GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

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1779 W 75th Ave.
Vancouver, B.C. Canada V6P 6P2

City of Coquitlam
3000 Guildford Way
Coquitlam, BC
V3B 7N2

March 24th, 2020
File #: 17705

Attention: Ed Castaneda

Re: Geotechnical Investigation – Robinson memorial Park Cemetery (Phase 1)
621 Robinson Street, Coquitlam, BC

1.0 INTRODUCTION

We understand that The City of Coquitlam is considering the above referenced property for redevelopment. We understand that the Memorial Forest redevelopment will maintain a buffer along the north west, site grading, removing trees elsewhere in the Phase 1, construction of meandering trails through the Green Burial grounds, provision of a new pedestrian connection of the northern half of cemetery, extending the central corridor/road to connect to Robinson street for secondary vehicular access, the addition of 380 traditional burial plots at the north half of the cemetery, grade and site preparation for additional cremated remains plots in the South of cemetery.

This report presents the results of a geotechnical investigation of the soil and groundwater conditions on site and provides preliminary recommendations for the design and construction of the contemplated redevelopment. The report has been prepared exclusively for The City of Coquitlam, for their use and the use of others on their design and construction team.

2.0 SITE DESCRIPTION

The site is located at the southeast corner of the intersection of Robinson Street and Foster Avenue, in Coquitlam, BC. The site is rectangular in shape. The Phase 1 site is bounded by Foster Avenue to the north, The Vancouver Golf Club property to the east, Robinson Street to the west and remaining cemetery lands to the south. At the time of our investigation, the site was predominantly covered with trees.

The location of the site relative to surrounding developments is shown on our site plan (Drawing No. 17705-01), following the text of this report.

3.0 FIELD INVESTIGATION

A geotechnical investigation for this site was completed by GeoPacific Consultants Ltd. February 20th, 2020. The investigation included 9 test pits with depths varying between 2.3 and 3.2 metres below grade. Additionally, in order to estimate in-situ infiltration characteristics of the existing soils, GeoPacific Consultants Ltd. performed Double Ring Infiltration Testing (DRIT) on February 20th, 2020 at the above referenced site. A total of three tests were completed along the north and west side of the development and are shown on our Drawing No. 17705-01 following the text of this letter.

The DRIT was completed using a double ring infiltrometer in accordance with ASTM D3385, modified for the use of electric piezometers for more accurate data collection. The double ring infiltrometer is designed

to meet standards for conducting infiltration of water into soils. The DRIT setup consists of two stainless steel rings measuring 300 mm and 600 mm in diameter. The premise of using two rings is to replicate one-dimensional, vertical flow. The water within the annular area will flow vertically and laterally, creating a vertical flow path for the water within the inner ring.

The two rings were driven into the existing soils approximately 100 mm for each soil layer; the smaller ring inside the larger ring, forming a central and annular area. The rings were filled with water and mini-piezometers were placed within the rings to record the pressure from the water head. An additional piezometer was placed outside the rings to record atmospheric pressure changes. The piezometers record the pressure in cm of water in 2 second intervals. The readings from the piezometer within the inner ring are normalized by the atmospheric pressure and plotted versus time. The slope of the graph indicates the infiltration rate.

4.0 SUBSURFACE CONDITIONS

4.1 Soil Conditions

The subsurface soil conditions encountered at the locations of our test pits generally consists of up to 0.5 m of sand and gravel fill or forest floor, underlain by dense sand. TP03-20 and TP05-20 show a compact sand and gravel layer beneath the forest floor that extends to depths of up to 1.5 metres below ground surface.

A detailed description of the soils encountered at the site during the investigation is provided in Appendix C. Approximate locations of the test pits are shown on Drawing No. 17705-01.

4.2 Groundwater Conditions

Groundwater was not observed during the geotechnical investigation.

4.3 DRIT and permeability laboratory test results

The depths of the tests were conducted between 1.0 m and 2.5 m below current site grades in dense to very dense sand. The soil profiles and infiltration rates are presented in Table 1 below – detailed results of the infiltration tests are attached in Appendix A. Five laboratory permeability tests were conducted on samples collected from different depths. Table 2 presents the hydraulic conductivity rates and the location and depth of the samples. Detailed results of the permeability tests are attached in Appendix B.

TABLE 1 – SOIL PROFILES AND INFILTRATION RATES

Location	Depth of Test (m)	Infiltration Rate (mm/hr)
DRIT20-01	1.0	315
DRIT20-02	2.5	300
DRIT20-03	2.0	240

TABLE 2 – SOIL PROFILES AND LABORATORY HYDRAULIC CONDUCTIVITY RATES

Location	Depth of Test (m)	Hydraulic Conductivity (mm/hr)
TP20-01	1.2	916.4
TP20-02	2.4	438.5
TP20-03	1.8	760
TP20-07	2.0	1136.7
TP20-08	2.4	900

5.0 DISCUSSION

5.1 General

We understand that some of the areas will be stripped and paved. We also understand that the soil stability and infiltration rates are of interest for future interments.

The native sand to sand and gravel would be well suited to support the future improvements, including walking paths, trails and roads. We confirm, from a geotechnical perspective, that the proposed improvements are feasible provided our recommendations as described in Section 6 of this report are followed.

6.0 DESIGN RECOMMENDATIONS

6.1 Site Preparation

Stripping of organics and/or loose soils will be required prior to placement of the trails, paths and pavement structures. Our minimum stripping depths for foundations, floor slabs, and pavement structures are provided in Table 1 below.

Table 1 - Recommended Minimum Stripping Depths for Foundations, Floor Slabs, & New Pavement Structures

Test Pit	Stripping Depth (metres)	Test Pit	Stripping Depth (metres)
TP20-01	0.6	**TP20-06**	0.3
TP20-02	0.9	**TP20-07**	0.5
TP20-03	0.3	**TP20-08**	0.3
TP20-04	0.3	**TP20-09**	0.3
TP20-05	0.3		

The stripping depths provided in Table 1 are our ***minimum*** stripping depths at each of our test hole locations. It should be appreciated that the depth of stripping can vary across the site. In determining our minimum stripping depths we have measured from the surface downward to the first suitable foundation bearing stratum.

In the context of this report, engineered fill is a well graded gravel that has been systematically placed in controlled lifts, not exceeding 300 mm loose, and compacted to 100% of its Standard Proctor maximum dry density (in accordance with ASTM D698), at a moisture content that is within 2% of optimum for compaction. Engineered fill can be used to support foundation, however it would be preferable to not use fill to support.

6.2 Building Foundations

Based on our investigation, we expect any future buildings to be founded on the native compact to dense sand to sand and gravel. Therefore, any future buildings can be founded on normal spread foundations, including pad and strip footings. Some over-excavation of the existing fills and forest floor could be required.

For subgrade of dense sand prepared as described above, foundations may be designed on the basis of a serviceability limit state (SLS) bearing pressure of 200 kPa and a factored ultimate limit state (ULS) bearing pressure of 300 kPa. For foundations designed as recommended we expect that settlements should be limited to less than 25 mm total and 20 mm over 10 meters differential. For subgrade of compact to dense sand (fill), foundations may be designed on the basis of a serviceability limit state (SLS) bearing pressure of 100 kPa and ultimate limit state (ULS) bearing pressure of 150 kPa.

Irrespective of specified bearing pressures, footings should not be less than 450 mm in width for strip footings and not less than 600 mm in width for square or rectangular footings.

Foundation subgrades must be inspected by the geotechnical engineer prior to construction of foundations.

6.3 Seismic Design of Foundations

The subgrade conditions underlying the site may be classified as Site Class C as defined in Table 4.1.8.4.A of the 2018 British Columbia Building Code. Peak ground accelerations on firm ground for the approximate site location is 0.329 g (National Resource Canada, Site Coordinates: 49.255 degrees North, 122.879 degrees West).

We do not consider the site soils to be prone to liquefaction. Thus, no special ground improvement measures are required to meet the serviceability requirements of the 2019 British Columbia Building Code.

6.4 Grade Supported Slabs

In order to provide suitable support for any grades supported slabs or sidewalks, we recommend that any fill placed under the floor slab should be clear gravel with not more that 5% by weight passing the 75μm sieve size, with a minimum of 150mm. In addition, this granular fill must be compacted to a standard of 98% of its Standard Proctor maximum dry density within 2% of the optimum moisture content for compaction.

Underslab fill must be reviewed by the geotechnical engineering prior to pouring the slab on grade.

6.5 Excavation stability

As noted above, we understand that part of the site will have excavations for interments up to 2.5 metres deep. During the investigation, vertical cuts up to 3 metres deep remained stable for 2 to 3 hours. Vertical

cuts in the dense sand are expected to remain stable during excavation for a short period of time. If manned entry into the excavations is needed, a professional engineer will be necessary to review the cuts as per Work Safe BC requirements.

6.6 Storm water infiltration and water management

Testing completed in-situ and in the laboratory confirm the range of infiltration values (presented in Section 4.3) for the on-site native sand to sand and gravel. Laboratory permeability testing was done on re-constituted samples, which are at a sufficiently lower relative density, consequently the showed higher rates of permeability. We recommend the Civil Designer to utilize a rate of 200 mm/hr (ultimate) for the design of any infiltration systems.

6.7 Utility Installation

Utility excavations shall be sloped or shored in accordance with the latest Worker's Compensation Board (WCB) Occupational Health & Safety Guidelines. Any excavation in excess of 1.2 metres in height requiring worker-entry must be reviewed by a professional geotechnical engineer.

Light to moderate seepage should be expected during the wet seasons, due to the formation of perched water tables. We expect that inflows may be handled with sumps and sump pumps.

6.8 On-Site Pavements and Roads

Following the recommended site preparation noted in Section 6.1. We envisage that subgrade soils consisting of compact to dense (granular) sand may be re-compacted in-situ with a large vibratory drum roller.

Where existing soils are soft/loose and can not be re-compacted to a minimum of 98% of Maximum Dry Density from a Standard Proctor test (ASTM D698), they must be excavated and replaced with engineered fill.

All base and subbase fills should be compacted to a minimum of 98% of Maximum Dry Density from a Standard Proctor test (ASTM D698).

GeoPacific believes that the minimum pavement structure for the asphalt road, given in Table 2, is sufficient to carry vehicle loads.

Table 2 – Asphalt Structure

Material	Thickness (mm)
Asphaltic Concrete	75
Base course, consisting of 19 mm minus crushed gravel	100
Sub-base course, consisting clean sand and gravel (well graded 100 mm minus)	200

All base and sub-base fills should be compacted to a minimum of 98% of Maximum Dry Density from a Standard Proctor test (ASTM D698), at a moisture content that is within ±2% of its Optimum Moisture Content (OMC).

Compaction tests shall be carried out and in-situ density of the compacted layers shall be measured by GeoPacific.

We envisage that a 300 mm thick layer of compacted 100 mm minus well graded clean sand and gravel can support service vehicles and machinery.

7.0 REVIEWS

The preceding sections make preliminary recommendations for the design and construction of the proposed improvements. We must review final structural design and grades relative to existing grade and update our recommendations as required.

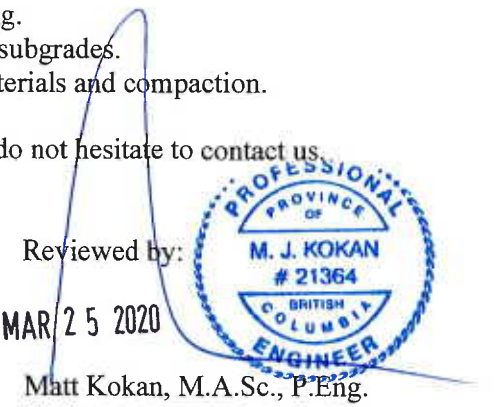
It is the responsibility of the contractors working on-site to inform GeoPacific a minimum of 48 hours in advance that a field review is required. In summary, reviews are required by the geotechnical engineer for the following portions of the work.

Stripping	Review of site stripping.
Foundation	Review of foundation subgrades.
Backfill	Review of backfill materials and compaction.

If you would like further details or clarification please do not hesitate to contact us.

For:
GeoPacific Consultants Ltd.

Reviewed by:



MAR 25 2020

Boris Kolev, M.A.Sc., EIT
Project Engineer

Matt Kokan, M.A.Sc., P.Eng.
Principal

Austin Lockstidt, B.A.Sc., EIT
Engineer In Training

LEGEND:

TP-20-00 – TEST PIT (TP) LOCATION
HOLE LOCATIONS ARE APPROXIMATE

REFERENCE:

GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

1779 W. 75th Avenue
Vancouver, B.C. V6P 6P2
P 604.439.0922
F 604.439.9189

DATE: FEBRUARY 20, 2020		
DRAWN BY: ALO	APPROVED BY: MJK	REVIEWED BY: BK
SCALE: NOT TO SCALE		

ROBINSON MEMORIAL PARK CEMETARY
621 ROBINSON STREET, COQUITLAM
APPROXIMATE GEOTECHNICAL INVESTIGATION

FILE NO.: 17705
DWG. NO.: 17705-01

REVISIONS:
A.
B.
C.

GR7

ORIGINAL PAPER SIZE 8.5"x11"

Test Pit Log: TP20-01 (DRIT20-01)

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 ft / 0 m		Ground Surface				
		FOREST FLOOR	0.0			
1		***SAND*** Sand, some silt, some organics, loose to compact, moist to wet, light brown	0.2	20.8%		
2		***SAND*** Medium grained sand, dense, moist, grey	0.6			
3 – 1						Infiltration rate of 314.4 mm/hr at 1.0 m.
4						
5						
6						
7 – 2						
8				8.7%		
		End of Test Pit	2.5			
9						
10 – 3						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A.1

Test Pit Log: TP20-02 (DRIT20-02)

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G9
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft)	Depth (m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0	0		Ground Surface				
			SAND GRAVEL (FILL) Sand and gravel fill, compact, moist, brown	0.0			
			FOREST FLOOR	0.4			
			SAND Sand, some silt, trace gravel, moist, brown		11.9%		
	1		**SAND** Fine to medium grained sand, dense, moist, grey.	0.9			
	2						Infiltration rate of 297.5 mm/hr at 2.5 m
	3				12.4%		
			End of Test Pit	3.2			

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A 2
Page: 1 of 1

Test Pit Log: TP20-03 (DRIT20-03)

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

INFERRED PROFILE

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 / 0		Ground Surface				
		FOREST FLOOR	0.0			
1		***SAND _GRAVEL***	0.3			
2		Sand and gravel, compact, moist, brown.				
3 / 1				7.0%		
		SAND	1.0			
4		Medium grained sand, compact, moist, grey				
5		Becomes dense @ 1.5 m				
6 / 2						Infiltration rate of 242.7 mm/hr at 2.0 m
7						
8						
		End of Test Pit	2.5			
9 / 3						
10						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A.3
Page: 1 of 1

Test Pit Log: TP20-04

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
[illegible] - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft)	Depth (m)	Symbol	INFERRED PROFILE: SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0	0		Ground Surface				
			FOREST FLOOR	0.0			
			SAND Medium grained sand, trace gravel, dense, moist, tan	0.2			
1							
2							
3	1						
			SAND Medium grained sand, some gravel, dense to very dense, moist, grey.	1.1			
4							
5							
6	2		Light seepage @ 2.0 m		10.6%		
7			End of Test Pit	2.1			
8							

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A.4

Test Pit Log: TP20-05

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 / 0		Ground Surface	0.0			
		FOREST FLOOR				
		SAND GRAVEL Sand and gravel, loose to compact, moist, light brown.		8.9%		
5 / 1		**SAND** Medium grained sand, dense, moist, grey.	1.5	13.2%		
8 / 2		End of Test Pit	2.4			
10 / 3						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A 5
Page: 1 of 1

Test Pit Log: TP20-06

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
2[illegible] - 1[illegible] West 7[illegible] Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth	Symbol	INFERRED PROFILE: SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 ft / 0 m		Ground Surface				
		FOREST FLOOR	0.0			
1		***SAND*** Medium grained sand, some gravel. compact to dense, moist, tan	0.3			
3 / 1				10.9%		
4		***SAND*** Medium grained sand, dense, moist, grey	1.3			
6 / 2				7.5%		
		End of Test Pit	2.4			
9 / 3						
10						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A 6
Page: 1 of 1

Test Pit Log: TP20-07

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 / 0		Ground Surface				
		FOREST FLOOR	0.0			
1						
		SAND Medium grained sand, trace gravel, some roots, compact, moist, brown	0.5			
2 / 1						
3						
4						
		SAND Medium grained sand, dense, moist, grey.	1.3			
5						
6 / 2						
7						
		End of Test Pit	2.3			
8						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A.7

Test Pit Log: TP20-08

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
210 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft / m)	Symbol	SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0 / 0		Ground Surface				
		FOREST FLOOR	0.0			
1		***SAND*** Medium grained sand, some gravel, compact, moist, brown	0.2	13.0%		
2						
3 / 1		***SAND*** Fine to medium grained sand, dense, moist, grey.	0.8			
4						
5						
6 / 2						
7						
8		End of Test Pit	2.5			
9						
10 / 3						

Logged: ALO
Method: MINI EXCAVATOR
Date: FEBRUARY 19 2020

Datum: GROUND SURFACE
Figure Number: A.8

Test Pit Log: TP20-09

File: 17705
Project: ROBINSON MEMORIAL PARK CEMETARY
Client: CITY OF COQUITLAM
Site Location: 621 ROBINSON STREET, COQUITLAM

GEOPACIFIC CONSULTANTS
215 - 1200 West 73rd Avenue, Vancouver, BC, V6P 6G5
Tel: 604-439-0922 Fax:604-439-9189

Depth (ft)	Depth (m)	Symbol	INFERRED PROFILE — SOIL DESCRIPTION	Depth (m)/Elev (m)	Moisture Content (%)	Groundwater / Well	Remarks
0	0		Ground Surface				
			FOREST FLOOR	0.0			
1			***SAND*** Medium grained sand, some gravel, compact, moist, brown.	0.3	12.2%		
2							
3	1						
4			***SAND*** Fine to medium grained sand, dense, moist, grey	1.2			
5							
6					7.5%		
	2						
7			End of Test Pit	2.1			
8							

Logged ALO
Method: MINI EXCAVATOR
Date FEBRUARY 19, 2020

Datum: GROUND SURFACE
Figure Number: A.9
Page: 1 of 1

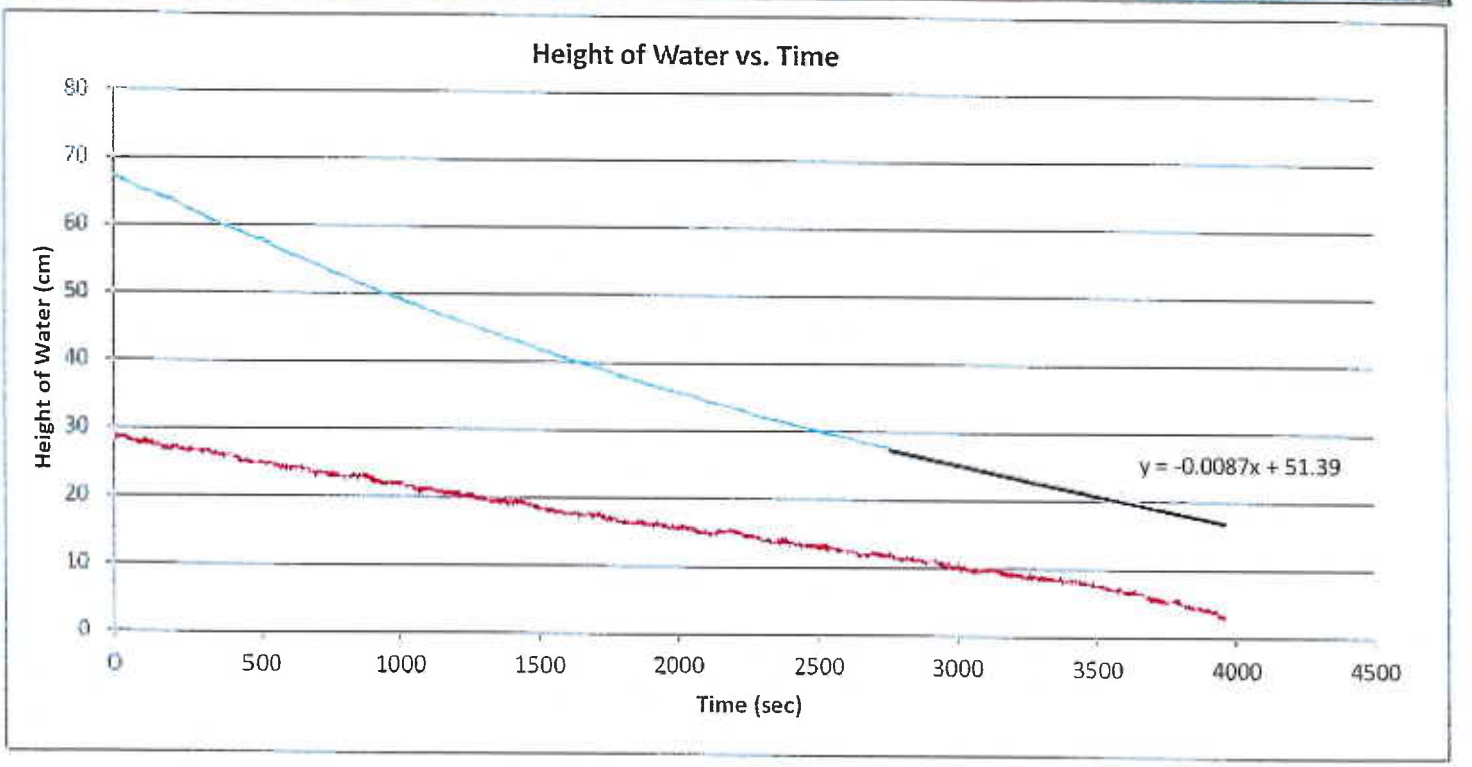
GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

DOUBLE RING INFILTRATION TEST (ASTM D3385)

Vancouver Lab
GR17
1779 West 75th Avenue
Vancouver, B.C
V6P 6P2

CLIENT:	CITY OF COQUITLAM	PROJECT #:	17705
PROJECT NAME:	ROBINSON MEMORIAL PARK CEMETARY	DATE:	20-Feb-2020 9:00
PROJECT LOCATION:	621 ROBSINSON STREET, COQUITLAM	TEST NO.:	DRIT20-01

ESTIMATED FIELD SATURATED INFILTRATION RATE: 314.4 mm/Hr



TEST INFORMATION

LIQUID USED:	WATER	AREA INNER CYLINDER:	72965.63 mm^2	DEPTH OF TEST BELOW CURRENT SITE GRADE (m):	1.0
LIQUID pH:	7.1	ANNULAR AREA:	209777.71 mm^2		
SOIL DESCRIPTION:	SAND	CYLINDER ACCURACY:	± 0.5 mm	INFILTRATION RATE (cm/sec):	8.732E-03
SOIL TYPE:	NATIVE	LIQUID DEPTH INNER:	67.4 cm		
WEATHER ON SITE:	CLEAR	LIQUID DEPTH OUTER:	29.2 cm	DEPTH TO WATER TABLE:	UNKNOWN

Comments:

Per: Austin Lockstidt, B.A.Sc., EIT

Enginner In Training

Reviewed by: Jakub Szary, B.Sc., AScT

FEB 24 2020

Lab Manager

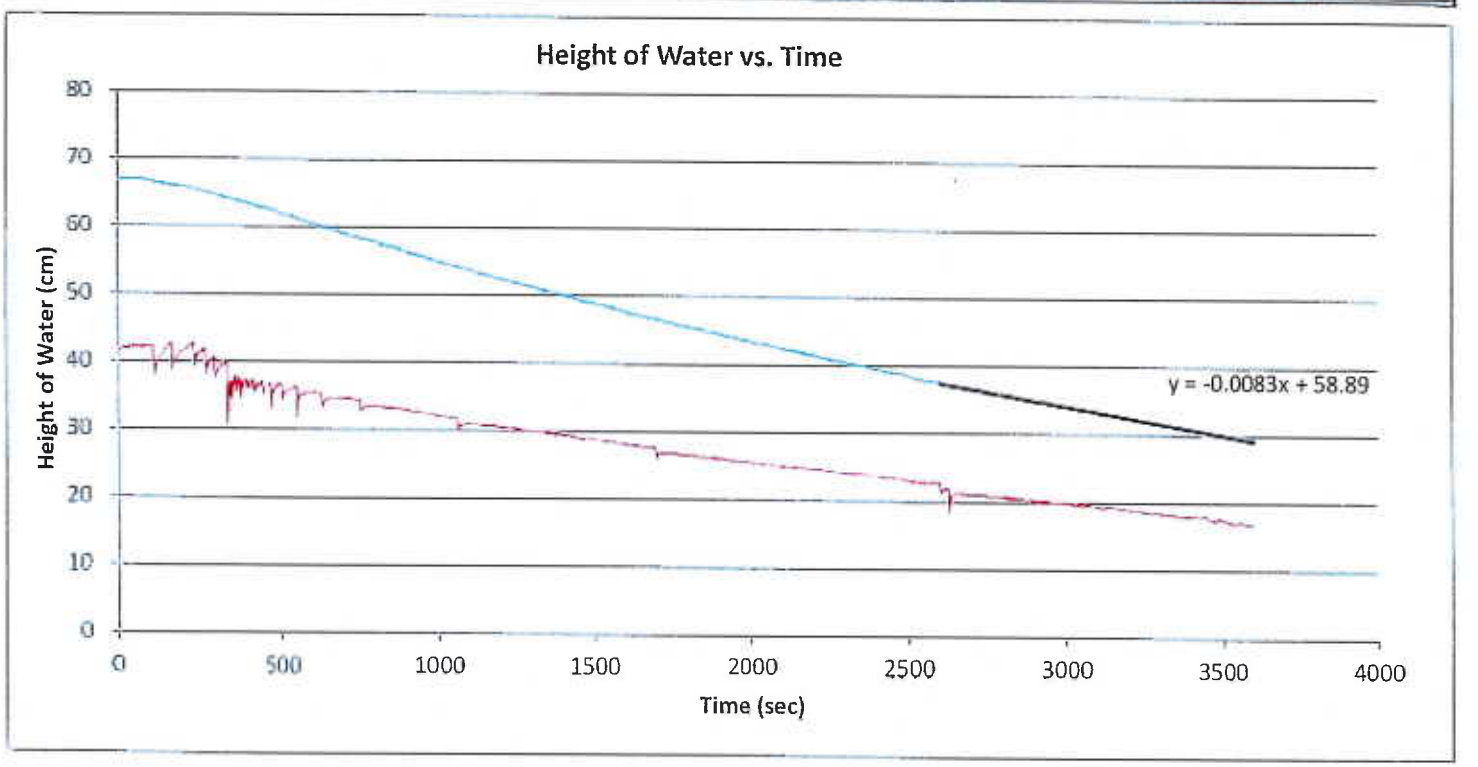
GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

DOUBLE RING INFILTRATION TEST (ASTM D3385)

Vancouver Lab
GR18
1779 West 75th Avenue
Vancouver, B.C
V6P 6P2

CLIENT:	CITY OF COQUITLAM	PROJECT #:	17705
PROJECT NAME:	ROBINSON MEMORIAL PARK CEMETARY	DATE:	20-Feb-2020 10:00
PROJECT LOCATION:	621 ROBSINSON STREET, COQUITLAM	TEST NO.:	DRIT20-02

ESTIMATED FIELD SATURATED INFILTRATION RATE: 297.5 mm/Hr



TEST INFORMATION

LIQUID USED:	WATER	AREA INNER CYLINDER:	72965.63 mm^2	DEPTH OF TEST BELOW CURRENT SITE GRADE (m):	2.5
LIQUID pH:	7.1	ANNULAR AREA:	209777.71 mm^2		
SOIL DESCRIPTION:	SAND	CYLINDER ACCURACY:	± 0.5 mm	INFILTRATION RATE (cm/sec):	8.263E-03
SOIL TYPE:	NATIVE	LIQUID DEPTH INNER:	67.1 cm		
WEATHER ON SITE:	CLEAR	LIQUID DEPTH OUTER:	42.8 cm	DEPTH TO WATER TABLE:	UNKNOWN

Comments:

Per: Austin Lockstidt, B.A.Sc., EIT

Enginner In Training

Reviewed by: Jakub Szary, B.Sc., AScT

FEB 24 2020

Lab Manager

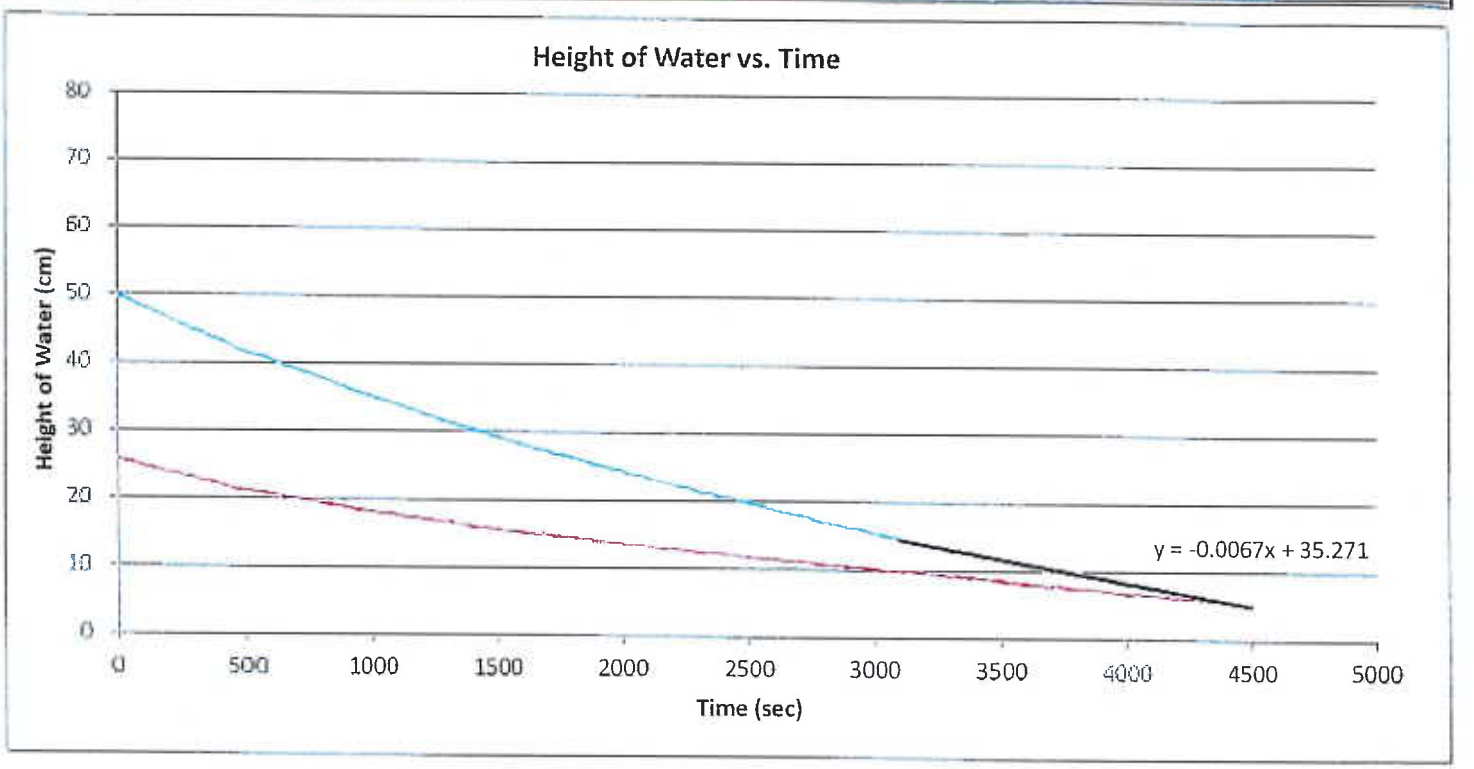
GEOPACIFIC
VANCOUVER KAMLOOPS CALGARY

DOUBLE RING INFILTRATION TEST (ASTM D3385)

Vancouver Lab
GR19
1779 West 75th Avenue
Vancouver, B.C
V6P 6P2

CLIENT:	CITY OF COQUITLAM	PROJECT #:	17705
PROJECT NAME:	ROBINSON MEMORIAL PARK CEMETARY	DATE:	20-Feb-2020 11:00
PROJECT LOCATION:	621 ROBSINSON STREET, COQUITLAM	TEST NO.:	DRIT20-03

ESTIMATED FIELD SATURATED INFILTRATION RATE: 242.7 mm/Hr



TEST INFORMATION

LIQUID USED:	WATER	AREA INNER CYLINDER:	72965.63 mm^2	DEPTH OF TEST BELOW CURRENT SITE GRADE (m):	1.0
LIQUID pH:	7.1	ANNULAR AREA:	209777.71 mm^2		
SOIL DESCRIPTION:	SAND	CYLINDER ACCURACY:	± 0.5 mm	INFILTRATION RATE (cm/sec):	6.740E-03
SOIL TYPE:	NATIVE	LIQUID DEPTH INNER:	49.9 cm		
WEATHER ON SITE:	CLEAR	LIQUID DEPTH OUTER:	25.9 cm	DEPTH TO WATER TABLE:	UNKNOWN

Comments:

Per: Austin Lockstedt, B.A.Sc. EIT

Enginner In Training

Reviewed by: Jakub Szary, B.Sc., AScT

FEB 24 2020

Lab Manager

GEOPACIFIC CONSULTANTS

Vancouver Lab
#200 - 8809 Heather Street
Vancouver, B.C.
V6P 3T1

CONSTANT HEAD PERMEABILITY TEST
(ASTM D2434)

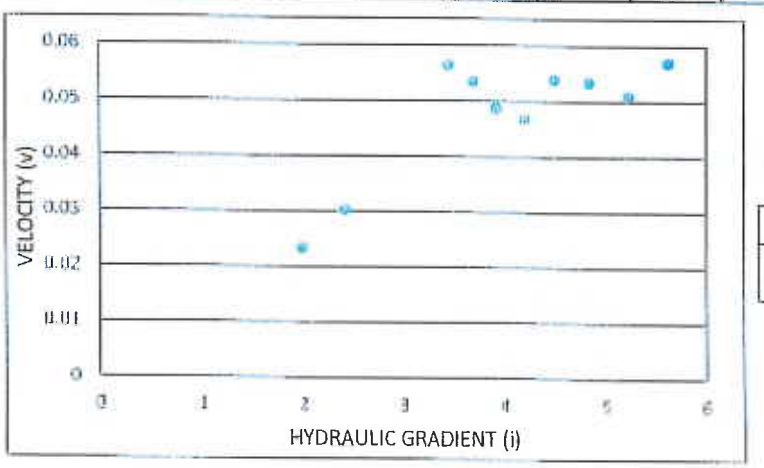
CLIENT:	CITY OF COQUITLAM
PROJECT:	ROBINSON MEMORIAL PARK CEMETARY (PHASE 1)
LOCATION:	621 ROBINSON STREET, COQUITLAM

JOB #	17705
RECEIVED:	19-Feb-20
TESTED	21-Feb-20

SAMPLE DETAILS			
SOIL DESCRIPTION:	SAND	SCREEN SIZE:	19mm
SAMPLE ID:	TP20-02 @ 2.4m	OVERSIZE:	0%

EQUATIONS & TEST PARAMETERS (cm)			
HYDRAULIC CONDUCTIVITY:	$k = \frac{Q \times L}{A \times t \times h}$	MOLD AREA (A):	45.4
HYDRAULIC GRADIENT:	$i = \frac{h}{L}$	MANOMETER SPACING (L):	7.6
VELOCITY:	$v = \frac{Q}{A \times t}$	DRY DENSITY:	1618 kg/m³

TEST RESULTS										
TRIAL #:	1	2	3	4	5	6	7	8	9	10
MANOMETER HEIGHT (h):	15.1	18.3	26.2	28.1	29.8	31.9	34.1	36.7	39.7	42.7
FLOW (Q):	909.9	901.3	682.6	756.5	892.3	971.4	907.2	974.4	1049.3	1077.3
TIME (t):	856	657	266	311	404	457	372	403	452	416
HYDRAULIC GRADIENT (i):	1.99	2.41	3.45	3.70	3.92	4.20	4.49	4.83	5.22	5.62
VELOCITY (v):	2.34E-02	3.02E-02	5.66E-02	5.36E-02	4.87E-02	4.69E-02	5.38E-02	5.33E-02	5.12E-02	5.71E-02
HYDRAULIC CONDUCTIVITY:	1.18E-02	1.26E-02	1.64E-02	1.45E-02	1.24E-02	1.12E-02	1.20E-02	1.10E-02	9.80E-03	1.02E-02



AVG HYDRAULIC CONDUCTIVITY
438.5 mm/hr

COMMENTS:

DISTRIBUTION: Boris Kovlev, GeoPacific
Austin Lockstidt, GeoPacific

Per: Cindy Marinovic, B.Sc.
Lab Technician

Reviewed By: Jakub Szary, B.Sc., AScT
Lab Manager

MAR 19 2020

GEOPACIFIC CONSULTANTS

Vancouver Lab
#200 - 8809 Heather Street
Vancouver, B.C.
V6P 3T1

CONSTANT HEAD PERMEABILITY TEST
(ASTM D2434)

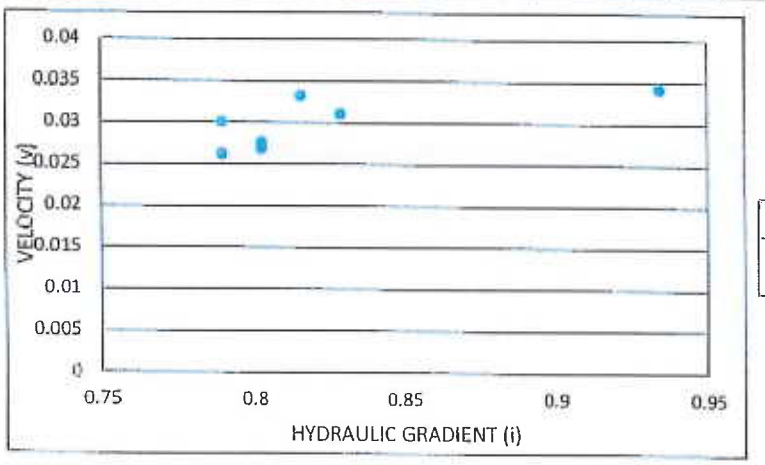
CLIENT:	CITY OF COQUITLAM
PROJECT:	ROBINSON MEMORIAL PARK CEMETARY (PHASE 1)
LOCATION:	621 ROBINSON STREET, COQUITLAM

JOB #	17795
RECEIVED:	19-Feb-20
TESTED:	2-Mar-20

SAMPLE DETAILS			
SOIL DESCRIPTION:	SAND	SCREEN SIZE:	19mm
SAMPLE ID:	TP20-01 @ 1.2m	OVERSIZE:	0%

EQUATIONS & TEST PARAMETERS (cm)			
HYDRAULIC CONDUCTIVITY:	$k = \frac{Q \times L}{A \times t \times h}$	MOLD AREA (A):	45.4
HYDRAULIC GRADIENT:	$i = \frac{h}{L}$	MANOMETER SPACING (L):	7.6
VELOCITY:	$v = \frac{Q}{A \times t}$	DRY DENSITY:	1368 kg/m^3

TEST RESULTS										
TRIAL #:	1	2	3	4	5	6	7	8	9	10
MANOMETER HEIGHT (h):	6.0	6.1	6.1	6.0	6.3	6.2	7.1			
FLOW (Q):	678.4	694.3	709.2	696.3	702.3	691.4	710.2			
TIME (t):	569	568	564	509	497	458	458			
HYDRAULIC GRADIENT (i):	0.79	0.80	0.80	0.79	0.83	0.82	0.93			
VELOCITY (v):	2.63E-02	2.69E-02	2.77E-02	3.02E-02	3.12E-02	3.33E-02	3.42E-02			
HYDRAULIC CONDUCTIVITY:	3.33E-02	3.36E-02	3.45E-02	3.82E-02	3.76E-02	4.08E-02	3.66E-02			



AVG HYDRAULIC CONDUCTIVITY
916.4 mm/hr

COMMENTS

DISTRIBUTION

Boris Kovlev, GeoPacific

Austin Lockstidt, GeoPacific

Per: Cindy Marinovic, B.Sc.

Lab Technician

Reviewed By: Jakub Szary, B.Sc., AScT

Lab Manager MAR 9 9 2020

GEOPACIFIC CONSULTANTS

Vancouver Lab
#200 - 8809 Heather Street
Vancouver, B.C.
V6P 3T1

CONSTANT HEAD PERMEABILITY TEST
(ASTM D2434)

CLIENT:	CITY OF COQUITLAM
PROJECT:	ROBINSON MEMORIAL PARK CEMETARY (PHASE 1)
LOCATION:	621 ROBINSON STREET, COQUITLAM

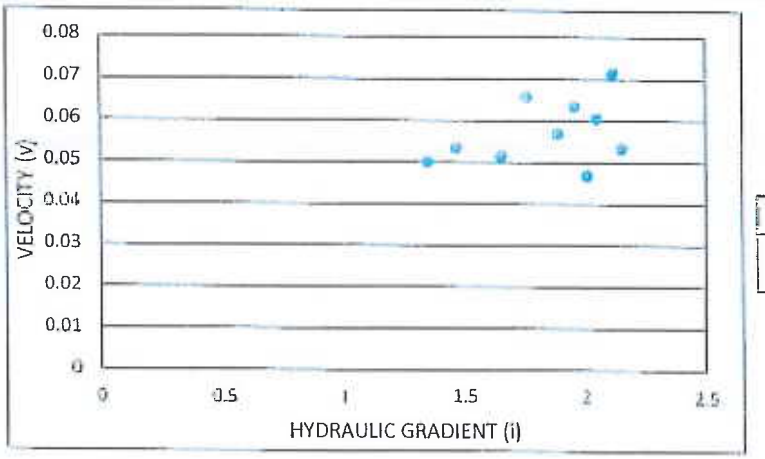
JOB #	17736
RECEIVED	19-Feb-20
TESTED	27-Feb-20

SAMPLE DETAILS			
SOIL DESCRIPTION:	SAND, SOME GRAVEL	SCREEN SIZE:	9.5mm
SAMPLE ID:	TP20-07 @ 2m	OVERSIZE:	7%

EQUATIONS & TEST PARAMETERS (cm)			
HYDRAULIC CONDUCTIVITY:	$k = \frac{Q \times L}{A \times t \times h}$	MOLD AREA (A):	45.4
HYDRAULIC GRADIENT:	$i = \frac{h}{L}$	MANOMETER SPACING (L):	7.6
VELOCITY:	$v = \frac{Q}{A \times t}$	DRY DENSITY:	1401 kg/m³

TEST RESULTS

TRIAL #:	1	2	3	4	5	6	7	8	9	10
MANOMETER HEIGHT (h):	10.3	11.2	12.6	13.4	14.4	14.9	15.6	16.4	15.3	16.1
FLOW (Q):	762.3	765.9	817.7	710.2	852.8	803.4	931.5	1204.6	1249.2	737.8
TIME (t):	335	315	349	238	330	278	339	497	588	227
HYDRAULIC GRADIENT (i):	1.36	1.47	1.66	1.76	1.89	1.96	2.05	2.16	2.01	2.12
VELOCITY (v):	5.02E-02	5.36E-02	5.16E-02	6.58E-02	5.70E-02	6.37E-02	6.06E-02	5.34E-02	4.68E-02	7.16E-02
HYDRAULIC CONDUCTIVITY:	3.70E-02	3.64E-02	3.12E-02	3.73E-02	3.01E-02	3.25E-02	2.95E-02	2.48E-02	2.33E-02	3.38E-02



AVG HYDRAULIC CONDUCTIVITY
1136.7 mm/hr

COMMENTS:

DISTRIBUTION: Boris Kovlev, GeoPacific
Austin Lockstidt, GeoPacific

Per: Cindy Marinovic, B.Sc.
Lab Technician

Reviewed By: Jakub Szary, B.Sc., AScT
Lab Manager

MAR 9 2020

GEOPACIFIC
CONSULTANTS

Vancouver Lab
#200 - 8809 Heather Street
Vancouver, B.C.
V6P 3T1

FALLING HEAD PERMEABILITY TEST

CLIENT:	CITY OF COQUITLAM
PROJECT:	ROBINSON MEMORIAL PARK CEMETARY (PHASE 1)
LOCATION:	621 ROBINSON STREET, COQUITLAM

JOB #:	17705
RECEIVED:	19-Feb-20
TESTED:	21-Feb-20

SAMPLE DETAILS			
SOIL DESCRIPTION:	FINE SAND, SOME SILT	SCREEN SIZE:	19 mm
SAMPLE ID:	TP20-03 @ 1.8m	OVERSIZE:	0.3%

EQUATIONS & TEST PARAMETERS (cm)			
HYDRAULIC CONDUCTIVITY:	$k = \frac{aL}{At} \ln \frac{h_0}{h_1}$	MOLD WEIGHT (g):	10301
MOLD AREA (A)	181.5	MOLD & SOIL WEIGHT (g):	14387.9
RESERVOIR AREA (a):	165.1	COMPACTION MOISTURE:	15.3%
MOLD LENGTH (L):	12.25	DRY DENSITY (kg/m^3):	1594

TEST RESULTS										
TRIAL #:	1	2	3	4	5	6	7	8	9	10
INITIAL HEIGHT (h_0):	48.6	43.00	39.0	34.3	28.6	24.9	20.9	18.0	14.4	11.8
FINAL HEIGHT (h_1):	43.20	39.1	34.5	31.6	25.0	21.0	18.1	14.5	11.9	9.6
TIME (t):	941	710	916	613	716	886	691	935	734	718
HYDRAULIC CONDUCTIVITY:	1.39E-03	1.49E-03	1.49E-03	1.49E-03	2.09E-03	2.14E-03	2.32E-03	2.58E-03	2.89E-03	3.20E-03

AVG HYDRAULIC CONDUCTIVITY
7.60E+01 mm/hr

COMMENTS:

DISTRIBUTION: Boris Kovlev, GeoPacific

Austin Lockstidt, GeoPacific

Per: Cindy Marinovic, B.Sc.

Lab Technician

Reviewed By: Jakub Szary, B.Sc., AScT

Lab Manager

MAR 0 9 2020

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Vancouver Lab
#200 - 8809 Heather Street
Vancouver, B.C.
V6P 3T1

CONSTANT HEAD PERMEABILITY TEST
(ASTM D2434)

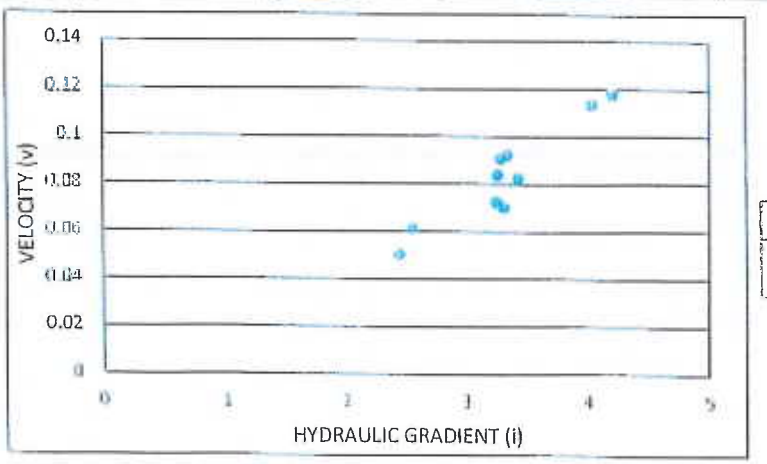
CLIENT:	CITY OF COQUITLAM
PROJECT:	ROBINSON MEMORIAL PARK CEMETARY (PHASE 1)
LOCATION:	621 ROBINSON STREET, COQUITLAM

JOB #	17705
RECEIVED	18-Feb-20
TESTED	4-Mar-20

SAMPLE DETAILS			
SOIL DESCRIPTION:	SAND, SOME GRAVEL, TRACE SILT	SCREEN SIZE:	19mm
SAMPLE ID:	TP20-08 @ 2.4m	OVERSIZE:	0.6%

EQUATIONS & TEST PARAMETERS (cm)			
HYDRAULIC CONDUCTIVITY:	$k = \frac{Q \times L}{A \times t \times h}$	MOLD AREA (A):	45.4
HYDRAULIC GRADIENT:	$i = \frac{h}{L}$	MANOMETER SPACING (L):	7.6
VELOCITY:	$v = \frac{Q}{A \times t}$	DRY DENSITY:	1593 kg/m3

TEST RESULTS										
TRIAL #:	1	2	3	4	5	6	7	8	9	10
MANOMETER HEIGHT (h):	30.7	32.0	24.7	25.2	24.8	25.4	25.0	26.1	19.4	18.6
FLOW (Q):	753.8	739.3	939.6	992.8	813.6	751.4	772.5	815.9	805.1	956.4
TIME (t):	146	138	285	311	213	179	187	217	287	417
HYDRAULIC GRADIENT (i):	4.04	4.21	3.25	3.32	3.26	3.34	3.29	3.43	2.55	2.45
VELOCITY (v):	1.14E-01	1.18E-01	7.27E-02	7.04E-02	8.42E-02	9.25E-02	9.11E-02	8.29E-02	6.18E-02	5.06E-02
HYDRAULIC CONDUCTIVITY:	2.82E-02	2.80E-02	2.24E-02	2.12E-02	2.58E-02	2.77E-02	2.77E-02	2.41E-02	2.42E-02	2.07E-02



AVG HYDRAULIC CONDUCTIVITY
900.0 mm/hr

COMMENTS:

DISTRIBUTION: Boris Kovlev, GeoPacific
Austin Lockstidt, GeoPacific

Per: Cindy Marinovic, B.Sc.
Lab Technician

Reviewed By: Jakub Szary, B.Sc., AScT
Lab Manager

MAR 0 9 2020

Appendix C

Environmental Soils Report

November 10, 2020

Reference: 10682/V4917

Urban Systems Ltd.
550-1090 Homer Street
Vancouver BC V6B 2W9

Attn: Michael Vorhies

Re: Robinson Memorial Park Cemetery Expansion Project Soil Sampling with Increased Scope

Dear Michael,

Triton Environmental Consultants Ltd. (Triton) was retained by Urban Systems to sample and review results for soil samples at Robinson memorial Park Cemetery in Coquitlam, BC (the Site). Sample results are compared to the BC Contaminated Sites Regulation (CSR) Schedule 3.1 – Soil Standards – Urban Park (PL), Residential Low Density (RL_{LD}), Residential High Density (RL_{HD}) and Industrial (IL). Samples are collected following appropriate field sampling and sample handling procedures (BC Field Sampling Manual 2013). A summary of sample information and results is provided below (Table 1), with the third-party analytical laboratory (AGAT Laboratories) Certificate of Analysis (20V624985) available in Appendix C and a comparison of sample results to CSR PL, CSR RL_{LD} and CSR RL_{HD}, and CSR IL Standards in Appendix D.

Table 1. CSR Schedule 3.1 Soil Standard Exceedances by Land Use

Sample Site	Depth (m)	< Commercial (CL)[1]	> Industrial (IL)[2]
Wooded Area (NW1)	0.5 – 1.0	-	-
	2.0 – 2.5	-	-
Wooded Area (NW2)	0.5 – 1.0	-	-
	2.0 – 2.5	-	-
Wooded Area (NW3)	0.5 – 1.0	-	-
	2.0 – 2.5	-	-
Wooded Area (NE)	0.5 – 1.0	-	-
	2.0 – 2.5	-	-
South Road (S1)	0 – 0.5	-	-
	0.5 – 1.0	Chloride	-
	1.0 – 1.5	-	-
	1.5 – 2.0	-	-
	2.0 – 2.5	-	-
South Road (S2)	0 – 0.5	-	Chloride
	0.5 – 1.0	-	Chloride, Selenium
	1.0 – 1.5	Chloride	-

	1.5 – 2.0	Chloride	-
	2.0 – 2.5	-	-
South Road (S3)	0 – 0.5	Chloride	-
	0.5 – 1.0	-	Chloride
	1.0 – 1.5	-	Chloride
	1.5 – 2.0	Chloride	-
	2.0 – 2.5	-	Chloride
South Road (S4)	0 – 0.5	-	Chloride
	0.5 – 1.0	Chloride	-
	1.0 – 1.5	Chloride	-
	1.5 – 2.0	-	-
	2.0 – 2.5	-	-

[1] – Exceeds all land uses except Commercial and Industrial land uses
[2] – Exceeds all land uses

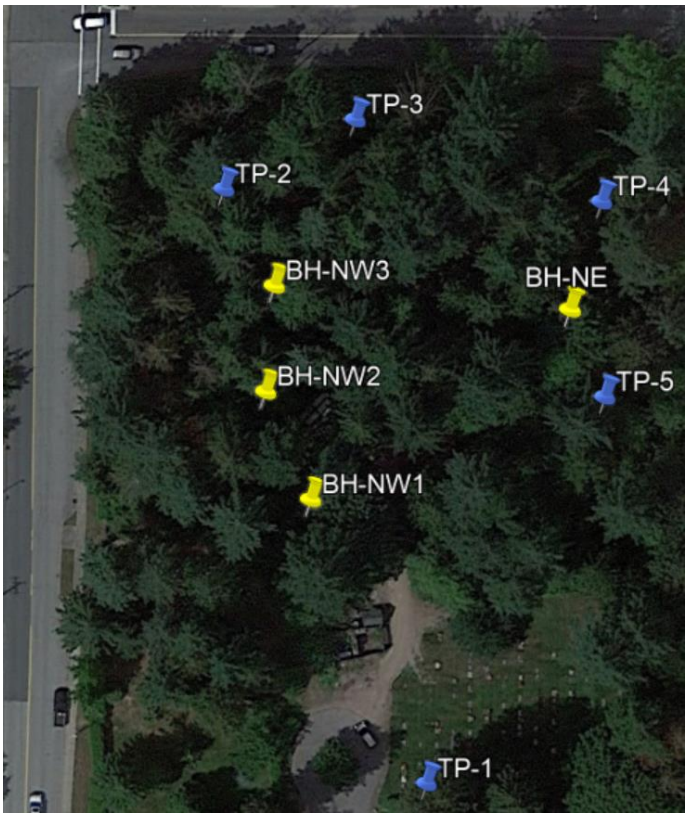


Figure 1. Soil sampling locations for North Wooded Area (Google 2020)

Figure 2. Soil sampling locations for South Cemetery Road (Google 2020)

Table 2. Soil sample information and results

Sample ID	*Date*	*Time*	*Sampler*	*Parameter*	*Within CSR PL?*	*Within CSR RL_{LD}?*	*Within CSR RL_{HD}?*	*Within CSR IL?*
BH-NW1-U (0.5-1.0)	13-Jul-20	10:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW1-U (0.5-1.0)	13-Jul-20	10:30	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NW1-L (2.0-2.5)	13-Jul-20	10:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW1-L (2.0-2.5)	13-Jul-20	10:30	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-NW1-L (2.0-2.5)	13-Jul-20	10:30	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NW2-U (0.5-1.0)	13-Jul-20	9:40	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW2-U (0.5-1.0)	13-Jul-20	9:40	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NW2-L (2.0-2.5)	13-Jul-20	9:40	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW2-L (2.0-2.5)	13-Jul-20	9:40	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-NW2-L (2.0-2.5)	13-Jul-20	9:40	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NW3 (0-0.5)	13-Jul-20	9:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW3 (0-0.5)	13-Jul-20	9:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NW3-L (2.0-2.5)	13-Jul-20	9:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NW3-L (2.0-2.5)	13-Jul-20	9:00	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-NW3-L (2.0-2.5)	13-Jul-20	9:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NE-U (0.5-1.0)	13-Jul-20	11:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NE-U (0.5-1.0)	13-Jul-20	11:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-NE-L (2.0-2.5)	13-Jul-20	11:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-NE-L (2.0-2.5)	13-Jul-20	11:00	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-NE-L (2.0-2.5)	13-Jul-20	11:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S1 (0-0.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S1-U (0.5-1.0)	13-Jul-20	13:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S1-U (0.5-1.0)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S1 (1.0-1.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☑	☑	☑	☑

Sample ID	Date	Time	Sampler	Parameter	Within CSR PL?	Within CSR RL_{LD}?	Within CSR RL_{HD}?	Within CSR IL?
BH-S1 (1.5-2.0)	13-Jul-20	13:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S1-L (2.0-2.5)	13-Jul-20	13:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S1-L (2.0-2.5)	13-Jul-20	13:00	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-S1-L (2.0-2.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S2 (0-0.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☒[3]
BH-S2-U (0.5-1.0)	13-Jul-20	12:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S2-U (0.5-1.0)	13-Jul-20	12:30	AO	CSR Metals[1]	☒[2,3]	☒[2,3]	☒[2,3]	☒[2,3]
BH-S2 (1.0-1.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S2 (1.5-2.0)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S2-L (2.0-2.5)	13-Jul-20	12:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S2-L (2.0-2.5)	13-Jul-20	12:30	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-S2-L (2.0-2.5)	13-Jul-20	12:30	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S3 (0-0.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S3-U (0.5-1.0)	13-Jul-20	12:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S3-U (0.5-1.0)	13-Jul-20	12:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☒[3]
BH-S3 (1.0-1.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☒[3]
BH-S3 (1.5-2.0)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S3-L (2.0-2.5)	13-Jul-20	12:00	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S3-L (2.0-2.5)	13-Jul-20	12:00	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-S3-L (2.0-2.5)	13-Jul-20	12:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☒[3]
BH-S4 (0-0.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☒[3]
BH-S4-U (0.5-1.0)	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S4-U (0.5-1.0)	13-Jul-20	11:30	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑
BH-S4 (1.0-1.5)	13-Jul-20	13:00	AO	CSR Metals[1]	☒[3]	☒[3]	☒[3]	☑

Sample ID	Date	Time	Sampler	Parameter	Within CSR PL?	Within CSR RL_{LD}?	Within CSR RL_{HD}?	Within CSR IL?
BH-S4 (1.5-2.0)	13-Jul-20	13:00	AO	CSR Metals[1]	☑	☑	☑	☑
BH-S4-L (2.0-2.5)	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
BH-S4-L (2.0-2.5)	13-Jul-20	11:30	AO	VPH/ BTEX / VOCs	☑	☑	☑	☑
BH-S4-L (2.0-2.5)	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑
TP-1	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
TP-1	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑
TP-2	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
TP-2	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑
TP-3	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
TP-3	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑
TP-4	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
TP-4	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑
TP-5	13-Jul-20	11:30	AO	LEPH/HEPH & PAH	☑	☑	☑	☑
TP-5	13-Jul-20	11:30	AO	CSR Metals[1]	☑	☑	☑	☑

[1] Na, Cl analysed by saturated paste method

[2] Selenium exceeded guidelines

[3] Chloride exceeded guidelines

Based on the soil results, only the south road soils require disposal at an appropriate receiving site. Figure 3 below indicates how the south road could be delineated for disposal purposes.

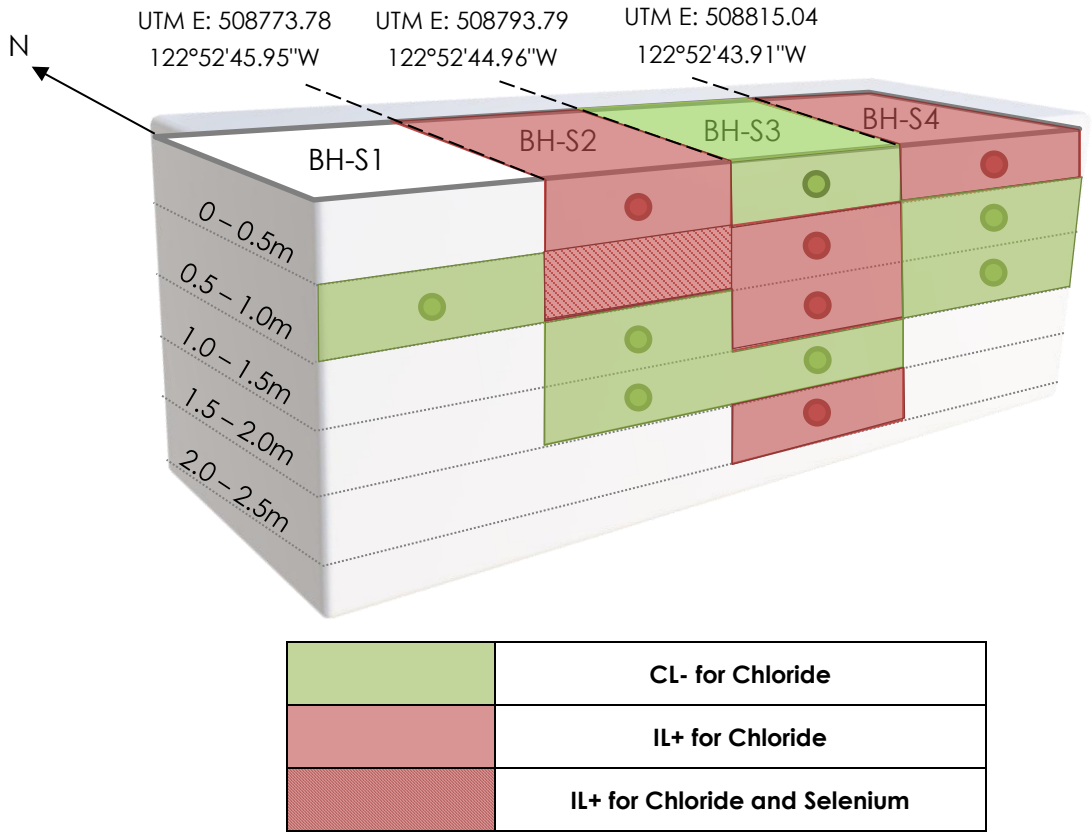


Figure 3. Delineation of contaminated soil onsite at South Road

BH-S1 (From Robinson Street to UTM Easting 508773.78)

- 0.5–1.0m contaminated with levels of chloride less than Commercial land use guidelines

BH-S2 (From UTM Easting 508773.78 to UTM Easting 508793.79)

- 0–0.5m contaminated with levels of chloride in exceedance of Industrial land use guidelines
- 0.5–1.0m contaminated with levels of chloride and selenium in exceedance of Industrial land use guidelines
- 1.0–2.0m contaminated with levels of chloride less than Commercial land use guidelines

BH-S3 (From UTM Easting 508793.79 to UTM Easting 508815.04)

- 0–0.5m contaminated with levels of chloride less than Commercial land use guidelines
- 0.5–1.5m contaminated with levels of chloride and selenium in exceedance of Industrial land use guidelines
- 1.5–2.0m contaminated with levels of chloride less than Commercial land use guidelines
- 2.0–2.5m contaminated with levels of chloride in exceedance of Industrial land use guidelines

BH-S4 (From UTM Easting 508815.04 to internal road intersection)

- 0–0.5m contaminated with levels of chloride in exceedance of Industrial land use guidelines
- 0.5–1.5m contaminated with levels of chloride less than Commercial land use guidelines

The south road should be delineated horizontally with the UTM coordinates listed above. Soil can be delineated vertically as listed above at each individual depth. All soil with results less than Commercial (CL) guidelines can disposed of at receiving sites with Commercial and Industrial land uses. Any soil with results greater than Industrial (IL) guidelines must be disposed of at an appropriate facility permitted to accept the material.

Please contact us if you have any questions or concerns about the report.

Regards,
Triton Environmental Consultants Ltd.

Adrian On, B.Sc., B.Tech., BC-CESCL
Environmental Professional

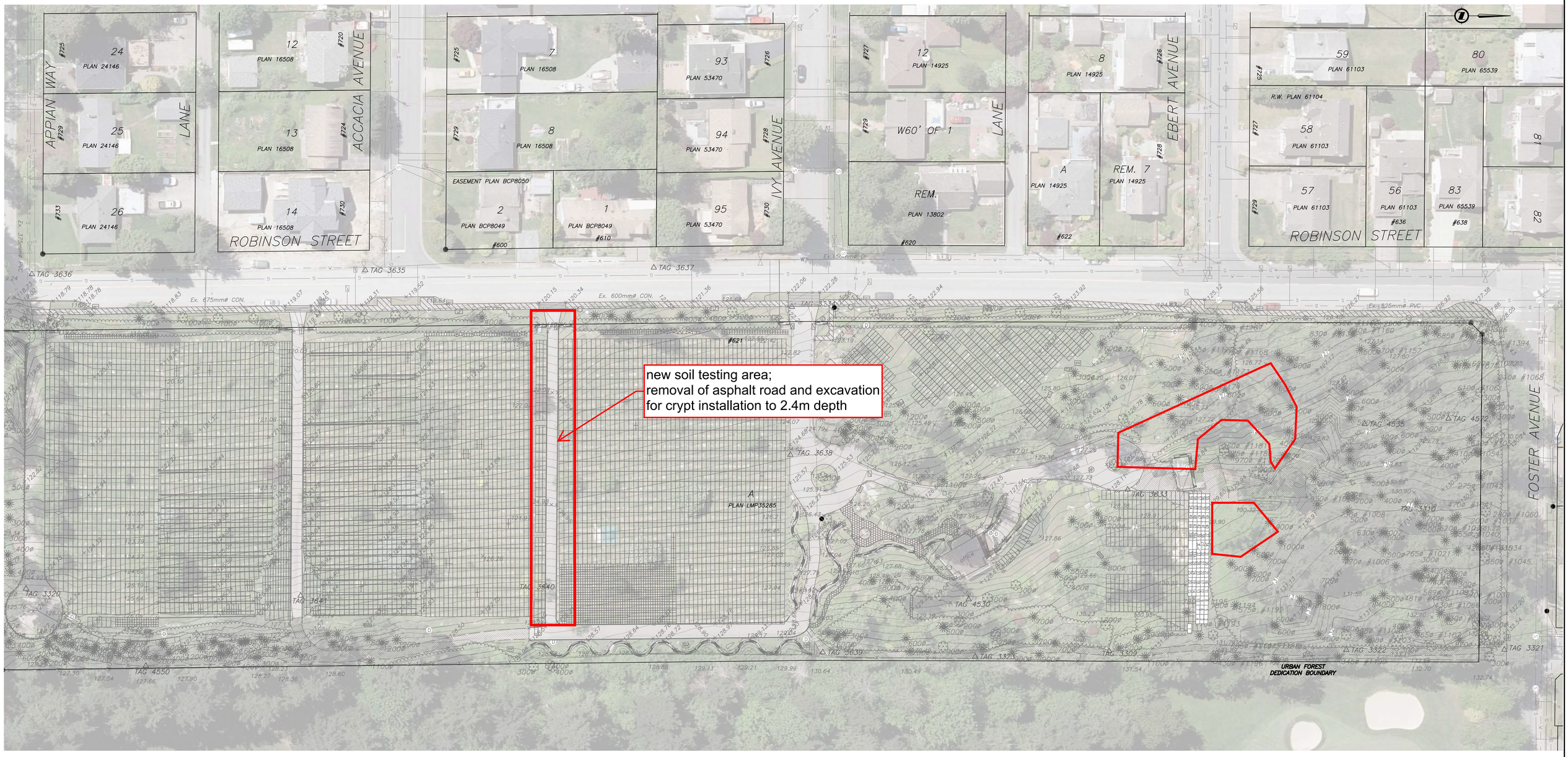
Miranda Lewis, P.Ag., M.Sc., BC-CESCL
Environmental Professional

Attachments : Appendix A – Urban Systems Site Drawing
Appendix B – Borehole Logs
Appendix C – AGAT Certificates of Analysis (20V624985)
Appendix D – Results to CSR Comparison

References

Map showing sample locations at 621 Robinson Street, Coquitlam, BC, Google Earth, 2020.

APPENDIX A
URBAN SYSTEMS SITE DRAWING



0 10 30m
1:500

ISSUED FOR
50%
2020-04-24
urbansystems.ca

SUPPLEMENTARY LEGEND

#100 House Number (Civic Address)	Fence/Building Post	Embankment Tops	Garden line
D Storm Cleanout	Lawn Drain	Bush/Hedge outline	Concrete
S Sanitary Cleanout	Irrigation Control Valve	Garden	Sidewalk Concrete
Catch Basin Round	Sign	Ditch Top	Brick
W Water Manhole	Wall	Ditch Line	
300 Vegetation Coniferous (diametre mm)	Bench	Swale	
300 Vegetation Deciduous (diametre mm)	Embankment Bottoms	Fence	

NOTES:

1. *ELEVATIONS ARE DERIVED FROM G.P.S. OBSERVATIONS. DATUM IS [CGVD28 (GVRD 2005)]. TAG 3637 IS 121.154m, LOCATED AT SOUTHEAST CORNER OF #610 ROBINSON STREET*
2. *THIS PLAN SHOWS HORIZONTAL GROUND LEVEL MEASURED DISTANCES. PRIOR TO COMPUTATION OF NAD83 U.T.M. COORDINATES MULTIPLY BY THE COMBINED FACTOR 0.9995887. DATE OF SURVEY COMPLETION IS AUGUST 15, 2017.*
3. *THE LOCATION OF EXISTING UNDERGROUND UTILITIES ARE INDICATED IN THE PUBLIC ROAD ALLOWANCE ONLY AND ARE SHOWN APPROXIMATE. ONLY CITY UTILITIES ARE SHOWN. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. BC ONE-CALL PROVIDES UNDERGROUND UTILITY LOCATIONS (1-800-474-6886).*
4. *BASEMAP WAS IMPORTED FROM CITY OF COQUITLAM G.I.S. COORDINATE GEOMETRY. ACCURACY IS ESTIMATED AT ±0.1m.*

Edge of pavement	Hydrant	Sanitary service	Hydro Guy Wire
Watermain and valve	Water air valve	Sanitary cleanout	Hydro Kiosk
Drainage sewer, MH	Water blowoff	Utility pole(joint pole)	Vegetation Conifer
Drainage ditch	Water service	Utility pole with light	Vegetation Deciduous
Sanitary sewer, MH	Catch basin, top inlet	Streetlight, davit	Vegetation Shrub
Sanitary forcemain	Catch basin, side inlet	Streetlight, post top	Survey Traverse Hub
Gasmain and valve	Catch basin, round	Comb signal pole	Survey Iron Pin
Hydro duct, MH	Drainage service	Traffic signal pole	Survey Lead Plug
Telephone duct, MH	Drainage cleanout	Junction box	Survey Monument

Plot Date: April 24, 2020

No.	Date	By	Revisions
2	2020-04-24	BF	ISSUED FOR 50% DETAIL DESIGN
1	2020-03-23	BF	ISSUED FOR 25% DETAIL DESIGN

Design by	M.KELDER	Date	2020-04-21
Drawn by	M.KELDER	Date	2020-04-21
Checked by	B.FAN	Date	2020-04-24
Approved by	B.FAN	Date	2020-04-24

URBAN systems
405-9900 King George Blvd
Surrey, British Columbia
V3T 0K9
604-953-6500

Coquitlam
Engineering & Public Works
3000 Guildford Way, Coquitlam, B.C. V3B 7N2

Scale horiz. 1:500 Scale vert.
Sheet of 3 of 5
Eng. Project No. 1150.0146.01

Project ROBINSON MEMORIAL PARK CEMETERY PHASE 1 IMPROVEMENTS
Description EXISTING CONDITIONS / SITE PREPARATION PLAN
File: G02-1150014601-EXISTING

APPENDIX B
BOREHOLE LOGS

Log of Monitoring Well: BH-NE

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 10:20
Site Location: North Wooded Area
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter:	Depth
ft / m		Ground Surface	0.00						Well Diameter:	ft / m
0 / 0		Topsoil w/ some sand, slight damp		X	(0-0.5)					0 / 0
1										1
2		Brownish gray sand w/ some gravel, dry		X	U					2
3 / 1										3 / 1
4				X	(1.0-1.5)					4
5				X	(1.5-2.0)					5
6 / 2		Gray sand, some brown, dry, some gravel								6 / 2
7				X	L					7
8		EOH = 2.5m								8
9										9
10 / 3										10 / 3
11										11
12										12
13 / 4										13 / 4
14										14
15										15
16 / 5										16 / 5
17										17
18										18
19										19
20 / 6		Major / Some / Trace Size / Consistency / Moisture / Color								20 / 6

Latitude: 49°15'21.48" N **Longitude:** 122°52'43.56" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-NW1

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 9:30
Site Location: North Wooded Area
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth (ft / m)	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth (ft / m)
0 ft / 0 m		Ground Surface	0.00							
0 – 3 ft		Topsoil, damp		X	(0-0.5)					
3 – 7 ft		Gray brown sand, some orange tint, damp		X	U					
				X	(1.0-1.5)					
				X	(1.5-2.0)					
7 – 8 ft		Gray sand, damp		X	L					
8 ft / 2.5 m		EOH = 2.5 m								
1 ft / 0 m – 20 ft / 6 m										

Major / Some / Trace
Size / Consistency / Moisture / Color

Latitude: 49°15'20.57" N **Longitude:** 122°52'45.45" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-NW2

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 9:07
Site Location: North Wooded Area
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth (ft / m)	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth (ft / m)
0 / 0		Ground Surface	0.00							
0 – 3 ft		Topsoil, damp, trace gravel		X	(0-0.5)					
2 ft		Grayish brown, some gravel, slight damp		X	U					
3 ft / 1 m				X	(1.0-1.5)					
5 ft				X	(1.5-2.0)					
6 ft / 2 m		Fine sand, gray, some brown staining								
7 ft				X	L					
8 ft		EOH = 2.5m								
10 ft / 3 m										
13 ft / 4 m										
16 ft / 5 m										
19 ft										
20 ft / 6 m		Major / Some / Trace Size / Consistency / Moisture / Color								

Latitude: 49°15'21.08" N **Longitude:** 122°52'45.79" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-NW3

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 8:42
Site Location: North Wooded Area
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth (ft / m)	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth (ft / m)
0 ft / 0 m		Ground Surface	0.00							
0 – 3 ft		Topsoil, dark brown, damp, some gravel		X	(0-0.5)					
3 – 5 ft		Fine sand, grayish brown, some gravel		X	U					
				X	(1.0-1.5)					
5 – 8 ft		Fine sand, gray, some brown staining		X	(1.5-2.0)					
				X	L					
8 ft		EOH = 2.5m								
1 ft / 0 m		Major / Some / Trace Size / Consistency / Moisture / Color								1 ft / 0 m

Latitude: 49°15'21.59" N **Longitude:** 122°52'45.73" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-S1

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 12:53
Site Location: South Road
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth (ft / m)	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth (ft / m)
0 / 0		Ground Surface	0.00							0 / 0
		Asphalt								
1		Reddish brown loose damp sand w/ some gravel		X	(0-0.5)					1
2										2
3 / 1		Compact damp grey silty sand w/ brown streaks		X	U					3 / 1
4										4
5		Wet dense silty clay w/ brown streaks		X	(1.0-1.5)					5
6 / 2		Damp dense brownish grey silty clay w/ reddish brown streaks		X	(1.5-2.0)					6 / 2
7		Damp dark grey silty clay, high plastic		X	L					7
8		EOH = 2.5 m								8
9										9
10 / 3										10 / 3
11										11
12										12
13 / 4										13 / 4
14										14
15										15
16 / 5										16 / 5
17										17
18										18
19										19
20 / 6		Major / Some / Trace Size / Consistency / Moisture / Color								20 / 6

Latitude: 49°15'14.58" N **Longitude:** 122°52'46.75" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-S2

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 12:15
Site Location: South Road
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth
ft / m		Ground Surface	0.00							ft / m
0 / 0		Asphalt								0 / 0
		Reddish brown loose damp sand w/ some gravel		X	(0-0.5)					
1										1
2		Reddish brown grey clayey sand, damp, loose		X	U					2
3 / 1		Compact grey w/ brown streak silty-clay, minor black smear		X	(1.0-1.5)					3 / 1
4										4
5		Very dense grey clay w/ brown streaks		X	(1.5-2.0)					5
6 / 2										6 / 2
7		Compact damp grey clayey silt		X	L					7
8		EOH = 2.5 m								8
9										9
10 / 3										10 / 3
11										11
12										12
13 / 4										13 / 4
14										14
15										15
16 / 5										16 / 5
17										17
18										18
19										19
20 / 6		Major / Some / Trace Size / Consistency / Moisture / Color								20 / 6

Latitude: 49°15'14.57" N **Longitude:** 122°52'45.44" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-S3

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 12:00
Site Location: South Road
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter:	Depth
ft / m		Ground Surface	0.00						Well Diameter:	ft / m
0 / 0		Asphalt								0 / 0
1		Brown clayey sand, damp w/ some cobble		X	(0-0.5)					1
2				X	U					2
3 / 1				X	(1.0-1.5)					3 / 1
4				X	(1.5-2.0)					4
5		Brownish grey damp dense silty-clay, trace gravel								5
6 / 2										6 / 2
7				X	L					7
8		EOH = 2.5 m								8
9										9
10 / 3										10 / 3
11										11
12										12
13 / 4										13 / 4
14										14
15										15
16 / 5										16 / 5
17										17
18										18
19										19
20 / 6		Major / Some / Trace Size / Consistency / Moisture / Color								20 / 6

Latitude: 49°15'14.57" N **Longitude:** 122°52'44.45" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation:

Log of Monitoring Well: BH-S4

Project Name / Number : 10682 Robinson Cemetery
Client: Urban Systems
Date Drilled: 7/13/2020 10:40
Site Location: South Road
Drilling Company: Omega
Drilling Method: Solid Stem Auger
Logged By: AO
Sheet: 1 of 1

TRITON Environmental Consultants

SOIL PROFILE			SAMPLE INFORMATION						MW DETAILS	
Depth	Symbol	Description	Depth (m)	Type	Sample ID	Vapour ppm (0 250 500)	LEL % (0 50 100)	Comments	BH Diameter: / Well Diameter:	Depth
ft / m		Ground Surface	0.00							ft / m
0 / 0		Asphalt								0 / 0
		Reddish brown sand some gray, w/ cobble and gravel, damp		X	(0-0.5)					
2		Brownish gray sandy-clay, dry. Some cobble/gravel		X	U					2
3 / 1		Dense dry grey clay w/ brown stains		X	(1.0-1.5)					3 / 1
4				X	(1.5-2.0)					4
6 / 2		Grey brown clayey silt w/ cobble/gravel								6 / 2
7		EOH = 2.3 m		X	L					7
		Refusal due to large boulder								
10 / 3										10 / 3
12										12
13 / 4										13 / 4
15										15
16 / 5										16 / 5
18										18
19										19
20 / 6		Major / Some / Trace Size / Consistency / Moisture / Color								20 / 6

Latitude: 49°15'14.55" N **Longitude:** 122°52'43.43" W
Depth to Water Level (TOC):
Depth of Well (TOC):
Well Elevation (TOC):
Ground Elevation: