforms can occur naturally in the environment, and presence of *E. coli* or Fecal Coliforms can be associated with both human and animal feces (Health Canada, 2012).

The BC Water Quality Guidelines for Primary- and Secondary-Contact Recreation criteria were used for interpretation of surface water samples, in the absence of applicable bacteriology soil guidelines, as indicated above. The criteria for Primary-Contact Recreation is applicable to waters where there is substantial risk of ingestion or intimate contact with eyes, ears, nose, mouth or groin. The Secondary-Contact Recreation criterion is applicable to waters where an individual would have limited direct contact, as well as water used to irrigate areas open to the public. Given current on-Site land use, analytical results were compared to the more conservative Primary-Contact Recreation criteria, as primary school children are considered to have an increased likelihood for ingesting (hand to mouth) while playing in the schoolyard adjacent to the septic field. Furthermore, the Primary-Contact Recreation criterion for bacteria is used as the safety limit to trigger beach and public area closures in Metro Vancouver.

E. coli concentrations exceeded the BC Water Quality Guidelines criteria for Recreation Primary-Contact in the single on-Site and off-site (background) water samples collected (SW18-01 and SW18-02). Exceedances of *E. coli* for Secondary-Contact criteria was present in the off-Site water sample (SW18-02). Human *Bacteroides* were not identified in the three soil samples (SS18-01, SS18-02, SS18-A) or the one on-Site water sample (SW18-01) submitted to EMSL Analytica. Total *Bacteroides* were identified in the on-Site surface water sample (SW18-01) analyzed by EMSL Analytical. Total *Bacteroides* were not identified in the three soil samples submitted (SS18-01, SS18-02, SS18-A).

In contrast to the Keystone Environmental February 2018 sampling, which yielded a detectable level of Human *Bacteroides* in one of the surface water samples submitted (SW18-03; located approximately 20 m north and up-gradient of SS18-04), the four samples submitted from the October 2018 sampling indicated non-detect sample results for Human *Bacteroides*. During the October 2018 sampling a surface water sample could not be collected from the same location as the February 2018 SW18-03 sample, as surface water was not present. A soil sample (SS18-04) was collected from a wetted area in proximity to the February 2018 SW18-03 location instead.

CONCLUSION

The results of bacteriology analyses identified *E. coli*. and Fecal/Total Coliforms within the Site soil and surface water samples collected, which can be associated with both human and animal feces, or can occur naturally in the environment. Surface water samples collected on-Site in exceedance of the provincial criteria for *E. coli*. (criteria is not applicable to soil), as well as selected soil samples, were analyzed for Human *Bacteroides* which is attributable to human feces or septic discharge. This additional bacteriology analysis of on-Site surface water and selected soil samples did not detect Human *Bacteroides*, and therefore, evidence of septic field discharge was not identified on-Site.

It should be noted that bacteria levels in soil and surface water can vary based on septic field and weather conditions, and therefore, it is recommended the existing fencing and signage be maintained around the affected area until septic field compliance issues related to the March 7, 2017 Ministry of Environment letter are resolved and additional sampling can be conducted.

This letter has been prepared solely for the internal use of Coquitlam School District No. 43 pursuant to the agreement between Keystone Environmental Ltd. and Coquitlam School District No. 43. By using this report, Coquitlam School District No. 43 agrees that they will review and use the letter in its entirety. Any use which other parties make of this letter, or any reliance on or decisions made based on it, are the responsibility of such parties. Keystone Environmental Ltd. accepts no responsibility for damages, if any, suffered by other parties as a result of decisions made or actions based on this letter.

If you have any questions, please do not hesitate to contact the undersigned.

Sincerely,

Keystone Environmental Ltd.



Krista Morden, B.A., Dipl.T
Environmental Technologist



Craig S. Patterson, R.P.Bio.
Project Manager

\\key-fs2012\Common\10900-10999\10988-Heritage School\Phase 103C - 2018 Sampling\10988-103C 181116 Analytical Results Letter.docx

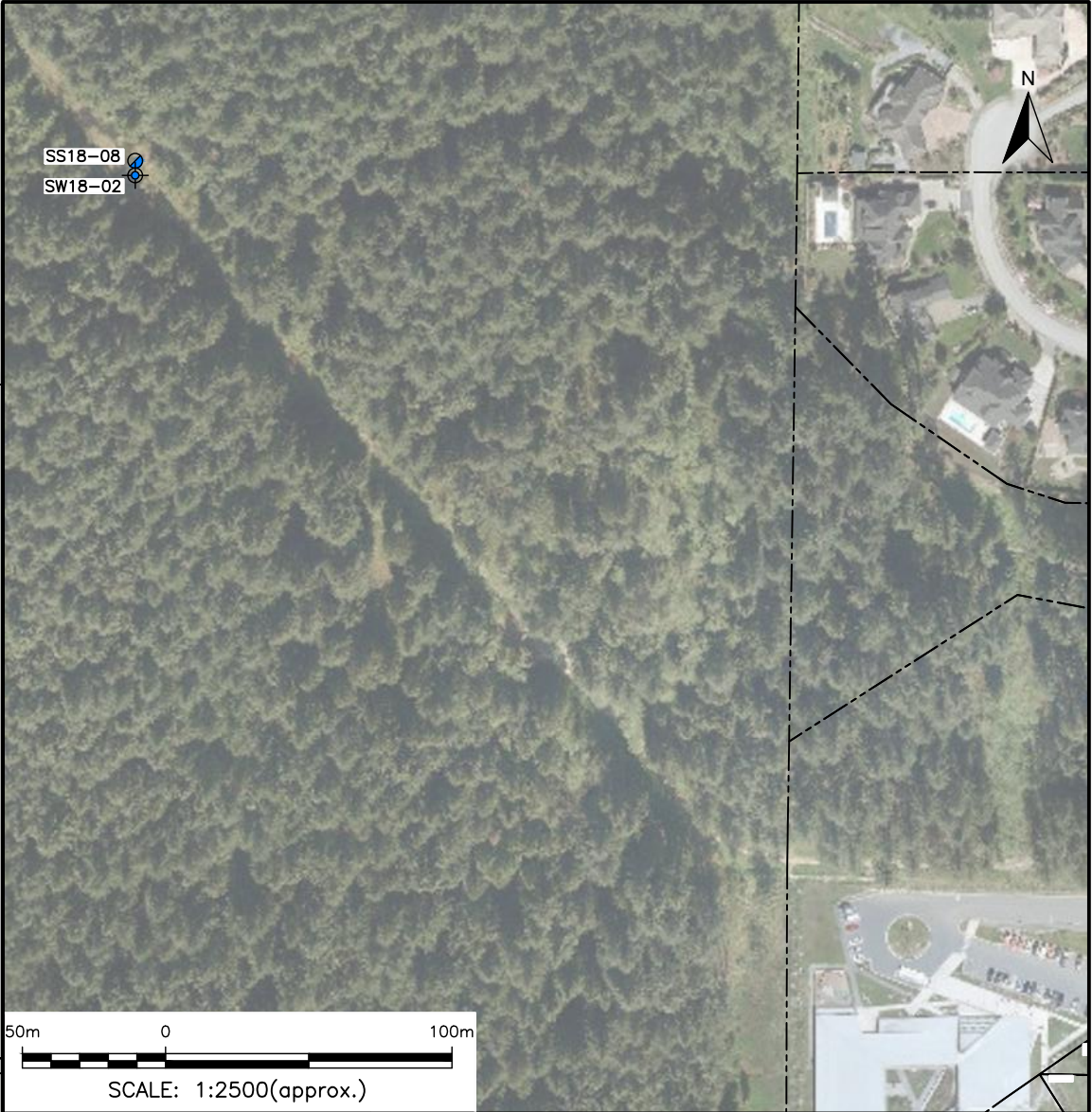
ATTACHMENTS:

- Figure 1: Site Plan
- Analytical Results Tables
- Laboratory Certificates of Analysis

REFERENCES

- CCME (2005). Canadian Council Ministers of the Environment. Guidelines for Compost Quality. PN 1340. 2005.
- Health Canada. 2012. Guidelines for Canadian Recreational Water Quality. Third Edition. Prepared by the Federal-Provincial-Territorial Working Group on Recreational Water Quality of the Federal-Provincial-Territorial Committee on Health and the Environment. April 2012.
- OMRR 2018. Organic Matter Recycling Regulation Includes amendments up to BC Reg. 243/2016, Nov 1, 2017 and current to February 13, 2018.

FIGURE



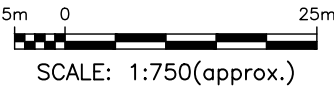
INSET

LEGEND

- PROPERTY LINE
- KEYSTONE SURFICIAL SOIL SAMPLE (2018)
- ⊕ KEYSTONE SURFACE WATER SAMPLE (2018)



NOTES:
1. THIS DRAWING IS FOR GENERAL INFORMATION ONLY.
LOT BOUNDARIES AND FEATURES ARE APPROXIMATE.
2. DATE OF AERIAL PHOTO IS 2015.



110 Dogwood Drive Anmore, B C Coquitlam School District No. 43		
REVISION No. 00	DATE Nov. 2018	PROJECT No. 10988-103C

Figure 1
Sample Location Plan

ANALYTICAL RESULTS TABLES

Table 1 Soil Sample Analytical Results

Federal/Provincial Soil or Sediment Regulatory Criteria	Sample ID		SS18-01	SS18-02	SS18-03	SS18-04	SS18-05	SS18-06	SS18-07	SS18-08	SS18-A
	Date Sampled		03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018	03-Oct-2018
	Lab Certificate		K020945	K020945	K020945	K020945	K020945	K020945	K020945	K020945	K020945
	Lab Sample ID	Units	UL7768	UL7769	UL7770	UL7771	UL7772	UL7773	UL7774	UL7775	UL7776
	Microbiology										
n/s	E. coli	MPN/100g	790	1,300	<20	130	<20	230	68	3,500	1,300
n/s	Fecal Coliforms	MPN/100g	790	1,300	<20	130	<20	230	68	3,500	1,300
n/s	Total Coliforms	MPN/100g	3,300,000	28,000	22,000	23,000	23,000	79,000	38,000	7,900	49,000
n/s	Total Bacteroides	CEs/g	ND	ND	-	-	-	-	-	-	ND
n/s	Human Bacteroides	CEs/g	ND	ND	-	-	-	-	-	-	ND

Table 2 Surface Water Sample Analytical Results

BCWQG	BCWQG	Sample ID		SW18-01	SW18-02
Recreation	Recreation	Date Sampled		03-Oct-2018	03-Oct-2018
Primary Contact	Secondary Contact	Lab Certificate		K020946	K020946
		Lab Sample ID	Units	UL7765	UL7766
		Microbiology			
77/100mL	385/100mL	E. coli	CFU/100mL	380	400
200/100mL	n/s	Fecal Coliforms	CFU/100mL	18	88
n/s	n/s	Total Coliforms	CFU/100mL	1,100	690
n/s	n/s	Total Bacteroides	CEs/100mL	111	-
n/s	n/s	Human Bacteroides	CEs/100mL	ND	-

Exceedances
125 Exceeds BC Water Quality Guideline for Primary Contact Recreation
125 Exceeds BC Water Quality Guideline for Secondary Contact Recreation

Glossary
MPN Most Probable Number
CEs Cell Equivalents, measured by Polymerase Chain Reaction using genomic DNA standards
CFU Coliform Unit
n/s No Standard
ND None Detected

LABORATORY CERTIFICATES OF ANALYSIS

Your Project #: 10988-C
Your C.O.C. #: K020946

Attention: Krista Morden

KEYSTONE ENVIRONMENTAL LTD
SUITE 320
4400 DOMINION STREET
BURNABY, BC
CANADA V5G 4G3

Report Date: 2018/10/25
Report #: R2640576
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B886133

Received: 2018/10/03, 10:50

Sample Matrix: Water
Samples Received: 2

Analyses	Date		Date Analyzed	Laboratory Method	Analytical Method
	Quantity	Extracted			
Fecal Coliform by membrane filtration	2	N/A	2018/10/03	BBY4SOP-00001	SM 22 9222 m
Total Coliform & E.Coli by MF-Chromocult	2	N/A	2018/10/03	BBY4SOP-00143	SM 22 9222
Human Bacteroides in Water Subcontract (1)	1	N/A	2018/10/19		
Total Bacteroides in Water Subcontract (1)	1	N/A	2018/10/19		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Sub Burnaby to EMSL (NJ)

Your Project #: 10988-C
Your C.O.C. #: K020946

Attention: Krista Morden

KEYSTONE ENVIRONMENTAL LTD
SUITE 320
4400 DOMINION STREET
BURNABY, BC
CANADA V5G 4G3

Report Date: 2018/10/25
Report #: R2640576
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B886133

Received: 2018/10/03, 10:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Gail Pedersen, Project Manager –Environmental Customer Service
Email: gpedersen@maxxam.ca
Phone# (604) 734 7276

=====

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 #: B886133
Report Date: 2018/10/25

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF WATER

Maxxam ID		UL7765	
Sampling Date		2018/10/03 08:00	
COC Number		K020946	
	UNITS	SW18-01	QC Batch
External Sublet Analysis			
Subcontract Parameter	N/A	ATTACHED	9192751

Maxxam Job #: B886133
Report Date: 2018/10/25

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

MICROBIOLOGY (WATER)

Maxxam ID		UL7765	UL7766		
Sampling Date		2018/10/03 08:00	2018/10/03 08:00		
COC Number		K020946	K020946		
	UNITS	SW18-01	SW18-02	RDL	QC Batch
Microbiological Param.					
Fecal Coliforms	CFU/100mL	18	88	2	9170543
Total Coliforms	CFU/100mL	1100	690	2	9170540
E. coli	CFU/100mL	380	400	2	9170540
RDL = Reportable Detection Limit					

Maxxam Job #: B886133
Report Date: 2018/10/25

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

GENERAL COMMENTS

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

Package 1	10.7°C
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Version 2: Report reissued to include results for total bacteroids and human bacteroids on sample SW18-01 as per request from Krista Morden on 2018/10/10

Results relate only to the items tested.

Maxxam Job #: B886133
Report Date: 2018/10/25

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

VALIDATION SIGNATURE PAGE

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



Rob Reinert, B.Sc., Scientific Spécialist



Thomas Pinchin, Junior Project Manager

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.

CHAIN OF CUSTODY RECORD

K 020946

BBY FCD-00077/07

Page 1 of 1

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5. Toll Free (800) 665-8566

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required	
Company Name: 3763 - Keystone Environmental Ltd.		Company Name: KEL		Quotation #: _____		<input checked="" type="checkbox"/> Regular TAT 5 days (Most analyses)	
Contact Name: Craig Patterson		Contact Name: Krista Hadden		P.O. #/ AFE#: _____		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS	
Address: #320 - 4400 Dominion Street		Address: _____		Project #: 10988-C		Rush TAT (Surcharges will be applied)	
Burnaby, BC PC: V5G 4G3		PC: _____		Site Location: _____		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days	
Phone: (604) 430-0671		Phone: _____		Site #: _____		<input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Days	
Email: cspatterson@keystoneenv.com		Email: khadden@keystoneenv.com		Sampled By: KM		Date Required: _____	
Regulatory Criteria		Special Instructions		Analysis Requested		Rush Confirmation #:	
<input type="checkbox"/> BC CSR Soil <input type="checkbox"/> BC CSR Water <input type="checkbox"/> YK CSR Soil <input type="checkbox"/> YK CSR Water <input type="checkbox"/> CCME (Specify) <input type="checkbox"/> Other (Specify) <input type="checkbox"/> Drinking Water <input type="checkbox"/> BC Water Quality		<input type="checkbox"/> Return Cooler <input type="checkbox"/> Ship Sample Bottles (Please Specify)		<input type="checkbox"/> MTBE <input type="checkbox"/> VOC / BTEX / VPH <input type="checkbox"/> VOC / BTEX / F1 <input type="checkbox"/> PAH <input type="checkbox"/> LEPH/HEPH/PAH <input type="checkbox"/> F2 - F4 <input type="checkbox"/> EPH <input type="checkbox"/> TEH <input type="checkbox"/> Filtered? <input type="checkbox"/> Preserved? <input type="checkbox"/> Dissolved Metals <input type="checkbox"/> Filtered? <input type="checkbox"/> Preserved? <input type="checkbox"/> Total Metals <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Total Mercury <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Chloride <input type="checkbox"/> Fluoride <input type="checkbox"/> Sulphate <input type="checkbox"/> TSS <input type="checkbox"/> BOD <input type="checkbox"/> COD <input type="checkbox"/> pH <input type="checkbox"/> Conductivity <input type="checkbox"/> Alkalinity <input type="checkbox"/> Nitrite <input type="checkbox"/> Nitrate <input type="checkbox"/> Ammonia <input type="checkbox"/> E. Coli / fecal Coliforms <input type="checkbox"/> Total Coliforms <input type="checkbox"/> Total Bacteroids <input type="checkbox"/> Human Bacteroides		LABORATORY USE ONLY CUSTODY SEAL Y / N <input checked="" type="checkbox"/> Present Intact COOLING MEDIA PRESENT <input type="checkbox"/> N COMMENTS: 10, 11, 11 (Coli) (media)	
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM							
Sample Identification		Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix			
1	SW18-01	2018/10/03	8:00	Water			
2	SW18-02	↓	↓	↓			
3							
4							
5							
6							
7							
8							
9							
10							
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)
Krista Hadden		2018/10/03	10:50	[Signature]		2018/10/03	10:50

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at

COC-1027 Keystone 247



B886133_COC

<http://www.emsl.com> E-mail: Dnalab2@EMSL.com



Client: Maxxam Analytics
4606 Canada Way
Burnaby, BC V5G 1K5
Attn: Megan Smith
Project: Maxxam Project #: B886133

EMSL Order ID: 611802064
Date Received: 10/15/2018
Date Analyzed: 10/16/2018
Date Reported: 10/18/2018
Date Amended:

Rapid Detection of Total *Bacteroides* by Quantitative PCR

EMSL Test: M095

[illegible]

CEs: Cell Equivalent, measured by PCR using genomic DNA standards.

EMSL maintains liability limited to the cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations.

be

Sergey Balashov, Ph.D.
PCR Laboratory Director

<http://www.emsl.com> E-mail: Dnalab2@EMSL.com



Client:	Maxxam Analytics 4066 Canada Way Burnaby, BC V5G 1K5
Attn:	Megan Smith
Project:	Maxxam Project #: B886133

EMSL Order ID: 611802064
Date Received: 10/15/2018
Date Analyzed: 10/16/2018
Date Reported: 10/18/2018
Date Amended:

Rapid Detection of Human *Bacteroides* by Quantitative PCR

EMSL Test Code: M199

[illegible]

Note: The qPCR assay for human *Bacteroides* is based on HF183 marker which was evaluated by EPA scientists (SAM, 33, 2010). The qPCR detects human specific *Bacteroides* predominantly.

CEs: Cells Equivalent, measured by PCR using genomic DNA standards.

EMSL maintains liability limited to the cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations

Sergey Balashov, Ph.D.
PCR Laboratory Director

Your Project #: 10988-C
Your C.O.C. #: K020945

Attention: Krista Morden

KEYSTONE ENVIRONMENTAL LTD
SUITE 320
4400 DOMINION STREET
BURNABY, BC
CANADA V5G 4G3

Report Date: 2018/10/19
Report #: R2637528
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B886135

Received: 2018/10/03, 10:50

Sample Matrix: Soil
Samples Received: 9

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Total Coliforms (MTF) in Soil (2)	9	N/A	2018/10/03	COR1 SOP-00019	Health Can MFHPB-19
Escherichia Coli (MTF) in Soil (2)	9	N/A	2018/10/03	COR1 SOP-00019	Health Can MFHPB-19
Fecal Coliforms (MTF) in Soil - Wet (2)	9	N/A	2018/10/03	COR1 SOP-00019	Health Can MFHPB-19
Moisture	9	2018/10/03	2018/10/04	BBY8SOP-00017	BCMOE BCLM Dec2000 m
Human Bacteroides in Soil Subcontract (1)	3	N/A	2018/10/18		
Total Bacteroides in Soil Subcontract (1)	3	N/A	2018/10/18		

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.

Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

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

(1) This test was performed by Sub Burnaby to EMSL (NJ)

(2) The matrix is non-food and is outside of the scope of the method. Sample(s) analyzed have not been subjected to Maxxam's standard validation process for the submitted matrix and is not an accredited method.

Your Project #: 10988-C
Your C.O.C. #: K020945

Attention: Krista Morden

KEYSTONE ENVIRONMENTAL LTD
SUITE 320
4400 DOMINION STREET
BURNABY, BC
CANADA V5G 4G3

Report Date: 2018/10/19
Report #: R2637528
Version: 2 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B886135

Received: 2018/10/03, 10:50

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Gail Pedersen, Project Manager –Environmental Customer Service
Email: gpedersen@maxxam.ca
Phone# (604) 734 7276

=====

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 #: B886135
Report Date: 2018/10/19

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

RESULTS OF CHEMICAL ANALYSES OF SOIL

Maxxam ID		UL7768	UL7769	UL7776	
Sampling Date		2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	
COC Number		K020945	K020945	K020945	
	UNITS	SS18-01	SS18-02	SS18-A	QC Batch
External Sublet Analysis					
Subcontract Parameter	N/A	ATTACHED	ATTACHED	ATTACHED	9190538

Maxxam Job #: B886135
Report Date: 2018/10/19

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

PHYSICAL TESTING (SOIL)

Maxxam ID		UL7768	UL7769	UL7770	UL7771	UL7772	UL7773	UL7774		
Sampling Date		2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00		
COC Number		K020945	K020945	K020945	K020945	K020945	K020945	K020945		
	UNITS	SS18-01	SS18-02	SS18-03	SS18-04	SS18-05	SS18-06	SS18-07	RDL	QC Batch

Physical Properties										
Moisture	%	16	28	15	24	21	12	19	0.30	9170201
RDL = Reportable Detection Limit										

Maxxam ID		UL7775	UL7776		
Sampling Date		2018/10/03 08:00	2018/10/03 08:00		
COC Number		K020945	K020945		
	UNITS	SS18-08	SS18-A	RDL	QC Batch

Physical Properties					
Moisture	%	88	12	0.30	9170201
RDL = Reportable Detection Limit					

Maxxam Job #: B886135
Report Date: 2018/10/19

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

MICROBIOLOGY (SOIL)

Maxxam ID		UL7768	UL7769	UL7770	UL7771	UL7772	UL7773	UL7774		
Sampling Date		2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00	2018/10/03 08:00		
COC Number		K020945	K020945	K020945	K020945	K020945	K020945	K020945		
	UNITS	SS18-01	SS18-02	SS18-03	SS18-04	SS18-05	SS18-06	SS18-07	RDL	QC Batch

Microbiological Param.

E. coli	MPN/100g	790	1300	<20	130	<20	230	68	20	9170733
Fecal Coliforms Wet	MPN/100g	790	1300	<20	130	<20	230	68	20	9170735
Total Coliforms	MPN/100g	3300000	28000	22000	23000	230000	79000	38000	20	9170730

RDL = Reportable Detection Limit

Maxxam ID		UL7775	UL7776		
Sampling Date		2018/10/03 08:00	2018/10/03 08:00		
COC Number		K020945	K020945		
	UNITS	SS18-08	SS18-A	RDL	QC Batch

Microbiological Param.

E. coli	MPN/100g	3500	1300	20	9170733
Fecal Coliforms Wet	MPN/100g	3500	1300	20	9170735
Total Coliforms	MPN/100g	7900	49000	20	9170730

RDL = Reportable Detection Limit

Maxxam Job #: B886135
Report Date: 2018/10/19

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

GENERAL COMMENTS

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

Package 1	10.7°C
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Version 2: Report reissued to include results for total bacteroids and human bacteroids on samples SS18-01, SS18-02 and SS18-A as per request from Krista Morden on 2018/10/10

Results relate only to the items tested.

Maxxam Job #: B886135
Report Date: 2018/10/19

QUALITY ASSURANCE REPORT

KEYSTONE ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

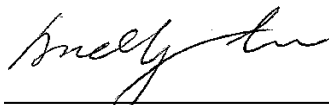
QC Batch	Parameter	Date	Method Blank		RPD	
			Value	UNITS	Value (%)	QC Limits
9170201	Moisture	2018/10/04	<0.30	%	18	20
Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.						
Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.						

Maxxam Job #: B886135
Report Date: 2018/10/19

KEystone ENVIRONMENTAL LTD
Client Project #: 10988-C
Sampler Initials: KM

VALIDATION SIGNATURE PAGE

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



Andy Lu, Ph.D., P.Chem., Scientific Specialist

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.

CHAIN OF CUSTODY RECORD

K 020945

BBY FCD-00077/07

Page 1 of 1

Burnaby: 4606 Canada Way, Burnaby, BC V5G 1K5, Toll Free (800) 665-8566

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required															
Company Name: 3763 - Keystone Environmental Ltd.		Company Name: KEL		Quotation #:		<input checked="" type="checkbox"/> Regular TAT 5 days (Most analyses)															
Contact Name: Graig Patterson		Contact Name: Krista Morden		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS															
Address: #320 - 4400 Dominion Street		Address:		Project #: 10908-C		Rush TAT (Surcharges will be applied)															
Burnaby, BC PC: V5G 4G3		PC:		Site Location:		<input type="checkbox"/> Same Day <input type="checkbox"/> 2 Days															
Phone: (604) 430-0671		Phone:		Site #:		<input type="checkbox"/> 1 Day <input type="checkbox"/> 3 Days															
Email: cpatterson@keystoneenvironmental.ca		Email: kmorden@keystoneenvironmental.ca		Sampled By: KM		Date Required:															
Regulatory Criteria		Special Instructions		Analysis Requested		Rush Confirmation #:															
<input type="checkbox"/> BC CSR Soil <input type="checkbox"/> BC CSR Water <input type="checkbox"/> YK CSR Soil <input type="checkbox"/> YK CSR Water <input type="checkbox"/> CCME (Specify) <input type="checkbox"/> Other (Specify) <input type="checkbox"/> Drinking Water <input type="checkbox"/> BC Water Quality		<input type="checkbox"/> Return Cooler <input type="checkbox"/> Ship Sample Bottles (Please Specify)		<input type="checkbox"/> VOC / BTEX / VPH <input type="checkbox"/> MTBE <input type="checkbox"/> VOC / BTEX / F1 <input type="checkbox"/> <input type="checkbox"/> PAH <input type="checkbox"/> LEH/NEH/PAH <input type="checkbox"/> F2 - F4 <input type="checkbox"/> EPH <input type="checkbox"/> TEH <input type="checkbox"/> Preserved? <input type="checkbox"/> Dissolved Metals <input type="checkbox"/> Filtered? <input type="checkbox"/> Dissolved Mercury <input type="checkbox"/> Filtered? <input type="checkbox"/> Total Metals <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Total Mercury <input type="checkbox"/> Field Preserved? <input type="checkbox"/> Chloride <input type="checkbox"/> Sulphate <input type="checkbox"/> TSS <input type="checkbox"/> BOD <input type="checkbox"/> COD <input type="checkbox"/> pH <input type="checkbox"/> Conductivity <input type="checkbox"/> Alkalinity <input type="checkbox"/> Nitrate <input type="checkbox"/> Ammonia <input type="checkbox"/> E. coli / fecal Coliforms <input type="checkbox"/> Total Coliforms <input type="checkbox"/> Total Bacteroides <input type="checkbox"/> Human Bacteroides		LABORATORY USE ONLY <table border="1"> <tr> <th colspan="2">CUSTODY SEAL Y / N</th> <th rowspan="2">COOLER TEMPERATURES</th> </tr> <tr> <th>Present</th> <th>Intact</th> </tr> <tr> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td>10:11 AM (Cold media)</td> </tr> <tr> <td colspan="2">COOLING MEDIA PRESENT Y / N</td> <td></td> </tr> <tr> <td colspan="2">COMMENTS</td> <td></td> </tr> </table>		CUSTODY SEAL Y / N		COOLER TEMPERATURES	Present	Intact	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10:11 AM (Cold media)	COOLING MEDIA PRESENT Y / N			COMMENTS		
CUSTODY SEAL Y / N		COOLER TEMPERATURES																			
Present	Intact																				
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	10:11 AM (Cold media)																			
COOLING MEDIA PRESENT Y / N																					
COMMENTS																					
SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM																					
Sample Identification		Date Sampled (YYYY/MM/DD)	Time Sampled (HH:MM)	Matrix																	
1	SS18-01	2018/10/03	8:00	Soil																	
2	SS18-02																				
3	SS18-03																				
4	SS18-04																				
5	SS18-05																				
6	SS18-06																				
7	SS18-07																				
8	SS18-08																				
9	SS18-A																				
10																					
RELINQUISHED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)		DATE: (YYYY/MM/DD)	TIME: (HH:MM)														
Krista Morden		2018/10/03	10:50	K.M. Morden		2018/10/03	10:50														

Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.com

COC-1027 Keystone

248



B886135_COC

200 Route 130 North, Cinnaminson, NJ 08077
Phone/Fax: (800) 220-3675/ 786-0262
<http://www.emsl.com> E-mail: Dnalab2@EMSL.com



EMSL Order ID: 611802065
Date Received: 10/15/2018
Date Analyzed: 10/17/2018
Date Reported: 10/18/2018
Date Amended: 10/19/2018

EMSL Test: M095

[illegible]

EMSL maintains liability limited to the cost of analysis. Interpretation of the data contained in this report is the responsibility of the client. This report relates only to the samples reported above and may not be reproduced, except in full, without written approval by EMSL. The above test report relates only to the items tested. EMSL bears no responsibility for sample collection activities or analytical method limitations.

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PCR-TMP-101-2
Rev 3 - 06/21/17

Printed: 10/19/2018 11:24 AM

