APPENDIX H

Chain of Custody Forms

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **111 1754**
Date Recv: 15-Mar-13 16:09
No of samples: 26 No of Fractions: 48

31111:7541

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13.024 3320901/1000/013	
Quote No	53976	*Order Number*
Primary Contact	Kate Ward	
Submitted By	Kate Ward	
Charge To	Beca Infrastructure	76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Missing Sample labeled TP103 S1
Have 2x Samples labeled TP104 S1 Unable to tell apart KP

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/3/13 4pm
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature: K Ward

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition Temp:
☐ Room Temp ☐ Chilled ☐ Frozen
☐ Sample Analysis details checked
Signature:

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)		Pot2 Potable Water (NZDWS)		
	GW Ground Water	L Leachate	☐ Audit Monitoring		Pot3 Potable Water (other)		
	SW Surface Water	S Saline	☐ Check Monitoring		Pool Swimming/Spa Pool		
	TW Trade Waste						
Solids	ES Soil	SE Sediment	SL Sludge		PL Plant		
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota		BM BM Biological Material		

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13.024 TP101 RR S1 0.2-0.3	14/3/13	ES	Heavy metals, TPH
2	13.024 TP101 RR S2 1.4-1.5	"	"	Hold Cold
3	13.024 TP102 RR S1 0.1-0.2	"	"	Heavy metals, TPH
4	13.024 TP102 RR S2 0.6-0.7	"	"	Hold Cold
5	13.024 TP102 RR S3 1.5-1.6	"	"	Hold Cold
6	13.024 TP103 RR S1 0.1-0.2	"	"	Heavy metals, TPH
7	13.024 TP103 RR S2 0.4-0.5	"	"	Hold Cold
8	13.024 TP103 RR S3 1.4-1.5	"	"	Hold Cold
9	13.024 TP104 RR S1 0.1-0.2	"	"	Heavy metals, TPH
10	13.024 TP104 RR S2 0.5-0.6	"	"	Hold Cold

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:024 TP104 RR S5 1.3-1.4	14/3/13	ES	Hold cold
12	13:024 TP105 RR S1 0.1-0.2	"	"	Heavy metals, TPH
13	13:024 TP105 RR S2 1.4-1.5	"	"	Hold Cold
14	13:024 TP106 RR S1 0.2-0.3	"	"	Heavy metals, TPH
15	13:024 TP106 RR S2 0.7-0.8	"	"	Hold Cold
16	13:024 TP106 RR S3 1.8-1.9	"	"	Hold Cold
17	13:024 TP112 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
18	13:024 TP112 LG S2 1.0-1.1	"	"	Hold Cold.
19	13:024 TP111 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
20	13:024 TP111 LG S2 0.4-0.5	"	"	Hold Cold
21	13:024 TP108 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
22	13:024 TP108 LG S2 0.7-0.8	"	"	Hold Cold
23	13:024 TP107 LG S1 0-0.1	"	"	Heavy metals, SVOC (trace), TPH
24	13:024 TP107 LG S2 0.4-0.5	"	"	Hold Cold
25	13:024 TP107 LG S3 1.2-1.3	"	"	Hold Cold
26				
27				
28	* Psoil container lid says TP111 LG S2			
29	label says TP108 LG S2. Have labeled as TP108A			
30				
31	Extra Sample Received labeled Q4 S1			
32				
33				
34				
35				
36				
37				
38				
39				
40				

Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1111754
Contact:	Kate Ward	**Date Registered:**	15-Mar-2013 4:00:07 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53976
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:024 TP101 RR S1 0.2-0.3 14-Mar-2012 1:05 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
2	13:024 TP101 RR S2 1.4-1.5 14-Mar-2013 1:10 pm	Soil	PSoil250, GSoil300	Hold Cold
3	13:024 TP102 RR S1 0.1-0.2 14-Mar-2013 12:10 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
4	13:024 TP102 RR S2 0.6-0.7 14-Mar-2013 12:30 pm	Soil	PSoil250, GSoil300	Hold Cold
5	13:024 TP102 RR S3 1.5-1.6 14-Mar-2013 12:35 pm	Soil	GSoil300	Hold Cold
6	13:024 TP103 RR S2 0.4-0.5 14-Mar-2013	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
7	13:024 TP103 RR S3 1.4-1.5 14-Mar-2013 12:00 pm	Soil	GSoil300	Hold Cold
9	13:024 TP104 RR S1 (B) 0.1-0.2 14-Mar-2013 11:00 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
10	13:024 TP104 RR S2 0.5-0.6 14-Mar-2013 11:05 am	Soil	PSoil250, GSoil300	Hold Cold
11	13:024 TP104 RR S31.3-1.4 14-Mar-2013 11:10 am	Soil	GSoil300	Hold Cold
12	13:024 TP105 RR S1 0.1-0.2 14-Mar-2013 10:20 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
13	13:024 TP105 RR S2 1.4-1.5 14-Mar-2013 11:40 am	Soil	GSoil300	Hold Cold
14	13:024 TP106 RR S1 0.2-0.3 14-Mar-2013 10:00 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
15	13:024 TP106 RR S2 0.7-0.8 14-Mar-2013 10:05 am	Soil	PSoil250, GSoil300	Hold Cold
16	13:024 TP106 RR S3 1.8-1.9 14-Mar-2013 10:10 am	Soil	PSoil250, GSoil300	Hold Cold
17	13:024 TP112 LG S1 0.1-0.2 14-Mar-2013 3:00 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Semivolatile Organic Compounds Trace in Soil by GC-MS
18	13:024 TP112 LG S2 1.0-1.1 14-Mar-2013 3:10 pm	Soil	PSoil250, GSoil300	Hold Cold
19	13:024 TP111 LG S1 0.1-0.2 14-Mar-2013 3:15 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
20	13:024 TP111 LG S2 0.4-0.5 14-Mar-2013 3:20 pm	Soil	PSoil250, GSoil300	Hold Cold
21	13:024 TP108 LG S1 0.1-0.2 14-Mar-2013 3:35 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
22	13:024 TP108 LG S2 0.7-0.8 14-Mar-2013 3:45 pm	Soil	PSoil250, GSoil300	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
23	13:024 TP107 LG S1 0-0.1 14-Mar-2013 4:10 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
24	13:024 TP107 LG S2 0.4-0.5 14-Mar-2013 4:15 pm	Soil	PSoil250, GSoil300	Hold Cold
25	13:024 TP107 LG S3 1.2-1.3 14-Mar-2013 4:30 pm	Soil	PSoil250, GSoil300	Hold Cold
26	13:0.24 TP103 RR S1 0.1-0.2 14-Mar-2013	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	19, 23
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	17, 21
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26

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ANALYSIS

Job No: **111 1983**

Date Rec'd: 16-Mar-13 13:24

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

No of samples: 27 No of Fractions: 52

3111119836

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13:024 3320901 / 1000 / 013	
Quote No	53976	*Order Number*

Primary Contact Kate Ward

Submitted By Kate Ward

Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter

☐ Fax Results

☑ Email Results envirolab@beca.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 15/3/13

Name: Kate Ward

☑ *Please tick if you require COC to be faxed back*

Signature:

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition *Temp:* 6.5

☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

2x samples for #8

2 extra samples at the end of the Job. TF

Priority

☐ **Low** ☐ **Normal** ☑ **High**

☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	*Sample Name*	*Sample Date & Time*	*Sample Type*	*Tests Required*
1	13.024 TP102 LG-S1 0.1-0.2	15/3/13	ES	Heavy metals, SVOC (trace), TPH
2	13.024 TP102 LG-S2 0.4-0.5	"	"	Hold Cold
3	13.024 TP102 LG-S3 1.5-1.6	"	"	Hold Cold
4	13.024 TP103 LG-S1 0-0.1	"	"	Heavy metals, SVOC (trace), TPH
5	13.024 TP103 LG-S2 0.5-0.6	"	"	Hold Cold
6	13.024 TP103 LG-S3 0.8-0.9	"	"	Hold Cold
7	13.024 TP103 LG-S4 1.5-1.6	"	"	Hold Cold
8	13.024 TP104 LG-S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
9	13.024 TP104 LG-S2 0.9-0.6	"	"	Hold Cold
10	13.024 TP104 LG-S3 1.0-1.1	"	"	Hold Cold

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Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
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Private Bag 3205
Hamilton 3240, New Zealand

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Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1111983
Contact:	Kate Ward	**Date Registered:**	16-Mar-2013 1:37:03 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53976
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:024 TP102 LG S1 0.1-0.2 15-Mar-2013 8:45 am	Soil	GSoil300, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
2	13:024 TP102 LG S2 0.4-0.5 15-Mar-2013 9:00 am	Soil	cPSoil, GSoil300	Hold Cold
3	13:024 TP102 LG S3 1.5-1.6 15-Mar-2013 9:05 am	Soil	PSoil250, GSoil300	Hold Cold
4	13:024 TP103 LG S1 0-0.1 15-Mar-2013 10:00 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
5	13:024 TP103 LG S2 0.5-0.6 15-Mar-2013 10:05 am	Soil	PSoil250, GSoil300	Hold Cold
6	13:024 TP103 LG S3 0.8-0.9 15-Mar-2013 10:10 am	Soil	PSoil250, GSoil300	Hold Cold
7	13:024 TP103 LG S4 1.5-1.6 15-Mar-2013 10:20 am	Soil	PSoil250, GSoil300	Hold Cold
8	13:024 TP1101 LG S1 0.1-0.2 08:45 15-Mar-2013	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
10	13:024 TP101 LG S2 0.5-0.6 15-Mar-2013 9:30 am	Soil	PSoil250, GSoil300	Hold Cold
11	13:024 TP101 LG S3 1.0-1.1 15-Mar-2013 9:40 am	Soil	PSoil250, GSoil300	Hold Cold
12	13:024 TP104 LG S1 0.1-0.2 15-Mar-2013 10:50 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
13	13:024 TP104 LG S2 0.9-1.0 15-Mar-2013 11:00 am	Soil	PSoil250, GSoil300	Hold Cold
14	13:024 Q5 S1 15-Mar-2013 10:50 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
15	13:024 TP105 LG S1 0.1-0.2 15-Mar-2013 11:10 am	Soil	PSoil250	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
16	13:024 TP105 LG S2 1.1-1.2 15-Mar-2013 11:20 am	Soil	PSoil250, GSoil300	Hold Cold
17	13:024 TP106 LS S1 0.1-0.2 15-Mar-2013 11:45 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
18	13:024 TP106 LS S2 0.6-0.7 15-Mar-2013 12:00 pm	Soil	PSoil250, GSoil300	Hold Cold
19	13:024 TP109 LG S1 0-0.1 15-Mar-2013 12:15 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
20	13:024 TP109 LG S2 0.5-0.6 15-Mar-2013 12:30 pm	Soil	PSoil250, GSoil300	Hold Cold
21	13:024 TP109 LG S3 1.1-1.2 15-Mar-2013 12:40 pm	Soil	PSoil250, GSoil300	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
22	13:024 TP110 LG S1 0-0.1 15-Mar-2013 12:50 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
23	13:024 TP110 LG S2 0.7-0.8 15-Mar-2013 1:00 pm	Soil	PSoil250, GSoil300	Hold Cold
24	13:024 TP110 LG S3 1.2-1.3 15-Mar-2013 1:05 pm	Soil	GSoil300, GSoil30(	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
25	13:024 TP110 LG S4 1.4-1.5 15-Mar-2013 1:10 pm	Soil	GSoil300, GSoil30(	Hold Cold
26	13:024 TP101 LG S4 1.8-1.9 15-Mar-2013 9:45 am	Soil	PSoil250, GSoil300	Hold Cold
27	13:024 TP101 LG S5 2.0-2.1 15-Mar-2013 9:50 am	Soil	PSoil250, GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 4, 8, 12, 14-15, 17, 19, 22, 24
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 4, 8, 12, 14-15, 17, 19, 22, 24
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	1, 4, 12, 14, 17, 22
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	8, 15, 19, 24
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1, 4, 8, 12, 14-15, 17, 19, 22, 24
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 4, 8, 12, 14-15, 17, 19, 22, 24
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 4, 8, 12, 14-15, 17, 19, 22, 24

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALY

R J Hill Laboratories Limit
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zeal

Job No: **111 0964**
Date Recv 14-Mar-13 10:10
No of samples: 25 No of Fractions: 116

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13:024 3320901 / 1000 / 013	
Quote No	53976	*Order Number*

Primary Contact Kate Ward
Submitted By Kate Ward
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06
Extra Sample Received
TP111 S3 1.9-2m.

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition
☑ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 17.4
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3** Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool** Swimming/Spa Pool
	TW	Trade Waste					
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL** Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:024 TP111 S1 0.2-0.3	14/2/13	ES	Heavy metals, TPH, PAH
2	13:024 TP111 S2 0.7-0.8	"	"	Hold Cold
3	13:024 TP109 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
4	13:024 TP109 S2 1.3-1.4	"	"	Hold Cold
5	13:024 TP110 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
6	13:024 TP110 S2 1.3-1.4	"	"	Hold Cold
7	13:024 TP115 S1 0.1-0.2	"	"	Heavy metals, TPH, PAH
8	13:024 TP115 S2 1.2-1.3	"	"	Hold Cold
9	13:024 TP114 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
10	13:024 TP114 S2 1.0-1.1	"	"	Hold Cold

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	B:024 TP109 RB S1 0.2-0.3	12/3/13	ES	Heavy metals, TPH, PAH
12	B:024 TB109 RB S2 1-1.1m	"	"	Hold Cold
13	B:024 TB109 RB S3 1.6-1.7	"	"	Heavy metals, TPH, PAH
14	B:024 TB108 RB S1 0.8-0.9	"	"	Heavy metals, TPH, PAH
15	B:024 TB108 RB S2 1.8-1.9	"	"	Hold Cold
16	B:024 TB107 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
17	B:024 TB107 RB S2 2.3-2.4	"	"	Hold Cold
18	B:024 TP106 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
19	B:024 TP106 RB S2 0.8-0.9	"	"	Heavy metals, TPH, PAH
20	B:024 TP101 RB S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
21	B:024 TP101 RB S2 1.7-1.8	"	"	Hold Cold
22	B:024 TP102 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
23	B:024 TP102 RB S2 1.4-1.5	"	"	Heavy metals, TPH, PAH.
24	B:024 TP109 RB S4 1.9-2	"	"	Hold cold
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R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1110964
Contact:	Kate Ward	**Date Registered:**	14-Mar-2013 10:44:49 am
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13.024 TP111 S1 0.2-0.3 12-Mar-2013 7:30 am	Soil	GSoil300, GSoil30(	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; TPH Oil Industry Profile + PAHscreen
2	13.024 TP111 S2 0.7-0.8 12-Mar-2013 7:35 am	Soil	GSoil300, GSoil30(	Hold Cold
3	13.024 TP109 S1 0.2-0.3 12-Mar-2013 8:00 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	13.024 TP109 S2 1.3-1.4 12-Mar-2013 8:20 am	Soil	GSoil300, GSoil30(	Hold Cold
5	13.024 TP110 S1 0.2-0.3 12-Mar-2013 8:30 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
6	13.024 TP110 S2 1.3-1.4 12-Mar-2013 8:40 am	Soil	GSoil300, GSoil30(	Hold Cold
7	13.024 TP115 S1 0.1-0.3 12-Mar-2013 8:55 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	13.024 TP115 S2 1.2-1.3 12-Mar-2013 9:00 am	Soil	GSoil300, GSoil30(	Hold Cold
9	13.024 TP114 S1 0.2-0.3 12-Mar-2013 9:20 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
10	13.024 TP114 S2 1.0-1.1 12-Mar-2013 9:30 am	Soil	GSoil300, GSoil30(	Hold Cold
11	13.024 TP109 RB S1 0.1-0.2 12-Mar-2013 1:30 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
12	13.024 TP109 RB S2 1-1.1m 12-Mar-2013 1:00 pm	Soil	GSoil300, GSoil30(	Hold Cold
13	13.024 TP109 RB S3 1.6-1.7 12-Mar-2013 1:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	13.024 TP108 RB S1 0.8-0.9 12-Mar-2013 2:05 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
15	13.024 TP108 RB S2 1.8-1.9 12-Mar-2013 2:15 pm	Soil	GSoil300	Hold Cold
16	13.024 TP107 RB S1 0.3-0.4 12-Mar-2013 2:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
17	13.024 TP107 RB S2 2.3-2.4 12-Mar-2013 2:50 pm	Soil	GSoil300	Hold Cold
18	13.024 TP106 RB S1 0.3-0.4 12-Mar-2013 3:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
19	13.024 TP106 RB S2 0.8-0.9 12-Mar-2013 3:20 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
20	13.024 TP101 RB S1 0.2-0.3 12-Mar-2013 3:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
21	13.024 TP101 RB S2 1.7-1.8 12-Mar-2013 3:40 pm	Soil	GSoil300, GSoil30(	Hold Cold
22	13.024 TP102 RB S1 0.3-0.4 12-Mar-2013 4:00 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
23	13.024 TP102 RB S2 1.4-1.5 12-Mar-2013 4:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
24	13.024 TP109 RB S4 1.9-2 12-Mar-2013 1:45 pm	Soil	GSoil300	Hold Cold
25	13.024 TP111 S3 1.9-2m 12-Mar-2013 7:40 am	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23

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ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **111 1703**
Date Recv: 15-Mar-13 14:42
No of samples: 28 No of Fractions: 51
3111117034

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13:024 3320901/1000/013	
Quote No	53976	*Order Number*

Primary Contact Kate Ward
Submitted By Kate Ward
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION
Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06
Extra Sample Received
TP115 S3 2.4-2.5

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/3/13, 7am
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition Temp: 10.5
☐ Room Temp ☐ Chilled ☐ Frozen
☐ Sample Analysis details checked
Signature:

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)		Pot2 Potable Water (NZDWS)		
	GW Ground Water	L Leachate	☐ Audit Monitoring		Pot3 Potable Water (other)		
	SW Surface Water	S Saline	☐ Check Monitoring		Pool Swimming/Spa Pool		
	TW Trade Waste						
Solids	ES Soil	SE Sediment	SL Sludge		PL Plant		
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota		BM BM Biological Material		

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:024 TP112 RB S1 0.2-0.3	13/3/13	ES	Heavy metals, PAH, TPH
2	13:024 TP112 RB S2 1.3-1.4	13/3/13	"	Hold Cold
3	13:024 TP112 RB S3 2.4-2.5	"	"	Hold Cold.
4	13:024 TP114 RB S1 0.1-0.2	"	"	Heavy metals, PAH, TPH
5	13:024 TP114 RB S2 1.1-1.2	"	"	Hold Cold
6	13:024 TP114 RB S3 2.4-2.5	"	"	Hold Cold
7	13:024 TP113 RB S1 0.2-0.3	"	"	Heavy metals, PAH, TPH
8	13:024 TP113 RB S2 1.3-1.4	"	"	Hold Cold
9	13:024 TP113 RB S3 2.2.1	"	"	Heavy metals, PAH, TPH
10	13:024 TP116 RB S1 0.1-0.2	"	"	Heavy metals, PAH, TPH

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	B:024 TP116 RB S2 1.2-1.3	13/3/13	ES	Heavy metals, TPH, PAH
12	B:024 TP116 RB S3	"	"	Hold Cold
13	B:024 TP115 RB S1 0.1-0.2	"	"	Heavy metals, PAH, TPH
14	B:024 TP115 RB S2 1.2-1.3	"	"	Hold Cold
15	B:024 Q3, S1	"	"	Heavy metals, PAH, TPH
16	B:024 TP117 RB S1 0.2-0.3	"	"	Heavy metals, PAH, TPH
17	B:024 TP117 RB S2 1.4-1.5	"	"	Heavy metals, PAH, TPH
18	B:024 TP117 RB S3 2.4-2.5	"	"	Hold Cold
19	B:024 TP119 RB S1 0.2-0.3	"	"	Heavy metals, PAH, TPH
20	B:024 TP119 RB S2 1.4-1.5	"	"	Heavy metals, PAH, TPH
21	B:024 TP120 RB S1 0.3-0.4	"	"	Heavy metals, PAH, TPH
22	B:024 TP120 RB S2 1.3-1.4	"	"	Hold Cold.
23	B:024 TP118 RB S1 0.2-0.3	"	"	Heavy metals, PAH, TPH
24	B:024 TP118 RB S2 0.6-0.7	"	"	Heavy metals, PAH, TPH
25	B:024 TP118 RB S3 1.2-1.3	"	"	Hold Cold.
26	B:024 TP121 RB S1 0.2-0.3	"	"	Heavy metals, PAH, TPH
27	B:024 TP121 RB S2 1.4-1.5	"	"	Hold Cold
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Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1111703
Contact:	Kate Ward	**Date Registered:**	15-Mar-2013 2:56:45 pm
	C/- Beca Infrastructure Limited	**Priority:**	Normal
	PO Box 6345	**Quote No:**	53976
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:024 TP112 RB S1 0.2-0.3 13-Mar-2013 10:20 am	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
2	13:024 TP112 RB S2 1.3-1.4 13-Mar-2013 10:30 am	Soil	GSoil300, GSoil300	Hold Cold
3	13:024 TP112 RB S3 2.4-2.5 13-Mar-2013 10:40 am	Soil	GSoil300	Hold Cold
4	13:024 TP114 RB S1 0.1-0.2 13-Mar-2013 11:40 am	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	13:024 TP114 RB S2 1.1-1.2 13-Mar-2013 11:50 am	Soil	GSoil300, GSoil300	Hold Cold
6	13:024 TP114 RB S3 2.4-2.5 13-Mar-2013 12:00 pm	Soil	GSoil300	Hold Cold
7	13:024 TP113 RB S1 0.2-0.3 13-Mar-2013 12:20 pm	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	13:024 TP113 RB S2 1.3-1.4 13-Mar-2013 12:25 pm	Soil	GSoil300, GSoil300	Hold Cold
9	13:024 TP113 RB S3 2-2.1 13-Mar-2013 12:30 pm	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
10	13:024 TP116 RB S1 0.1-0.2 13-Mar-2013 2:50 pm	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
11	13:024 TP116 RB S2 1.2-1.3 13-Mar-2013 2:00 pm	Soil	GSoil300, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
12	13:024 TP116 RB S3 13-Mar-2013 2:10 pm	Soil	GSoil300	Hold Cold
13	13:024 TP115 RB S1 0.1-0.2 13-Mar-2013 2:40 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	13:024 TP115 RB S2 1.2-1.3 13-Mar-2013 3:00 pm	Soil	PSoil250, GSoil300	Hold Cold
15	13:024 Q3, S1 13-Mar-2013 2:40 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
16	13:024 TP117 RB S1 0.2-0.3 13-Mar-2013 3:30 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
17	13:024 TP117 RB S2 1.4-1.5 13-Mar-2013 3:40 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
18	13:024 TP117 RB S3 2.4-2.5 13-Mar-2013 3:50 pm	Soil	GSoil300	Hold Cold
19	13:024 TP119 RB S1 0.2-0.3 13-Mar-2013 4:00 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
20	13:024 TP119 RB S2 1.4-1.5 13-Mar-2013 4:20 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
21	13:024 TP120 RB S1 0.3-0.4 13-Mar-2013 4:10 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
22	13:024 TP120 RB S2 1.3-1.4 13-Mar-2013 4:20 pm	Soil	PSoil250, GSoil300	Hold Cold
23	13:024 TP118 RB S1 0.2-0.3 13-Mar-2013 5:00 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
24	13:024 TP118 RB S2 0.6-0.7 13-Mar-2013 5:05 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
25	13:024 TP118 RB S3 1-2.2 13-Mar-2013 5:15 pm	Soil	PSoil250, GSoil300	Hold Cold
26	13:024 TP121 KB S1 0.2-0.3 13-Mar-2013 5:20 pm	Soil	PSoil250, GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
27	13:024 TP121 KB S2 1.4-1.5 13-Mar-2013 5:30 pm	Soil	PSoil250, GSoil300	Hold Cold
28	TP115 RB S3 2.4-2.5 13-Mar-2013 3:10 pm	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 4, 7, 9-11, 13, 15-17, 19-21, 23-24, 26
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	1, 4, 7, 9-11, 13, 15-17, 19-21, 23-24, 26
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 4, 7, 9-11, 13, 15-17, 19-21, 23-24, 26
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 4, 7, 9-11, 13, 15-17, 19-21, 23-24, 26
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 4, 7, 9-11, 13, 15-17, 19-21, 23-24, 26

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ANALYSIS 111 1765

Date Rec'd 15-Mar-13 16:

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

No of samples: 16 No of Fractions: 69

3111117655

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	Fax 09 300 9300
Client Reference	13:024 3320901/1000/013	
Quote No	53976	Order Number

Primary Contact Kate Ward
Submitted By Kate Ward
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/3/13. 7am
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition Temp: 2.2°C
☐ Room Temp ☐ Chilled ☐ Frozen
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

TP104 S2 1.4m-1.5 Accidentally dropped sample + Bottom smashed. Have transferred to new container. RP

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types 2 x Samples Received for TP104 S1 Times are 7.3

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)
	GW Ground Water	L Leachate	☐ Audit Monitoring	Pot3 Potable Water (other)
	SW Surface Water	S Saline	☐ Check Monitoring	Pool Swimming/Spa Pool
	TW Trade Waste			
Solids	ES Soil	SE Sediment	SL Sludge	PL Plant
Other	O Oil	M Miscellaneous	FS Fish/shellfish/biota	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13 024 TP105 RB S1 0-2-0.3	13/3/13	ES	Heavy metals, PAH, TPH
2	13:024 TP103 RB S2 1.2-1.3	"	"	Hold Cold
3	13 024 TP103 RB S3 2.1-2.2	"	"	Hold Cold
4	13:024 TP104 RB S1 0 3-0.3	"	"	Heavy metals, PAH, TPH
5	13:024 TP104 RB S2 1.4-1.5	"	"	Heavy metals, PAH, TPH
6	13:024 TP105 RB S1 0.15-0.25	"	"	Hold Cold
7	13:024 TP105 RB S2 0.6-0.7	"	"	Heavy metals, PAH, TPH
8	13:024 TP105 RB S3 1.9-2	"	"	Hold Cold
9	13:024 TP110 RB S1 0 1-0.2	"	"	Hold Cold
10	13:024 TP110 RB S2 1.4-1.2	"	"	Heavy metals, PAH, TPH

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:024 TP11 KB S3 21-22	13/3/13	ES	Hold Cold
12	13:024 TP11 KB S1 0.4-0.5	"	"	Heavy metals, PAH, TPH
13	13:024 TP11 KB S2 14-15	"	"	Hold Cold
14	13:024 TP11 KB S3 23-24	"	"	Hold Cold
15	13:024 QZ S1	"	"	Heavy metals, PAH, TPH.
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Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1111765
Contact:	Kate Ward	**Date Registered:**	15-Mar-2013 4:22:17 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53976
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
2	13:024 TP103 RB S2 1.2-1.3 13-Mar-2013 7:35 am	Soil	GSoil300, GSoil30(	Hold Cold
3	13:024 TP103 RB S3 2.1-2.2 13-Mar-2013 7:40 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	13:024 TP104 RB S1 0.2-0.3 13-Mar-2013 9:00 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	13:024 TP103 RB S1 0.2-0.3 13-Mar-2013 7:30 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
6	13:024 TP104 RB S2 1.4-1.5 13-Mar-2013 9:15 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
7	13:024 TP105 RB S1 0.15-0.25 13-Mar-2013 8:15 am	Soil	GSoil300, GSoil30(	Hold Cold
8	13:024 TP105 RB S2 0.6-0.7 13-Mar-2013 8:25 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
9	13:024 TP105 RB S3 1.9-2 13-Mar-2013 8:30 am	Soil	GSoil300, GSoil30(	Hold Cold
10	13:024 TP110 RB S1 0.1-0.2 13-Mar-2013 9:30 am	Soil	GSoil300, GSoil30(	Hold Cold
11	13:024 TP110 RB S2 1.1-1.2 13-Mar-2013 9:40 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
12	13:024 TP110 RB S3 2.1-2.2 13-Mar-2013 9:50 am	Soil	GSoil300, GSoil30(	Hold Cold
13	13:024 TP111 RB S1 0.4-0.5 13-Mar-2013 11:10 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	13:024 TP111 RB S2 1.4-1.5 13-Mar-2013 11:20 am	Soil	GSoil300, cGSoil	Hold Cold
15	13:024 TP111 RB S3 2.3-2.4 13-Mar-2013 11:30 am	Soil	GSoil300	Hold Cold
16	13:024 Q2 S1 13-Mar-2013 7:30 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	3-6, 8, 11, 13, 16
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	3-6, 8, 11, 13, 16
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	3-6, 8, 11, 13, 16

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	3-6, 8, 11, 13, 16
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	3-6, 8, 11, 13, 16

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **109 9950**
Date Recv: 14-Feb-13 13:36
No of samples: 13 No of Fractions: 13
3110999501

Client

Name: Beca Infrastructure 76225
Address: PO Box 6345, AUCKLAND

Phone: 09 300 9000 Fax: 09 300 9300
Client Reference: 13:016 3320901/1000/013
Quote No: 53458 Order Number:

Primary Contact Kate Jackson
Submitted By Kate Jackson
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 13/2/13 5pm
Name: Kate Jackson
☑ Please tick if you require COC to be faxed back
Signature:

Received at Hill Laboratories
Date & Time: 14 FEB 13 8:12
Name:
Signature: Gbarley

Condition ☐ Room Temp ☐ Chilled ☐ Frozen
Temp: 17.9
☐ Sample Analysis details checked
Signature:

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)
	GW Ground Water	L Leachate	☐ Audit Monitoring	Pot3 Potable Water (other)
	SW Surface Water	S Saline	☐ Check Monitoring	Pool Swimming/Spa Pool
	TW Trade Waste			
Solids	ES Soil	SE Sediment	SL Sludge	PL Plant
Other	O Oil	M Miscellaneous	FS FS Fish/shellfish/biota	BM BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:016 TP215 S1 0-0.1m	13/2/13	ES	Hold cold
2	13:016 TP215 S2 0.5-0.4m	"	"	"
3	13:016 TP215 S3 1-1.1m	"	"	"
4	13:016 TP215 S4 1.9-2m	"	"	"
5	13:016 TP216 S1 0-0.1	"	"	"
6	13:016 TP216 S2 0.5-0.6	"	"	"
7	13:016 TP216 S3 1.5-1.6	"	"	"
8	13:016 TP216 S4 2.4-2.5	"	"	"
9	13:016 TP217 S1 0-0.1	"	"	"
10	13:016 TP217 S2 0.5-0.6	"	"	"

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:016 TP217 SB 1.4-1.5	13/2/13	ES	Hold Cold
12	13:016 TP217 SA 1.8-1.9	"	"	"
13	13:016 TP217 SS 2.9-3	"	"	"
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Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1099950
Contact:	Kate Jackson	**Date Registered:**	14-Feb-2013 1:40:40 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53458
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:016 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Jackson
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:016 TP215 S1 0-0.1m 13-Feb-2013 8:30 am	Soil	GSoil300	Hold Cold
2	13:016 TP215 S2 0.3-0.4m 13-Feb-2013 8:35 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
3	13:016 TP215 S3 1-1.1m 13-Feb-2013 8:45 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	13:016 TP215 S4 1.9-2m 13-Feb-2013 9:00 am	Soil	GSoil300	Hold Cold
5	13:016 TP216 S1 0-0.1m 13-Feb-2013 9:15 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
6	13:016 TP216 S2 0.5-0.6m 13-Feb-2013 9:30 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
7	13:016 TP216 S3 1.5-1.6m 13-Feb-2013 9:50 am	Soil	GSoil300	Hold Cold
8	13:016 TP216 S4 2.4-2.5m 13-Feb-2013 10:00 am	Soil	GSoil300	Hold Cold
9	13:016 TP217 S1 0-0.1m 13-Feb-2013 10:45 am	Soil	GSoil300	Hold Cold
10	13:016 TP217 S2 0.5-0.6m 13-Feb-2013 11:00 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg
11	13:016 TP217 S3 1.4-1.5m 13-Feb-2013 11:05 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg
12	13:016 TP217 S4 1.8-1.9m 13-Feb-2013 11:10 am	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg
13	13:016 TP217 S5 2.9-3m 13-Feb-2013 11:15 am	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	2-3, 5-6, 10-12
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	2-3, 5-6, 10-12
Heavy metals, screen As,Cd,Cr,Cu,Ni,Pb,Zn,Hg	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	10-12
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	2-3, 5-6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	2-3, 5-6, 10-12

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	2-3, 5-6, 10-12

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ANALYSIS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **111 1754**
Date Recv: 15-Mar-13 16:09
No of samples: 26 No of Fractions: 48

31111:7541

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13.024 3320901/1000/013	
Quote No	53976	*Order Number*
Primary Contact	Kate Ward	
Submitted By	Kate Ward	
Charge To	Beca Infrastructure	76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Missing Sample labeled TP103 S1
Have 2x Samples labeled TP104 S1 Unable to tell apart KP

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/3/13 4pm
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature: K Ward

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition Temp:
☐ Room Temp ☐ Chilled ☐ Frozen
☐ Sample Analysis details checked
Signature:

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)		Pot2 Potable Water (NZDWS)		
	GW Ground Water	L Leachate	☐ Audit Monitoring		Pot3 Potable Water (other)		
	SW Surface Water	S Saline	☐ Check Monitoring		Pool Swimming/Spa Pool		
	TW Trade Waste						
Solids	ES Soil	SE Sediment	SL Sludge		PL Plant		
Other	O O Oil	M Miscellaneous	FS FS Fish/shellfish/biota		BM BM Biological Material		

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13.024 TP101 RR S1 0.2-0.3	14/3/13	ES	Heavy metals, TPH
2	13.024 TP101 RR S2 1.4-1.5	"	"	Hold Cold
3	13.024 TP102 RR S1 0.1-0.2	"	"	Heavy metals, TPH
4	13.024 TP102 RR S2 0.6-0.7	"	"	Hold Cold
5	13.024 TP102 RR S3 1.5-1.6	"	"	Hold Cold
6	13.024 TP103 RR S1 0.1-0.2	"	"	Heavy metals, TPH
7	13.024 TP103 RR S2 0.4-0.5	"	"	Hold Cold
8	13.024 TP103 RR S3 1.4-1.5	"	"	Hold Cold
9	13.024 TP104 RR S1 0.1-0.2	"	"	Heavy metals, TPH
10	13.024 TP104 RR S2 0.5-0.6	"	"	Hold Cold

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:024 TP104 RR S5 1.3-1.4	14/3/13	ES	Hold cold
12	13:024 TP105 RR S1 0.1-0.2	"	"	Heavy metals, TPH
13	13:024 TP105 RR S2 1.4-1.5	"	"	Hold Cold
14	13:024 TP106 RR S1 0.2-0.3	"	"	Heavy metals, TPH
15	13:024 TP106 RR S2 0.7-0.8	"	"	Hold Cold
16	13:024 TP106 RR S3 1.8-1.9	"	"	Hold Cold
17	13:024 TP112 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
18	13:024 TP112 LG S2 1.0-1.1	"	"	Hold Cold.
19	13:024 TP111 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
20	13:024 TP111 LG S2 0.4-0.5	"	"	Hold Cold
21	13:024 TP108 LG S1 0.1-0.2	"	"	Heavy metals, SVOC (trace), TPH
22	13:024 TP108 LG S2 0.7-0.8	"	"	Hold Cold
23	13:024 TP107 LG S1 0-0.1	"	"	Heavy metals, SVOC (trace), TPH
24	13:024 TP107 LG S2 0.4-0.5	"	"	Hold Cold
25	13:024 TP107 LG S3 1.2-1.3	"	"	Hold Cold
26				
27				
28	* Psoil container lid says TP111 LG S2			
29	label says TP108 LG S2. Have labeled as TP108A			
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31	Extra Sample Received labeled Q4 S1			
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Hill Laboratories
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R J Hill Laboratories Limited
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Hamilton 3240, New Zealand

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Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1111754
Contact:	Kate Ward	**Date Registered:**	15-Mar-2013 4:00:07 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53976
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:024 TP101 RR S1 0.2-0.3 14-Mar-2012 1:05 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
2	13:024 TP101 RR S2 1.4-1.5 14-Mar-2013 1:10 pm	Soil	PSoil250, GSoil300	Hold Cold
3	13:024 TP102 RR S1 0.1-0.2 14-Mar-2013 12:10 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
4	13:024 TP102 RR S2 0.6-0.7 14-Mar-2013 12:30 pm	Soil	PSoil250, GSoil300	Hold Cold
5	13:024 TP102 RR S3 1.5-1.6 14-Mar-2013 12:35 pm	Soil	GSoil300	Hold Cold
6	13:024 TP103 RR S2 0.4-0.5 14-Mar-2013	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
7	13:024 TP103 RR S3 1.4-1.5 14-Mar-2013 12:00 pm	Soil	GSoil300	Hold Cold
9	13:024 TP104 RR S1 (B) 0.1-0.2 14-Mar-2013 11:00 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
10	13:024 TP104 RR S2 0.5-0.6 14-Mar-2013 11:05 am	Soil	PSoil250, GSoil300	Hold Cold
11	13:024 TP104 RR S31.3-1.4 14-Mar-2013 11:10 am	Soil	GSoil300	Hold Cold
12	13:024 TP105 RR S1 0.1-0.2 14-Mar-2013 10:20 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
13	13:024 TP105 RR S2 1.4-1.5 14-Mar-2013 11:40 am	Soil	GSoil300	Hold Cold
14	13:024 TP106 RR S1 0.2-0.3 14-Mar-2013 10:00 am	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil
15	13:024 TP106 RR S2 0.7-0.8 14-Mar-2013 10:05 am	Soil	PSoil250, GSoil300	Hold Cold
16	13:024 TP106 RR S3 1.8-1.9 14-Mar-2013 10:10 am	Soil	PSoil250, GSoil300	Hold Cold
17	13:024 TP112 LG S1 0.1-0.2 14-Mar-2013 3:00 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Semivolatile Organic Compounds Trace in Soil by GC-MS
18	13:024 TP112 LG S2 1.0-1.1 14-Mar-2013 3:10 pm	Soil	PSoil250, GSoil300	Hold Cold
19	13:024 TP111 LG S1 0.1-0.2 14-Mar-2013 3:15 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
20	13:024 TP111 LG S2 0.4-0.5 14-Mar-2013 3:20 pm	Soil	PSoil250, GSoil300	Hold Cold
21	13:024 TP108 LG S1 0.1-0.2 14-Mar-2013 3:35 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Semivolatile Organic Compounds Trace in Soil by GC-MS; Total Petroleum Hydrocarbons in Soil
22	13:024 TP108 LG S2 0.7-0.8 14-Mar-2013 3:45 pm	Soil	PSoil250, GSoil300	Hold Cold

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
23	13:024 TP107 LG S1 0-0.1 14-Mar-2013 4:10 pm	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil; Polycyclic Aromatic Hydrocarbons Screening in Soil
24	13:024 TP107 LG S2 0.4-0.5 14-Mar-2013 4:15 pm	Soil	PSoil250, GSoil300	Hold Cold
25	13:024 TP107 LG S3 1.2-1.3 14-Mar-2013 4:30 pm	Soil	PSoil250, GSoil300	Hold Cold
26	13:0.24 TP103 RR S1 0.1-0.2 14-Mar-2013	Soil	PSoil250, GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Total Petroleum Hydrocarbons in Soil

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Polycyclic Aromatic Hydrocarbons Screening in Soil	Sonication extraction, Dilution or SPE cleanup (if required), GC-MS SIM analysis (modified US EPA 8270). Tested on as received sample.	-	19, 23
Semivolatile Organic Compounds Trace in Soil by GC-MS	Sonication extraction, GPC cleanup, GC-MS FS analysis. Tested on as received sample	-	17, 21
Total Petroleum Hydrocarbons in Soil	Sonication extraction in DCM, Silica cleanup, GC-FID analysis US EPA 8015B/MfE Petroleum Industry Guidelines. Tested on as received sample	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 6, 9, 12, 14, 17, 19, 21, 23, 26

Job No: Date Rec 13-Feb-13 13:19

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ANALYSIS R 109 9401

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

No of samples: 40 No of Fractions: 88

3110994017

Client

Name	Beca Infrastructure	76225	
Address	PO Box 6345, AUCKLAND		
Phone	09 300 9000	*Fax*	09 300 9300
Client Reference	13:016 3320901/1000/013		
Quote No	53458	*Order Number*	

Primary Contact	Kate Jackson	
Submitted By	Kate Jackson	
Charge To	Beca Infrastructure	76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION
Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Office use only Job No.

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 12/2/13 9am
Name: Kate Jackson
☑ *Please tick if you require COC to be faxed back*
Signature: Kaj

Received at Hill Laboratories
Date & Time: 13 FEB '13 5:46
Name:
Signature:

Condition ☑ Room Temp ☐ Chilled ☐ Frozen Temp: 21.2
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2**	Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3**	Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool**	Swimming/Spa Pool
	TW	Trade Waste						
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL**	Plant
Other	**O**	Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM**	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:016 Composite 1A	11/2/13	ES	Composite 1A, 1B, 1C, 1D and analyse for heavy metals and OCP/ONP (Sc)
2	13:016 Composite 1B	"	"	
3	13:016 Composite 1C	"	"	
4	13:016 Composite 1D	"	"	
5	13:016 Composite 2A	"	"	Composite 2A, 2B, 2C and 2D and analyse for heavy metals and OCP/ONP (Sc)
6	13:016 Composite 2B	"	"	
7	13:016 Composite 2C	"	"	
8	13:016 Composite 2D	"	"	
9	13:016 Composite 3A	"	"	Composite 3A, 3B, 3C, 3D and analyse for heavy metals and OCP/ONP (Sc)
10	13:016 Composite 3B	"	"	

Continued on next page

OCP/ONP (Sc).

Hill Laboratories
BETTER TESTING BETTER RESULTS
R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1099401
Contact:	Kate Jackson	**Date Registered:**	13-Feb-2013 1:32:02 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53458
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:016 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Jackson
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:016 Composite 1A 0-0.15 11-Feb-2013 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
2	13:016 Composite 1B 0-0.15 11-Feb-2013 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
3	13:016 Composite 1C 0-0.15 11-Feb-2013 10:55 am	Soil	GSoil300	Composite Environmental Solid Samples
4	13:016 Composite 1D 0-0.15 11-Feb-2013 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
5	13:016 Composite 2A 0-0.15 11-Feb-2013 11:15 am	Soil	GSoil300	Composite Environmental Solid Samples
6	13:016 Composite 2B 0-0.15 11-Feb-2013 11:40 am	Soil	GSoil300	Composite Environmental Solid Samples
7	13:016 Composite 2C 0-0.15 11-Feb-2013 11:20 am	Soil	GSoil300	Composite Environmental Solid Samples
8	13:016 Composite 2D 0-0.15 11-Feb-2013 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
9	13:016 Composite 3A 0-0.15 11-Feb-2013 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
10	13:016 Composite 3B 0-0.15 11-Feb-2013 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
11	13:016 Composite 3C 0-0.15 11-Feb-2013 12:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
12	13:016 Composite 3D 0-0.15 11-Feb-2013 12:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
13	13:016 Composite 4A 0-0.15 11-Feb-2013 12:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
14	13:016 Composite 4B 0-0.15 11-Feb-2013 12:55 pm	Soil	GSoil300	Composite Environmental Solid Samples
15	13:016 Composite 4C 0-0.15 11-Feb-2013 1:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
16	13:016 Composite 4D 0-0.15 11-Feb-2013 1:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
17	13:016 Composite 7A 0-0.15 11-Feb-2013 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
18	13:016 Composite 7B 0-0.15 11-Feb-2013 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
19	13:016 Composite 7C 0-0.15 11-Feb-2013 2:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
20	13:016 Composite 7D 0-0.15 11-Feb-2013 2:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
21	13:016 Composite 8A 0-0.15 11-Feb-2013 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
22	13:016 Composite 8B 0-0.15 11-Feb-2013 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
23	13:016 Composite 8C 0-0.15 11-Feb-2013 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
24	13:016 Composite 8D 0-0.15 11-Feb-2013 3:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
25	13:016 Composite 9A 0-0.15 11-Feb-2013 4:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
26	13:016 Composite 9B 0-0.15 11-Feb-2013 4:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
27	13:016 Composite 9C 0-0.15 11-Feb-2013 3:10 pm	Soil	GSoil300	Composite Environmental Solid Samples
28	13:016 Composite 9D 0-0.15 11-Feb-2013 3:50 pm	Soil	GSoil300	Composite Environmental Solid Samples
29	13:016 Composite 10A 0-0.15 11-Feb-2013 3:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
30	13:016 Composite 10B 0-0.15 11-Feb-2013 3:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
31	13:016 Composite 10C 0-0.15 11-Feb-2013 3:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
32	13:016 Composite 10D 0-0.15 11-Feb-2013 3:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
33	Composite of 13:016 Composite 1A, 13:016 Composite 1B, 13:016 Composite 1C, 13:016 Composite 1D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
34	Composite of 13:016 Composite 2A, 13:016 Composite 2B, 13:016 Composite 2C, 13:016 Composite 2D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
35	Composite of 13:016 Composite 3A, 13:016 Composite 3B, 13:016 Composite 3C, 13:016 Composite 3D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
36	Composite of 13:016 Composite 4A, 13:016 Composite 4B, 13:016 Composite 4C, 13:016 Composite 4D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
37	Composite of 13:016 Composite 7A, 13:016 Composite 7B, 13:016 Composite 7C , 13:016 Composite 7D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
38	Composite of 13:016 Composite 8A, 13:016 Composite 8B, 13:016 Composite 8C, 13:016 Composite 8D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
39	Composite of 13:016 Composite 9A, 13:016 Composite 9B, 13:016 Composite 9C, 13:016 Composite 9D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
40	Composite of 13:016 Composite 10A, 13:016 Composite 10B, 13:016 Composite 10C, 13:016 Composite 10D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	33-40
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	33-40
Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS	Sonication extraction, Dilution cleanup, GC-MS analysis. Tested on as received sample	-	33-40
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	33-40
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	33-40

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Samples**
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction.	-	1-32

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ANALYSIS R

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: **109 9944**
Date Recv 14-Feb-13 13:22
No of samples: 28 No of Fractions: 76

3110999446

Client

Name: Beca Infrastructure 76225
Address: PO Box 6345, AUCKLAND

Phone: 09 300 9000 Fax: 09 300 9300
Client Reference: 13:016 3320901/1000/013
Quote No: 53458 Order Number:

Primary Contact Kate Jackson
Submitted By Kate Jackson
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 13/02/13, 5pm
Name: Kate Jackson
☑ Please tick if you require COC to be faxed back
Signature: Kate

Received at Hill Laboratories
Date & Time: 14 FEB 13 8:12
Name: Lisa Bailey
Signature: Lisa Bailey

Condition
☑ Room Temp ☐ Chilled ☐ Frozen
Temp: 19.6°C

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Priority

☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E Effluent	G Geothermal	Pot1 Potable Water (LAS/EU)	Pot2 Potable Water (NZDWS)
	GW Ground Water	L Leachate	☐ Audit Monitoring	Pot3 Potable Water (other)
	SW Surface Water	S Saline	☐ Check Monitoring	Pool Swimming/Spa Pool
	TW Trade Waste			
Solids	ES Soil	SE Sediment	SL Sludge	PL Plant
Other	O Oil	M Miscellaneous	FS FS Fish/shellfish/biota	BM BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:016 Composite 11A	12/2/13	ES	composite 11A, 11B, 11C, 11D and analyse for heavy metals and OCP/ONP (Sc).
2	13:016 Composite 11B	"	"	
3	13:016 Composite 11C	"	"	
4	13:016 Composite 11D	"	"	
5	13:016 Composite 12A	"	"	composite 12A, 12B, 12C, 12D and analyse for heavy metals and OCP/ONP (Sc).
6	13:016 Composite 12B	"	"	
7	13:016 Composite 12C	"	"	
8	13:016 Composite 12D	"	"	
9	13:016 Composite 13A	"	"	composite 13A, 13B, 13C, 13D and analyse for heavy metals and
10	13:016 Composite 13B	"	"	

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:016 composite 13C	12/2/13	ES	OCP/ONP (Sc).
12	13:016 composite 13D	"	"	
13	13:016 composite 14A	"	"	composite 14A, 14B, 14C, 14D and
14	13:016 composite 14B	"	"	analyse for heavy metals and
15	13:016 composite 14C	"	"	OCP/ONP (Sc).
16	13:016 composite 14D	"	"	
17	13:016 composite 15A	"	"	composite 15A, 15B, 15C, 15D and
18	13:016 composite 15B	"	"	analyse for heavy metals and
19	13:016 composite 15C	"	"	OCP/ONP (Sc).
20	13:016 composite 15D	"	"	
21	13:016 HA101	"	"	Heavy metals, OCP/ONP (Sc)
22	13:016 HA122	"	"	Heavy metals, OCP/ONP (Sc)
23	13:016 HA132	"	"	Heavy metals, OCP/ONP (Sc).
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Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1099944
Contact:	Kate Jackson	**Date Registered:**	14-Feb-2013 1:31:46 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	53458
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	
		Add. Client Ref:	
		Submitted By:	Kate Jackson
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:016 Composite 11A 12-Feb-2013 3:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
2	13:016 Composite 11B 12-Feb-2013 1:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
3	13:016 Composite 11C 12-Feb-2013 2:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
4	13:016 Composite 11D 12-Feb-2013 2:15 pm	Soil	GSoil300	Composite Environmental Solid Samples
5	13:016 Composite 12A 12-Feb-2013 1:35 pm	Soil	GSoil300	Composite Environmental Solid Samples
6	13:016 Composite 12B 12-Feb-2013 11:45 am	Soil	GSoil300	Composite Environmental Solid Samples
7	13:016 Composite 12C 12-Feb-2013 1:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
8	13:016 Composite 12D 12-Feb-2013 11:00 am	Soil	GSoil300	Composite Environmental Solid Samples
9	13:016 Composite 13A 12-Feb-2013 11:30 am	Soil	cGSoil	Composite Environmental Solid Samples
10	13:016 Composite 13B 12-Feb-2013 11:25 am	Soil	GSoil300	Composite Environmental Solid Samples
11	13:016 Composite 13C 12-Feb-2013 10:30 am	Soil	GSoil300	Composite Environmental Solid Samples
12	13:016 Composite 13D 12-Feb-2013 10:45 am	Soil	GSoil300	Composite Environmental Solid Samples
13	13:016 Composite 5A 12-Feb-2013 1:00 pm	Soil	cGSoil	Composite Environmental Solid Samples
14	13:016 Composite 5B 12-Feb-2013 12:05 pm	Soil	GSoil300	Composite Environmental Solid Samples
15	13:016 Composite 5C 12-Feb-2013 12:00 pm	Soil	GSoil300	Composite Environmental Solid Samples
16	13:016 Composite 5D 12-Feb-2013 1:40 pm	Soil	GSoil300	Composite Environmental Solid Samples
17	13:016 Composite 6A 12-Feb-2013 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
18	13:016 Composite 6B 12-Feb-2013 12:45 pm	Soil	GSoil300	Composite Environmental Solid Samples
19	13:016 Composite 6C 12-Feb-2013 12:20 pm	Soil	GSoil300	Composite Environmental Solid Samples
20	13:016 Composite 6D 12-Feb-2013 12:30 pm	Soil	GSoil300	Composite Environmental Solid Samples
21	13:016 HA101 12-Feb-2013 9:20 am	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
22	13:016 HA122 12-Feb-2013 9:20 am	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
23	13:016 HA132 12-Feb-2013 3:00 pm	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
24	Composite of 13:016 Composite 11A + 13:016 Composite 11B + 13:016 Composite 11C + 13:016 Composite 11D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
25	Composite of 13:016 Composite 12A + 13:016 Composite 12B + 13:016 Composite 12C + 13:016 Composite 12D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
26	Composite of 13:016 Composite 13A + 13:016 Composite 13B + 13:016 Composite 13C + 13:016 Composite 13D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
27	Composite of 13:016 Composite 5A + 13:016 Composite 5B + 13:016 Composite 5C + 13:016 Composite 5D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS
28	Composite of 13:016 Composite 6A + 13:016 Composite 6B + 13:016 Composite 6C+ 13:016 Composite 6D	Soil	GSoil300	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	21-28
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	21-28
Organochlorine/nitro&phosphorus Pest.s Screen in Soils, GCMS	Sonication extraction, Dilution cleanup, GC-MS analysis. Tested on as received sample	-	21-28
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	21-28
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	21-28
Composite Environmental Solid Samples	Individual sample fractions mixed together to form a composite fraction.	-	1-20

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R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Job No: 111 0684
Date Rec: 13-Mar-13 16:01
No of samples: 28
No of Fractions: 0
3111106841

ANALYSIS REQUEST

CHAIN OF CUSTODY RECORD

Office use only

Client

Name	Beca Infrastructure	76225	
Address	PO Box 6345, AUCKLAND		
Phone	09 300 9000	Fax	09 300 9300
Client Reference	13:024 3320901 / 1000 / 013		
Quote No	53976	Order Number	

Primary Contact Kate Ward
Submitted By Kate Ward
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

Sent to Hill Laboratories
Date & Time: 12/3/13
Name: Kate Ward
Signature:
☑ Please tick if you require COC to be faxed back

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition Temp:
☐ Room Temp ☐ Chilled ☐ Frozen
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06

Priority
☐ Low ☐ Normal ☑ High
☐ Urgent (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	E	Effluent	G	Geothermal	Pot1	Potable Water (LAS/EU)	Pot2	Potable Water (NZDWS)
	GW	Ground Water	L	Leachate	☐	Audit Monitoring	Pot3	Potable Water (other)
	SW	Surface Water	S	Saline	☐	Check Monitoring	Pool	Swimming/Spa Pool
	TW	Trade Waste						
Solids	ES	Soil	SE	Sediment	SL	Sludge	PL	Plant
Other	O	O Oil	M	Miscellaneous	FS	FS Fish/shellfish/biota	BM	BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:024 TP104 S1 0.1-0.15	11/3/13	ES	Heavy metals, TPH, PAH
2	13:024 TP104 S2 0.6-0.7	"	"	Heavy metals, TPH, PAH
3	13:024 TP104 S3 1.9-2	"	"	Hold Cold
4	13:024 TP105 S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
5	13:024 TP105 S2 1.0-1.1	"	"	Hold Cold.
6	13:024 TP105 S3 1.5-1.6	"	"	Hold Cold
7	13:024 TP113 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
8	13:024 TP113 S2 1.1-1.2	"	"	Heavy metals, TPH, PAH
9	13:024 TP113 S3 2.8-2.9	"	"	Hold Cold
10	13:024 TP106 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	13:024 TP106 1-1.1m	11/3/13	"	Hold Cold
12	13:024 TP106 1.5-1.6m	"	"	Hold Cold
13	13:024 Q1 S1	"	"	Heavy metals, TPH, PAH
14	13:024 Q1 S2	"	"	Hold Cold
15	13:024 TP103 0.2-0.3m	"	"	Heavy metals, TPH, PAH
16	13:024 TP103 1.2-1.3m	"	"	Hold Cold
17	13:024 TP102 0.4-0.5m	"	"	Heavy metals, TPH, PAH
18	13:024 TP102 1.1-1.2m	"	"	Heavy metals, TPH, PAH
19	13:024 TP102 2.4-2.5m	"	"	Hold Cold
20	13:024 TP101 0.1-0.2m	"	"	Heavy metals, TPH, PAH
21	13:024 TP101 1.2-1.3m	"	"	Heavy metals, TPH, PAH
22	13:024 TP101 2.2-2.3m	"	"	Hold Cold
23	13:024 TP109 0.1-0.2m	"	"	Heavy metals, TPH, PAH
24	13:024 TP109 0.9-1m	"	"	Hold Cold
25	13:024 TP107 0.2-0.3m	"	"	Heavy metals, TPH, PAH
26	13:024 TP107 1.3-1.4m	"	"	Hold Cold
27	13:024 TP112 0.1-0.2m	"	"	Heavy metals, TPH, PAH
28	13:024 TP112 1.2-1.3m	"	"	Hold Cold.
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Hill Laboratories
BETTER TESTING BETTER RESULTS

R J Hill Laboratories Limited
1 Clyde Street
Private Bag 3205
Hamilton 3240, New Zealand

Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1110684
Contact:	Kate Ward	**Date Registered:**	13-Mar-2013 4:31:47 pm
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13:024 TP104 S1 0.1-0.15 m 11-Mar-2013 10:40 am	Soil	GSoil300, GSoil30(	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; TPH Oil Industry Profile + PAHscreen
2	13:024 TP104 S2 0.6-0.7m 11-Mar-2013 10:50 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
3	13:024 TP104 S3 1.9-2m 11-Mar-2013 11:00 am	Soil	GSoil300	Hold Cold
4	13:024 TP105 S1 0.3-0.4m 11-Mar-2013 11:30 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
5	13:024 TP105 S2 1.0-1.1m 11-Mar-2013 11:45 am	Soil	GSoil300, GSoil30(	Hold Cold
6	13:024 TP105 S3 1.5-1.6m 11-Mar-2013 12:00 pm	Soil	GSoil300, GSoil30(	Hold Cold
7	13:024 TP113 S1 0.2-0.3m 11-Mar-2013 12:15 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	13:024 TP113 S2 1.1-1.2m 11-Mar-2013 12:30 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
9	13:024 TP113 S3 2.8-2.9m 11-Mar-2013 12:35 pm	Soil	GSoil300	Hold Cold
10	13:024 TP106 S1 0.2-0.3m 11-Mar-2013 1:00 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
11	13:024 TP106 S2 1.0-1.1m 11-Mar-2013 1:05 pm	Soil	GSoil300, GSoil30(	Hold Cold
12	13:024 TP106 S3 1.5-1.6m 11-Mar-2013 1:10 pm	Soil	GSoil300	Hold Cold
13	13:024 Q1 S1 11-Mar-2013 1:30 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	13:024 Q1 S2 11-Mar-2013	Soil	GSoil300	Hold Cold
15	13:024 TP103 S1 0.2-0.3m 11-Mar-2013 1:30 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
16	13:024 TP103 S2 1.2-1.3m 11-Mar-2013 1:45 pm	Soil	GSoil300, GSoil30(	Hold Cold
17	13:024 TP102 S1 0.4-0.5m 11-Mar-2013 2:25 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
18	13:024 TP102 S2 1.1-1.2m 11-Mar-2013 2:35 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
19	13:024 TP102 S3 2.4-2.5m 11-Mar-2013 2:45 pm	Soil	GSoil300	Hold Cold
20	13:024 TP101 S1 0.1-0.2m 11-Mar-2013 3:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
21	13:024 TP101 S2 1.2-1.3m 11-Mar-2013 3:15 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
22	13:024 TP101 S3 2.2-2.3m 11-Mar-2013	Soil	GSoil300	Hold Cold
23	13:024 TP109 S1 0.1-0.2m 11-Mar-2013 4:00 pm	Soil	GSoil300	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
24	13:024 TP109 S2 0.9-1m 11-Mar-2013 4:05 pm	Soil	GSoil300, GSoil30(	Hold Cold
25	13:024 TP107 S1 0.2-0.3m 11-Mar-2013 4:35 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
26	13:024 TP107 S2 1.3-1.4m 11-Mar-2013 4:45 pm	Soil	GSoil300, GSoil30(	Hold Cold
27	13:024 TP112 S1 0.1-0.2m 11-Mar-2013 5:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
28	13:024 TP112 S2 1.2-1.3 11-Mar-2013 5:20 pm	Soil	GSoil300, GSoil30(	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-2, 4, 7-8, 10, 13, 15, 17-18, 20-21, 23, 25, 27
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	1-2, 4, 7-8, 10, 13, 15, 17-18, 20-21, 23, 25, 27
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1-2, 4, 7-8, 10, 13, 15, 17-18, 20-21, 23, 25, 27
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1-2, 4, 7-8, 10, 13, 15, 17-18, 20-21, 23, 25, 27
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2, 4, 7-8, 10, 13, 15, 17-18, 20-21, 23, 25, 27

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ANALY

R J Hill Laboratories Limit
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Private Bag 3205
Hamilton 3240, New Zeal

Job No: **111 0964**
Date Recv 14-Mar-13 10:10
No of samples: 25 No of Fractions: 116

Client

Name	Beca Infrastructure	76225
Address	PO Box 6345, AUCKLAND	
Phone	09 300 9000	*Fax* 09 300 9300
Client Reference	13:024 3320901 / 1000 / 013	
Quote No	53976	*Order Number*

Primary Contact Kate Ward
Submitted By Kate Ward
Charge To Beca Infrastructure 76225

Results To ☑ Mail Client ☐ Mail Submitter
☐ Fax Results
☑ Email Results envirolab@beca.com

ADDITIONAL INFORMATION

Please carry out work in accordance with our standard conditions of engagement, as described in letter dated 24-04-06
Extra Sample Received
TP111 S3 1.9-2m.

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name: Kate Ward
☑ *Please tick if you require COC to be faxed back*
Signature:

Received at Hill Laboratories
Date & Time:
Name:
Signature:

Condition
☑ *Room Temp* ☐ *Chilled* ☐ *Frozen* *Temp:* 17.4
☐ Sample Analysis details checked
Signature:

Priority
☐ **Low** ☐ **Normal** ☑ **High**
☐ **Urgent** (ASAP, extra charge applies, please contact the lab first)

Requested Reporting Date:

Sample Types

Waters	**E**	Effluent	**G**	Geothermal	**Pot1**	Potable Water (LAS/EU)	**Pot2** Potable Water (NZDWS)
	GW	Ground Water	**L**	Leachate	☐	Audit Monitoring	**Pot3** Potable Water (other)
	SW	Surface Water	**S**	Saline	☐	Check Monitoring	**Pool** Swimming/Spa Pool
	TW	Trade Waste					
Solids	**ES**	Soil	**SE**	Sediment	**SL**	Sludge	**PL** Plant
Other	**O**	O Oil	**M**	Miscellaneous	**FS**	FS Fish/shellfish/biota	**BM** BM Biological Material

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
1	13:024 TP111 S1 0.2-0.3	14/2/13	ES	Heavy metals, TPH, PAH
2	13:024 TP111 S2 0.7-0.8	"	"	Hold Cold
3	13:024 TP109 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
4	13:024 TP109 S2 1.3-1.4	"	"	Hold Cold
5	13:024 TP110 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
6	13:024 TP110 S2 1.3-1.4	"	"	Hold Cold
7	13:024 TP115 S1 0.1-0.2	"	"	Heavy metals, TPH, PAH
8	13:024 TP115 S2 1.2-1.3	"	"	Hold Cold
9	13:024 TP114 S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
10	13:024 TP114 S2 1.0-1.1	"	"	Hold Cold

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	B:024 TP109 RB S1 0.2-0.3	12/3/13	ES	Heavy metals, TPH, PAH
12	B:024 TB109 RB S2 1-1.1m	"	"	Hold Cold
13	B:024 TB109 RB S3 1.6-1.7	"	"	Heavy metals, TPH, PAH
14	B:024 TB108 RB S1 0.8-0.9	"	"	Heavy metals, TPH, PAH
15	B:024 TB108 RB S2 1.8-1.9	"	"	Hold Cold
16	B:024 TB107 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
17	B:024 TB107 RB S2 2.3-2.4	"	"	Hold Cold
18	B:024 TP106 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
19	B:024 TP106 RB S2 0.8-0.9	"	"	Heavy metals, TPH, PAH
20	B:024 TP101 RB S1 0.2-0.3	"	"	Heavy metals, TPH, PAH
21	B:024 TP101 RB S2 1.7-1.8	"	"	Hold Cold
22	B:024 TP102 RB S1 0.3-0.4	"	"	Heavy metals, TPH, PAH
23	B:024 TP102 RB S2 1.4-1.5	"	"	Heavy metals, TPH, PAH.
24	B:024 TP109 RB S4 1.9-2	"	"	Hold cold
25				
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32				
33				
34				
35				
36				
37				
38				
39				
40				

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Tel +64 7 858 2000
Fax +64 7 858 2001
Email mail@hill-labs.co.nz
Web www.hill-labs.co.nz

Job Information Summary

Client:	Beca Infrastructure Limited	**Lab No:**	1110964
Contact:	Kate Ward	**Date Registered:**	14-Mar-2013 10:44:49 am
	C/- Beca Infrastructure Limited	**Priority:**	High
	PO Box 6345	**Quote No:**	
	Wellesley Street	**Order No:**	
	AUCKLAND 1141	**Client Reference:**	13:024 3320901/1000/013
		Add. Client Ref:	
		Submitted By:	Kate Ward
		Charge To:	Beca Infrastructure Limited

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
1	13.024 TP111 S1 0.2-0.3 12-Mar-2013 7:30 am	Soil	GSoil300, GSoil30(	Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn; TPH Oil Industry Profile + PAHscreen
2	13.024 TP111 S2 0.7-0.8 12-Mar-2013 7:35 am	Soil	GSoil300, GSoil30(	Hold Cold
3	13.024 TP109 S1 0.2-0.3 12-Mar-2013 8:00 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
4	13.024 TP109 S2 1.3-1.4 12-Mar-2013 8:20 am	Soil	GSoil300, GSoil30(	Hold Cold
5	13.024 TP110 S1 0.2-0.3 12-Mar-2013 8:30 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
6	13.024 TP110 S2 1.3-1.4 12-Mar-2013 8:40 am	Soil	GSoil300, GSoil30(	Hold Cold
7	13.024 TP115 S1 0.1-0.3 12-Mar-2013 8:55 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
8	13.024 TP115 S2 1.2-1.3 12-Mar-2013 9:00 am	Soil	GSoil300, GSoil30(	Hold Cold
9	13.024 TP114 S1 0.2-0.3 12-Mar-2013 9:20 am	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
10	13.024 TP114 S2 1.0-1.1 12-Mar-2013 9:30 am	Soil	GSoil300, GSoil30(	Hold Cold
11	13.024 TP109 RB S1 0.1-0.2 12-Mar-2013 1:30 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
12	13.024 TP109 RB S2 1-1.1m 12-Mar-2013 1:00 pm	Soil	GSoil300, GSoil30(	Hold Cold
13	13.024 TP109 RB S3 1.6-1.7 12-Mar-2013 1:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
14	13.024 TP108 RB S1 0.8-0.9 12-Mar-2013 2:05 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
15	13.024 TP108 RB S2 1.8-1.9 12-Mar-2013 2:15 pm	Soil	GSoil300	Hold Cold
16	13.024 TP107 RB S1 0.3-0.4 12-Mar-2013 2:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
17	13.024 TP107 RB S2 2.3-2.4 12-Mar-2013 2:50 pm	Soil	GSoil300	Hold Cold
18	13.024 TP106 RB S1 0.3-0.4 12-Mar-2013 3:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
19	13.024 TP106 RB S2 0.8-0.9 12-Mar-2013 3:20 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
20	13.024 TP101 RB S1 0.2-0.3 12-Mar-2013 3:40 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
21	13.024 TP101 RB S2 1.7-1.8 12-Mar-2013 3:40 pm	Soil	GSoil300, GSoil30(	Hold Cold
22	13.024 TP102 RB S1 0.3-0.4 12-Mar-2013 4:00 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn
23	13.024 TP102 RB S2 1.4-1.5 12-Mar-2013 4:10 pm	Soil	GSoil300, GSoil30(	TPH Oil Industry Profile + PAHscreen; Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn

Samples

No	Sample Name	Sample Type	Containers	Tests Requested
24	13.024 TP109 RB S4 1.9-2 12-Mar-2013 1:45 pm	Soil	GSoil300	Hold Cold
25	13.024 TP111 S3 1.9-2m 12-Mar-2013 7:40 am	Soil	GSoil300	Hold Cold

SUMMARY OF METHODS

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively clean matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Samples
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
TPH Oil Industry Profile + PAHscreen	Sonication in DCM extraction, SPE cleanup, GC-FID & GC-MS analysis. Tested on as received sample. US EPA 8015B/MfE Petroleum Industry Guidelines	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Heavy metal screen level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, screen level.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. US EPA 3550. (Free water removed before analysis).	0.10 g/100g as rcvd	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1, 3, 5, 7, 9, 11, 13-14, 16, 18-20, 22-23

Appendix F to Technical Report 23

MacKays to Peka Peka Expressway, Contamination Desk Study

NZ TRANSPORT AGENCY
WAKA KOTAHI

1 MacKays to Peka Peka Expressway

Revision History

Revision Nº	Prepared By	Description	Date
A	Kate Jackson	Draft	5/11/10
B	Genevieve Smith	Review following final alignment selection	24/6/11
C	Genevieve Smith	Review following EPA comments	5/3/12

Document Acceptance

Action	Name	Signed	Date
Prepared by	Kate Jackson and Genevieve Smith		
Reviewed by	Kerry Laing		
Approved by	Graham Spargo		
on behalf of	Beca Infrastructure Ltd		

Table of Contents

Executive Summary

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCA's) to construct, operate and maintain an expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

As part of the Assessment of Environmental Effects (AEE) for the Project, a series of technical reports have been produced. The aim of this Stage 1 desk study is to ascertain whether the soil and groundwater along the route has the potential to be contaminated as a result of current and/or historical land use activities.

The desk study has been compiled using the following information sources:

- Review of properties registered on the Selected Land Use Register (SLUR) held by Greater Wellington Regional Council (GWRC).
- Review of discharge resource consents issued within 200m of the Expressway designation.
- Review of information held by the Kāpiti Coast District Council (KCDC) including property files, building consent registers, resource consent registers, dangerous goods licence registers, and underground tank location registers.
- Review of historical aerial photographs available.
- Review of Kāpiti Coast groundwater abstraction borehole information.
- A walkover of the route viewing land and activities within the route.
- A detailed site inspection of sites identified as having the potential to be contaminated.

The Project has been divided into four sectors which broadly define the urban and rural areas along the route of the Expressway.

Sector 1

The potential for land and groundwater contamination in the section of route between Queen Elizabeth Park and Poplar Ave is considered to be low. Two properties have been identified in the area between Poplar Ave and Raumati Road from the inspections as having the potential to be contaminated by current or historical activities, and these are as follows:

- 16 Leinster Avenue – possible contamination arising from unknown fill materials and dumping of waste and empty chemical containers and drums.
- 150 Raumati Road – possible contamination arising from dumping of waste materials.

Sector 2

The route follows the existing Western Link Road (WLR) Designation for the whole of this sector through the township of Paraparaumu. Four properties have been identified as having the potential to be contaminated by current or historical activities, and these are as follows:

- 55 Rata Road – identified SLUR site, hydrocarbon storage and general contractor's yard containing stockpiled metal, timber, rubble and machinery.
- 58 Kiwi Road – from aerial photographs taken in 1957 this land parcel is likely to have been used for horticultural activities.
- Area of designated land behind Manchester and Sheffield Streets - the potential that waste materials may have been dumped in this area from the adjacent industrial zone.
- 109 Kāpiti Road – firewood storage area where land has been raised from original level with fill from multiple sources.

Sector 3

The route through this sector runs adjacent to Otaihanga Landfill, crosses the Waikanae River and passes through a residential area at Te Moana Road. Two properties have been identified as having the potential to be contaminated by current or historical activities, and these are as follows:

- Otaihanga Landfiil – the landfill is unlined and is consented to discharge contaminants to groundwater.
- 124-154 Te Moana Road – market gardening activities.

The discharge consent granted for the Otaihanga Landfill has the potential to affect the adjacent land parcels within the route. Otaihanga Landfill is also identified on the SLUR register. Landfilling activities are unlikely to have taken place within land parcels within the route.

A public water supply observation borehole is located on the property boundary of 124-154 Te Moana Road which may require monitoring for potential groundwater contamination associated with the property.

Sector 4

The land use in this sector is predominately rural and the potential for land contamination from current activities is considered to be low. However given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Such activities, if they occurred, may lie outside the designation, which is only a small proportion of the rural land in the sector.

1 Introduction

The NZ Transport Agency ('the NZTA') is lodging a Notice of Requirement (NOR) and resource consent applications (RCA's) to construct, operate and maintain an expressway between MacKays Crossing and Peka Peka ('the Project') on the Kāpiti Coast.

The MacKays to Peka Peka Expressway route[1] ('the Expressway') has been identified as one of eight sections within the Wellington Northern Corridor (SH1 from Levin to the Wellington Airport) which is an identified "Road of National Significance" (RoNS) in terms of the 2009 Government Policy Statement[2].

Figure 1: Wellington Northern Corridor

As part of the Assessment of Environmental Effects (AEE) for the Project, a series of technical reports have been produced. This report is a Stage 1 desk study which relates to the assessment of effects from land and groundwater contamination. The aim of this desk study is to ascertain whether

[1] Route refers to the overall corridor of land between MacKays Crossing and Peka Peka

[2] Government Policy Statement on Land Transport Funding 2009/2010-2018/2019

the soil and groundwater along the route has the potential to be contaminated as a result of current and/or historical land use activities.

This desk study has been carried out and reported in general accordance with the Ministry for the Environment (MfE) *'Contaminated Land Management Guidelines No. 1 – Reporting on Contaminated Sites in New Zealand'* (2003).

1.1 Documentation and Methodology

The desk study has been compiled using the following information sources:

- A walkover of the route viewing land parcels within the route of the Expressway from public roads.
- A detailed site inspection of sites identified as having the potential to be contaminated, where possible.
- Review of properties registered on the Selected Land Use Register (SLUR) held by Greater Wellington Regional Council (GWRC) and any associated information referenced.
- Review of discharge resource consents issued within 200m of the Expressway designation.
- Review of information held by the Kāpiti Coast District Council (KCDC) including property files, building consent registers, resource consent registers, dangerous goods licence registers, and underground tank location registers.
- Review of historical aerial photographs available from the National Library of New Zealand and NZ Aerial Mapping.
- Review of Kāpiti Coast groundwater abstraction borehole information held by Beca.

1.2 Report structure

The Project has been divided into four Sectors (Sector Diagram, Part D, Chapter 7, Section 3, Volume 2) which broadly define the different rural and urban zones of the Project.

The main body of this report (Sections 2-5) is structured around the four Sectors, with each Sector having its own section. The Sector specific sections are intended to be relatively 'stand alone' and each contains the following relevant information retrieved during the information searches listed above.

2 Sector 1

Sector 1 runs from just south of Poplar Avenue to Raumati Road. This portion of the route will comprise construction of an interchange at Poplar Avenue and stormwater wetlands.

The route passes through the corner of Queen Elizabeth Park and follows approximately the existing Western Link Road (WLR) Designation through Raumati towards the Kāpiti Road intersection.

The extent of Sector 1 is shown in **Figure 2** with the yellow line indicating the route of the Expressway. Maps of the route are shown in Drawing EN-CL-009, Volume 5.

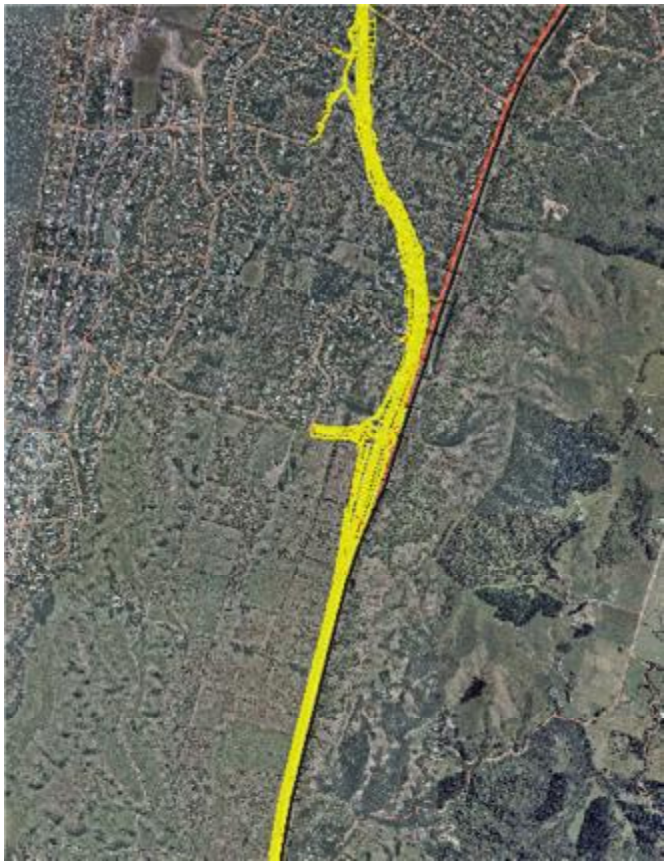

Figure 2: Sector 1

2.1 Description

The land use within this sector is a mix of rural and residential. The route follows the WLR Designation for the most part, with the exception of the section after Poplar Avenue where the route deviates from the existing SH1 route at 200 Main Road and passes through a group of lifestyle blocks adjacent to Leinster Avenue. The route then passes through the township of Raumati within the designation, which is currently unoccupied bush.

The KCDC District Plan shows the areas bordering the route to be zoned as rural and residential. Queen Elizabeth Park is zoned open space.

2.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 1 of the route.

Aerial photographs for the entire route for the years 1956/57 and 2001/2 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/57

Queen Elizabeth Park is visible between MacKays Crossing and Poplar Avenue, with a small area of earthworks observed towards Poplar Avenue. The Leinster Avenue area is sparsely populated with remnant bush areas and wetland covering this area up to Raumati Road. There are no signs of earthworks or dumped materials through this section.

Aerial photographs 2001/2

Small areas of QE Park adjacent to SH1 appear to have been ploughed but no crop planting is visible. The area of earthworks towards Poplar Avenue has increased in size. The Leinster Avenue area is now a fully populated residential area. The property at 16 Leinster Avenue appears to contain a residential building with bush and lawns covering the remainder of the property. The area between Leinster Avenue and Raumati Road contains a central wetland/bush area with infill of residential and lifestyle blocks along SH1 and Raumati Road. The central bush area appears to have an accessway cleared through the bush. There are no visible signs of earthworks or dumped waste materials.

2.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 1.**

Table 1: Current Land Use, Sector 1.

Location	Property Address	Activity	Observations
Queen Elizabeth Park, Poplar Avenue	Various	Paddocks and bush	Predominantly rural use. Area of landfilling observed towards Poplar Avenue - stockpiled soil and construction debris.
Poplar Avenue	Various	Residential properties	No activities indicating the potential for land contamination.

	16 Leinster Avenue	Commercial nursery shop	Possible storage of herbicides and pesticides on site.
Existing SH1 Route	Between Leinster Avenue and Raumati Road	Lifestyle blocks	No activities indicating the potential for land contamination.
Raumati Road	Various	Residential properties	No activities indicating the potential for land contamination.
	150 Raumati Road	Unoccupied bush area (existing WLR Designation)	Possible area for dumped waste materials.

With respect to the stockpiled earth observed within Queen Elizabeth Park, the director of Goodmans Contractors Limited, Stan Goodman, confirmed that the company operates a small cleanfill site at this location which has been established for several years. This site is not within the construction footprint of the Expressway, and therefore is not considered further in this study.

A detailed site inspection was undertaken on 12 April 2011 at the two remaining properties which had the potential to be contaminated, and are within the construction footprint of the Expressway. The properties and observations made are detailed in **Table 2**:

Table 2: Detailed Site Inspections, Sector 1.

Location	Activity	Observations
16 Leinster Avenue	Commercial Garden Centre	There did not appear to be any significant bulk storage area for pesticides and herbicides within the garden centre building area. The land area behind the buildings was being used as a contractor/transport storage yard. The ground had been levelled using imported fill, with stockpiles of materials at the edge of the site. There was evidence of dumping of waste materials including timber, sheet metal, empty chemical containers and drums. Photographs are included below.
150 Raumati Road	Unoccupied bush area	The land was generally low lying bush/wetland area. There was evidence of dumping of waste materials including sheet metal, timber and an abandoned car. An area of ground may have been levelled with fill materials. Photographs are included below.

Figure 3: 16 Leinster Avenue

Figure 4: 16 Leinster Avenue

Figure 5: 16 Leinster Avenue

Figure 6: 150 Raumati Road

Figure 7: 150 Raumati Road

2.4 Hazardous Activities and Industries List (HAIL)

There are a number of activities and industries that are considered by the Ministry for the Environment (MfE) to have potential for causing land contamination due to hazardous substance use, storage or disposal. This is known as the Hazardous Activities and Industries List (HAIL). GWRC hold a register of sites in the region on which an activity or industry listed on the HAIL is currently taking place, or has previously taken place. This is called the Selected Land Use Register (SLUR).

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register. Information received from GWRC shows that no properties within Sector 1 are recorded on the SLUR database.

2.5 Council Information Request

2.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land and groundwater contamination (see **Table 2**) were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at 16 Leinster Avenue and 150 Raumati Road. KCDC reported that the associated files for these properties are missing from their records.

A request was made to KCDC to search their records for any properties in Sector 1 where a dangerous good licence had been issued, or where an underground storage tank was located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 1 and that no property was listed as having an underground storage tank on site.

2.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the route of the Expressway. A number of discharge consents were returned for Sector 1 but none were identified as likely to have an impact on land parcels within the route for Sector 1.

Construction of the Expressway in this sector of the route will involve widening of the existing SH1 route and construction of a roundabout in the far northern corner adjacent to Poplar Avenue. It is known that Queen Elizabeth Park was used as a World War II military base. Information was requested from GWRC on locations of the base itself and any subsequent discoveries of ammunition dumps. The location of the base is well documented and is towards the MacKays Crossing end of the park. Discoveries of ammunition in the park have also been documented. It is considered that the potential for the discovery of buried ammunitions in the areas to be disturbed is low. GWRC provided a procedure to be followed for any earthworks taking place in the park, including sweeping the ground with Ground Penetrating Radar (GPR).

2.6 Groundwater Abstraction Review

Beca has been assisting KCDC with a wider study into the effects of saline intrusion into groundwater boreholes in the region and consequently Beca holds information on the location and depth of groundwater boreholes along the Kāpiti Coast.

A review of groundwater abstraction boreholes within a 300m downgradient radius of 16 Leinster Avenue and 150 Raumati Road was undertaken. The aim of the review was to determine whether there were any water abstractions that could be affected by possible land contamination at these properties.

No boreholes were considered likely to be affected by any potential contamination at 16 Leinster Avenue and 150 Raumati Road, due to their depth, use or location.

2.7 Summary

The section of route between Queen Elizabeth Park and Poplar Ave is park land, and based on information detailed in the above sections, the potential for land and groundwater contamination from current activities is considered to be low.

The area between Poplar Ave and Raumati Road is mixed residential and lifestyle blocks with a portion of unoccupied bush land. Two properties have been identified from detailed site inspections as having the potential to be contaminated by current or historical activities, and these are as follows:

- 16 Leinster Avenue – possible contamination arising from unknown fill materials and dumping of waste and empty chemical containers and drums.

- 150 Raumati Road – possible contamination arising from dumping of waste materials.

No boreholes were considered likely to be affected by any potential contamination at 16 Leinster Avenue and 150 Raumati Road, due to their depth, use or location.

3 Sector 2

This sector runs along the existing WLR Designation through the area of Paraparaumu from Raumati Road to 300m north of Mazengarb Road. Underbridges will be constructed over local roads at Raumati Road and Mazengarb Road, with an underbridge spanning the Wharemauku Stream. A new intersection will be constructed at Kāpiti Road.

The extent of Sector 2 is shown in **Figure 8** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are shown in Drawings EN-CL-010 and 011, Volume 5.

Figure 8: Sector 2

3.1 Description

The land use within this sector is a mix of rural and residential. The route follows the existing WLR Designation for the whole of this section of the route through the township of Paraparaumu. This is due to the constraints of property development up to the designation boundary.

The portion of the route from Raumati Road to Kāpiti Road passes through a semi-rural area. At Kāpiti Road there is significant residential development to the east of the route and commercial industrial businesses to the west. From Kāpiti Road to Fytfield Place residential properties border the route on the east with interspersed residential and rural properties to the west.

The KCDC District Plan shows the areas bordering the route to be predominantly zoned as rural and residential. There is an area zoned as industrial on the western boundary of the route between Kāpiti Road and the end of Te Roto Drive in Paraparaumu.

3.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 2 of the route.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/7

The area of land between Raumati Road and Kāpiti Road is predominantly rural with bush and wetlands visible. A property along Rata Road (actual address is 58 Kiwi Road) appears to have been used for horticultural activities. The property at 55 Rata Road appears to be an unused paddock. The area between Kāpiti Road and Mazengarb Road is again rural and sparsely populated with residential houses.

Aerial photographs 2001/2

The area between Raumati Road and Kāpiti Road remains predominantly rural, but with infill of residential properties adjacent to Raumati and Rata Roads. The property at 55 Rata Road is still an unused paddock. The horticultural activities at 58 Kiwi Road appear to have been discontinued, with the site turned over to pasture. The area between Kāpiti Road and Mazengarb Road has been occupied by a commercial/industrial zone and residential housing. The WLR Designation is clearly visible as an area where development has not occurred. The exception is a small area which has been used for commercial premises adjacent to Kāpiti Road, and an area of bush clearance to make an accessway between Sheffield Street and Makanini Street. The remainder of the designation between Kāpiti Road and Mazengarb Road is bush.

3.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 3** and relevant photographs are shown in the figures below.

Table 3: Current Land Use, Sector 2.

Location	Property Address	Activity	Observations
Rata Road	55 Rata Road	Storage Yard	Stockpiled metal, timber, fill and machinery.

Commercial / Industrial Zone (Paraparaumu)	Various – Sheffield Street	Commercial / Industrial	Several heavy engineering service businesses. An interiors fittings business.
	Various – Manchester Street	Commercial / Industrial	A haulage business, a kitchen cupboard manufacturer, a plastic extrusion business and storage units.
	Area of designated land behind Manchester and Sheffield Streets	Unoccupied land, dense vegetation	Potential for dumped waste materials.
	109 Kāpiti Road	Commercial	Firewood storage area.
	102 Kāpiti Road	Commercial	Brick and paving products storage yard.
	104 Kāpiti Road	Commercial	Tool sharpening services. Timber joinery factory.
	108 Kāpiti Road	Commercial	Goodyear Auto Service Centre.
Paraparaumu Wastewater Treatment Plant	26 Fytfield Place	Wastewater Treatment Plant	Paraparaumu Wastewater Treatment Plant and Emergency Operations Centre.

Of the properties listed above, only the land parcels at 55 Rata Road, 109 Kāpiti Road and the area of designated land behind Manchester and Sheffield Streets are affected by the Expressway construction footprint. As the remaining sites of potential interest are not directly affected, no further investigation of the sites was considered necessary.

Figure 9: 55 Rata Road

Figure 10: Area of designated land behind Manchester and Sheffield Streets

A detailed site inspection was undertaken on 12 April 2011 at one property, with observations made. This is shown in **Table 4**.

Table 4: Detailed Site Inspections, Sector 2.

Location	Activity	Observations
109 Kāpiti Road	Firewood storage area	The site had been raised from its original level by placement of fill. The area covered by the fill was extensive and from visibly different sources. Photographs are included below.

Figure 11: 109 Kāpiti Road

Figure 12: showing fill placement from multiple sources, natural ground level seen in the background

3.4 Hazardous Activities and Industries List (HAIL).

A request was made to GWRC to search their SLUR register for information relating to any property along to the route of the Expressway identified on the register in Sector 2. The properties listed on the SLUR for Sector 2 are shown in **Table 5.**

Table 5: HAIL Summary, Sector 2.

Site Address	Legal Description	Category	Activity
55 Rata Road	Lots 1 & 3 DP 349464	Category V –Verified Hazardous Activity or	**Storage – Fuel** Site used by transport operator.

		Industry	Hydrocarbons (diesel and petrol) stored in bulk quantities. Photos on file show tank removal however no tank pull report is held.
102 Kāpiti Road	Lot 1 DP 307526	Category V –Verified Hazardous Activity or Industry	**Service Station** Petrol and diesel underground storage tanks removed 22 October 1997. No tank pull records held.
108 Kāpiti Road	Lot 1 DP 29743	Contamination Acceptable/Managed/ Remediated	**Motor Vehicle Workshop** Site previously used as small parts foundry, currently a motor vehicle workshop. Diesel underground storage tank removed by Mobil in 1992/3. Testing found localised contamination.
106 Kāpiti Road	Lot 1 DP 29743	Category V –Verified Hazardous Activity or Industry	**Iron and Steel Works** Site used for the manufacture of wire and tube products and metal powder-coating. No site assessment held by GWRC, extent of contamination unknown, if any.
106 Kāpiti Road	Lot 1 DP 87980	Category V –Verified Hazardous Activity or Industry	**Iron and Steel Works** Site used for the manufacture of wire and tube products and metal powder-coating. No site assessment held by GWRC, extent of contamination unknown, if any.
24 Fytfield Place	Pt Lot 2 DP 2241	Category V –Verified Hazardous Activity or Industry	**Waste storage/treatment/disposal – Sewage Treatment Facility** Paraparaumu Wastewater Treatment Plant

Of the properties listed above, only the land parcel at 55 Rata Road is intersected by the Expressway construction footprint. As the remaining SLUR sites are not directly affected no further investigation of the sites is considered necessary.

The full information provided by the GWRC for 55 Rata Road is presented in **Appendix B**.

3.5 Council Information Request

3.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land and groundwater contamination were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at 55 Rata Road, 58 Kiwi Road, the area of designated land behind Manchester and Sheffield Streets and 109 Kāpiti Road. KCDC confirmed that no records are held for the property at 58 Kiwi Road or the designated land behind Manchester and Sheffield Streets. Building and property files were received and reviewed for 55 Rata Road and 109 Kāpiti Road, however there was no information relating to potentially contaminating activities on the files.

A request was made to KCDC to search their records for any properties in Sector 2 where a dangerous good licence had been issued. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 2, which appears inconsistent with the bulk fuel storage tanks referred to below.

A request was made to KCDC to search their records for any properties where underground storage tanks were located. The following properties were listed in their records:

- 55 Rata Road
- 102 Kāpiti Road
- 108 Kāpiti Road

This list corresponds to the information held by GWRC on the SLUR register (listed in **Table 5**). No further information was held by KCDC in relation to these sites than that already provided by GWRC (see **Appendix B** for SLUR information). Of the three properties only 55 Rata Road is affected by the construction of the Expressway.

3.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the route of the Expressway. There was one property where discharge consents had been granted which could impact land parcels within the route for Sector 2, and this is:

- Paraparaumu Wastewater Treatment Plant (PWWTP)

The resource consents granted for PWWTP relate to the discharge of treated wastewater to the Mazengarb Drain and the discharge of contaminants to air, land and water from the sludge lagoons. A copy of the consents is included in **Appendix C**. The consent conditions refer to the requirement for groundwater monitoring for a range of contaminants. Groundwater monitoring data and borehole locations have been requested and received from the GWRC Compliance Officer for the site, and this is also included in **Appendix C**.

3.6 Groundwater Abstraction Review

A review of groundwater abstraction boreholes within a 300m downgradient radius of 55 Rata Road, 58 Kiwi Road, 109 Kāpiti Road and the area of designated land behind Manchester and Sheffield Streets was undertaken. The aim of the review was to determine whether there were any water abstractions that could be affected by possible land contamination at these properties.

There is one domestic supply borehole screened at a depth of less than 20m located downgradient of 58 Kiwi Road. Should contamination be present in the soils at the site, it is recommended that this borehole be monitored for similar contamination in the groundwater. No boreholes were considered likely to be affected by any potential contamination at 55 Rata Road, 109 Kāpiti Road or the area of designated land behind Manchester and Sheffield Streets, due to their depth, use or location.

3.7 Summary

The land use within this sector is a mix of rural and residential. The route follows the existing WLR Designation for the whole of this section of the route through the township of Paraparaumu.

Four properties have been identified as having the potential to be contaminated by current or historical activities, and are as follows:

- 55 Rata Road – identified SLUR site, hydrocarbon storage and general contractor's yard containing stockpiled metal, timber, rubble and machinery.
- 58 Kiwi Road – from aerial photographs taken in 1957 this land parcel is likely to have been used for horticultural activities.
- Area of designated land behind Manchester and Sheffield Streets - the potential that waste materials may have been dumped in this area from the adjacent industrial zone.
- 109 Kāpiti Road – firewood storage area where land has been raised from original level with fill from multiple sources.

Several businesses occupying the commercial / industrial zone in Manchester and Sheffield Streets, and some businesses along Kāpiti Road were identified during the site visit, and are listed on the SLUR register, as undertaking activities that have the potential to cause land contamination, including car workshops, engineering services, and a timber joinery factory. However these properties are not affected by the Expressway construction footprint and therefore no further investigation of the sites is considered necessary. There were no relevant discharge consents relating to these properties which had the potential to affect land parcels with the route.

The wastewater treatment plant was also identified through the site visit and from the SLUR register as an activity which has the potential to cause contamination. As the property is not directly affected by the Expressway construction footprint no further investigation of the site is considered necessary. However resource consents issued to the site have the potential to affect land parcels within the route of the Expressway.

One domestic supply groundwater abstraction borehole may be affected by any potential contamination at 58 Kiwi Road.

4 Sector 3

This sector runs approximately along the existing WLR Designation through the area of Waikanae from 300m north of Mazengarb Road to 600m north of Te Moana Road. An underbridge will be constructed over Otaihanga Road, with a new bridge spanning the Waikanae River and a new intersection at Te Moana Road. The main construction yard and Project office will be established at the Otaihanga Landfill site on Otaihanga Road.

The extent of Sector 3 is shown in **Figure 13** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are show in Drawings EN-CL-012 and 013, Volume 5.

Figure 3: Sector 3

4.1 Description

The route follows the WLR Designation from Fytfield Place to Otaihanga Road, running through land adjacent to the western side of Otaihanga Landfill. The land use in this portion of the route comprises a recreation mountain bike park.

A new crossing will be constructed over the Waikanae River. The land use in this portion of the route comprises mainly rural blocks.

There is a residential area between the Waikanae River and Te Moana Road and a sacred Waahi Tapu burial site (urupa). An interchange will be constructed at Te Moana Road.

The KCDC District Plan shows the areas bordering the route to be rural, with a residential area within Waikanae. The Waikanae Golf Course is zoned as open space.

4.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives found two historical aerial photographs relevant to Sector 3. These are presented in **Appendix A** and are summarised below.

30 April 1965 – Aerial view of Waikanae looking north

The photograph shows the settlement of Waikanae Beach with Te Moana Road running through the middle of the residential area. The route passes through the pasture and bush land in the distance to the north east of the photograph. There is very little evidence of development along the route with the area appearing rural.

7 March 1969 – Aerial view of Waikanae looking south

This photograph is an aerial view of Waikanae looking south. It shows the Waikanae River running through the centre of the photograph with residential developments along Te Moana Road parallel to the river. The route passes adjacent to the Paraparaumu airfield, which can be seen in the far south-west, and cross the river approximately where there are darker patches of bush, again to the west. There is some housing development interspersed with bush and pasture where the route crosses the river.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping. In addition aerial photographs from 1942, 1964, 1986 and 1998 for the Otaihanga Landfill area were sourced. All photographs are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photograph 1942 – Otaihanga Landfill area only

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible.

Aerial photographs 1956/7

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible. The area between Otaihanga Road and the Waikanae River is rural pasture land. The area of Te Moana Road is also rural pasture land with limited housing along Te Moana Road and some along Greenaway and Puriri Roads.

Aerial photograph 1964 – Otaihanga Landfill area only

The area of Otaihanga Landfill is a wetland/bush area with sand dunes; no landfilling activity is visible.

Aerial photograph 1986 – Otaihanga Landfill area only

Landfilling has occurred in the southern corner of the site near the wastewater treatment plant and bush/wetland has been cleared in the east and north-east areas of the site. The land within the Expressway route appears to be unaltered from the 1964 photograph.

Aerial photograph 1998 – Otaihanga Landfill area only

The area of landfilling has spread from the southern corner towards the centre of the site. There is no evidence of waste materials being deposited near the land designated for the Expressway. The sand dunes within the route appear to have been planted with pine trees.

Aerial photographs 2001/2

The land adjacent to Otaihanga Landfill remains as pine forest and wetlands. The area that has been subject to landfilling is clearly visible and appears to have occurred only in the southern portion of the land parcel with the northern portion remaining as wetland. The area between Otaihanga Road and the Waikanae River is pasture land with very few buildings within the route of the Expressway. The area between the Waikanae River and Te Moana Road is bush with residential housing present along all roads in the area. Horticultural activities are visible at 124-154 Te Moana Road.

4.3 Current Land Use and Site Visits

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. The land uses observed are detailed in **Table 6** and relevant photographs are shown in the figures below.

Table 6 - Current Land Uses, Sector 3

Location	Property Address	Activity	Observations
Otaihanga	160 Otaihanga Road	Landfill	Landfill currently accepts cleanfill green waste and treated sludge from the wastewater treatment plant. Leachate collection ditch observed which contained floating waste materials.
Otaihanga Road to Waikanae River	Various	Rural / Lifestyle blocks	No activities indicating the potential for land contamination.

Waikanae River to Te Moana Road	Various	Residential	No activities indicating the potential for land contamination.
	22 Kauri Road	Commercial	A community lifestyle farm camp.
Te Moana Road	124-154 Te Moana Road	Horticultural	Market gardening activities observed.

Figure 14: Otaihanga Landfill – toe of landfill, route to the right in the pine trees

Figure 15: Otaihanga Landfill – Landfill Drain.

Figure 16: 124-154 Te Moana Road

4.4 Hazardous Activities and Industries List (HAIL).

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register in Sector 3. The properties listed on the SLUR for Sector 3 are shown in **Table 7.** The full information provided by the GWRC for this property is presented in **Appendix C**.

Table 7: HAIL Summary, Sector 3.

Site Address	Legal Description	Category	Activity
160 Otaihanga Road, Paraparaumu	Pt Lot 2 DP 2241, Pt Sec 5 Ngarara Settlement, Sec 3 SO 419095	Category V – Verified Hazardous Activity or Industry	**Landfill** **Waste Storage / Treatment / Disposal – Sewage Treatment Facilities** Landfill established since at least the early 1970s. Water table at the site is high, with possibility of leachate entering groundwater. 2000 litres of fuel and a number of smaller quantities of hazardous substances in drums stored on site.

4.5 Council Information Request

4.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land contamination were highlighted for further consideration and information was sought from KCDC.

A request was made to KCDC to view building and property files for land parcels at Otaihanga Landfill and 124-154 Te Moana Road. KCDC provided a recent annual report on the Otaihanga Landfill, the details of which are discussed in Section 4.6 below. The file for 124-154 Te Moana Road was received and reviewed, however there was no relevant information contained within the file.

A request was made to KCDC to search their records for any properties in Sector 3 where a dangerous good licence had been issued or where an underground tank was located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 3 and no property was listed as having an underground storage tank.

4.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the Expressway designation. There was one property where discharge consents had been granted which could impact land parcels within the designation for Sector 3, and this is:

- Otaihanga Landfill

The consents issued for the Otaihanga Landfill relate to the discharge of leachate to groundwater, the discharge of municipal waste to the landfill and the discharge of clean diverted stormwater from around the landfill into the Mazengarb Drain. The key discharge which is likely to impact adjacent land parcels within the route is the discharge of leachate to groundwater. The route runs adjacent to the western side of the landfill and so the groundwater under the route is likely to be affected by this discharge. A copy of the consent is included in **Appendix C**.

4.6 Otaihanga Landfill

The Otaihanga Landfill is located at 160 Otaihanga Road. It is owned by the KCDC and has been in operation since approximately 1970. The KCDC annual plan indicates that the landfill is now closed, however it continues to accept treated sludge (from the Paraparaumu and Ōtaki Wastewater Treatment Plants), cleanfill and green waste. Information from the KCDC website indicates that the landfill is not lined.

The landfill is being capped and clean fill is being accepted for this purpose. The site now operates as a recycling centre.

The route passes through the existing WLR Designation in the western portion of the site. There appears to be no information on the extent of landfilling activities.

The MfE report *"Wellington "waste catchment" trial: An investigation into a new model for waste monitoring"* (2007) discusses the Otaihanga Landfill as part of the catchment trial. Relevant

information from this report includes the waste types previously accepted at Otaihanga Landfill. These are listed below.

- General commercial and residential wastes.
- Council domestic kerbside collections.
- Green waste separated and composted.
- Sludge from Paraparaumu Wastewater Treatment Plant.
- Hazardous wastes were not accepted.

The consultants Montgomery Watson Harza (MWH) were commissioned by the KCDC to carry out groundwater and surface water monitoring at the Otaihanga Landfill, for the consent compliance reporting. The 2009 / 2010 report is summarised below and is included as **Appendix D**.

The resource consent for the site requires groundwater monitoring to be undertaken at three groundwater bores around the landfill and surface water monitoring at three locations along Mazengarb Drain. Groundwater has been monitored at the landfill since 1992.

A detailed description of the hydrogeology is contained within the report and not summarised here. However, it is stated in the report that groundwater is abstracted from a gravel aquifer which underlies the site.

There is a leachate collection drain constructed along the north-western boundary of the landfill which collects both surface and groundwater. The leachate is discharged via sewer to the Paraparaumu Wastewater Treatment Plant.

One of the groundwater sampling boreholes (K1) is located very close to the route and analysis results indicate that this tends to have the lowest levels of contaminants of the three groundwater sampling locations. Monitoring results show that groundwater quality at the landfill is slowly deteriorating. However the annual report states that there will be a decrease in leachate and subsequent improvement in groundwater quality following the closure of the landfill.

Surface water sampling point K7 is the closest monitoring point to the route. It is located in the Western Tributary which arises from the wetland immediately north-west of the landfill. The landfill appears to be having a negative impact on water quality in this area. This is attributed to K7 being located close to the most recent landfilling activities and to the leachate collection drain. However, there is no mention of further investigation of this matter in the report.

4.7 Groundwater Abstraction Review

A review of shallow groundwater abstraction boreholes (<10m depth) within a 300m hydraulic downgradient radius of Otaihanga Landfill and 124-154 Te Moana Road was undertaken. The aim

of the review was to determine whether there were any groundwater abstractions that could be affected by possible land contamination at these properties.

One borehole located on the boundary of the Te Moana Road property is noted as being a public water supply observation bore. Should contamination be present in the soils at the site, it is recommended that this borehole be monitored for similar contamination in the groundwater.

4.8 Summary

The route runs adjacent to Otaihanga Landfill, crosses the Waikanae River and passes through a residential area at Te Moana Road. The land use in the portion of the route adjacent to Otaihanga Landfill comprises a recreation mountain bike park. There is a sacred Waahi Tapu burial site (urupa) in the area near the Waikane River.

Two properties have been identified as having the potential to be contaminated by current or historical activities, and are as follows:

- Otaihanga Landfiil – the landfill is unlined and is consented to discharge contaminants to groundwater.
- 124-154 Te Moana Road – market gardening activities.

The discharge consent granted for the Otaihanga Landfill has the potential to affect the adjacent land parcels within the route. Otaihanga Landfill is also identified on the SLUR register.

From historical aerial photographs it appears that landfilling activities at have not encroached into the land designated for the Expressway, and therefore an assessment of soil contamination is not considered necessary. The priority therefore would be to characterise any groundwater contamination present within this section of the route.

A public water supply observation borehole is located on the property boundary of 124-154 Te Moana Road which may require monitoring for potential groundwater contamination associated with the property.

5 Sector 4

Sector 4 runs from Te Moana Road to Peka Peka Beach Road. A new link to Ngarara Road will be built to cross the Expressway, which will include construction of an overbridge. Smithfield Road will be relocated to the south of its existing position, with an overbridge constructed to carry the new road over the Expressway. At the Peka Peka end, an interchange will be constructed over both the Expressway and the existing railway, linking Peka Peak Beach Road to Hadfield Road.

The extent of Sector 4 is shown in **Figure 17** with the yellow line indicating the route of the Expressway. Maps of the route within this sector are shown in Drawings EN-MP-003a, Volume 5.

Figure 17: Sector 4

5.1 Description

The land use within Sector 4 is rural comprising pasture and bush. The route deviates slightly from the existing WLR Designation mainly on the eastern side. There are no intersections along the route other than at Te Moana Road and at Peka Peka Road at the end of the Expressway.

The KCDC District Plan shows the areas bordering the route to be rural.

5.2 Historical Aerial Photographs

A search of the National Library of New Zealand photographic archives was undertaken. There were no relevant historical aerial photographs available for Sector 4 of the route.

Aerial photographs for the entire route for 1957 and 2001 were sourced from NZ Aerial Mapping and are shown in **Appendix A**. The following observations from the photographs were made:

Aerial photographs 1956/7

The area between Te Moana Road and Peka Peka is almost entirely pasture with bush and wetland patches. There are very few buildings or evidence of earthworks in this sector of the route.

Aerial photographs 2001/2

This sector has remained predominantly pasture with bush and wetland patches. There are a few buildings visible towards Peka Peka, but no evidence of earthworks.

5.3 Current Land Use and Site Visit

A site visit was undertaken on 15 September 2010 and comprised a general overview from the public roads and footpaths across the project area. Much of Sector 4 is private land and so views of the area from public roads were limited. The land uses observed are detailed in **Table 8.**

Table 8 - Current Land Uses, Sector 4

Location	Property Address	Activity	Observations
Peka Peka Road, Ngarara Road and the existing SH1 route	Various	Rural	No activities indicating the potential for land contamination.

Given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Detailed site investigations or inspections were not undertaken at the time as the exact route of the Expressway was not known. Potentially contaminating activities, if any, may not have occurred along the route.

5.4 Hazardous Activities and Industries List (HAIL)

A request was made to GWRC to search their SLUR register for information relating to any property along the route of the Expressway identified on the register in Sector 4. Information received from GWRC shows that there are no properties within Sector 4 recorded on the SLUR register.

5.5 Council Information Request

5.5.1 Kāpiti Coast District Council

Those properties and land parcels considered to have the greatest potential for land contamination were highlighted for further consideration and information was sought from KCDC.

Based on a review of the information obtained during the site visit, there were no properties identified within Sector 4 where a request to the KCDC for further information was deemed to be necessary.

A request was made to KCDC to search their records for any properties in Sector 4 where a dangerous good licence had been issued or where underground storage tanks were located. KCDC confirmed that no dangerous goods licences were issued to any property in Sector 4 and no properties were listed as having underground storage tanks.

5.5.2 Greater Wellington Regional Council

A request was made to GWRC for information on any discharge consents issued to properties within a 200m radius of the Expressway designation. There were no discharge consents identified which would impact land parcels within the route for Sector 4.

5.6 Summary

The land use in this sector is predominately rural and the potential for land contamination from current activities, based on information detailed in the above sections, is considered to be low. However given the rural nature of the sector the potential for contamination may exist from unknown farm dumps, sheep dips and DDT, sheds storing pesticides and fertilisers, small diesel tanks and waste oil. Such activities, if they occurred, may lie outside the designation, which is only a small proportion of the rural land in the sector.

6 Potential Contamination

The following assessment of potential contamination is based on the information gained from the review of aerial imagery, information from local government authorities and observations made during the site visits. The assessment presents the findings of the desk study in relation to each sector.

The properties presented in **Table 9**, and shown on the maps in Drawings EN-CL-010 to 012, Volume 5 are those which are considered, based on current and historical activities, to have the greatest potential for land and groundwater contamination. The table details the address, the activity or land use and the associated potential contaminants.

Table 9: Properties for Further Inspection/Investigation

Map Reference	Sector	Address/Reason for Inspection	Activity/ Land Use	Potential Contaminants
A	1	16 Leinster Avenue: to assess any ground contamination from dumped waste materials and empty containers and unknown fill.	Contractor/transport storage yard (commercial)	Fuels and oils, metals.
B	1	150 Raumati Road: to assess any potential ground contamination from possible dumping of waste materials.	Unoccupied area of bush	Unknown.
C	2	55 Rata Road: to assess any potential ground contamination from the historical fuel storage activity and current stockpiling activities.	Contractor/transport storage yard (commercial)	Fuels and oils, metals.
D	2	58 Kiwi Road: to assess any potential ground contamination from historical horticultural activities.	Horticultural	Pesticides, metals.
E	2	109 Kāpiti Road: to assess any potential ground contamination from multiple sources of fill at the site.	Firewood storage yard (commercial)	Fuels and oils, metals.
F	2	Area of designated land behind Manchester and Sheffield Streets: to assess any potential ground contamination from possible dumping of waste materials.	Unoccupied area of bush	Unknown.
G	3	Otaihanga Mountain Bike Park: to	Landfill	Metals, fuels

		assess any potential land and groundwater contamination from the Otaihanga Landfill.		and oils. Landfill gas, leachate.
H	3	124 – 154 Te Moana Road: to assess any potential ground contamination from current horticultural activities.	Horticultural	Pesticides, metals.

7 Recommendations

The findings of this desk study have indicated that historical and current activities along the route of the Expressway have limited potential to cause land and groundwater contamination.

It is therefore recommended that the properties listed in **Table 9** and summarised below should undergo further contamination investigation.

Sector 1

The properties at 16 Leinster Avenue and 150 Raumati Road are within the construction footprint of the Expressway and portions of the land will also be used for the construction of stormwater wetlands/ponds. Further investigation of these sites is recommended.

Sector 2

The properties at 55 Rata Road, 58 Kiwi Road and 109 Kāpiti Road are within the route of the Expressway, with the land at 109 Kāpiti Road and 58 Kiwi Road likely to be used to construct stormwater wetland/ponds. Further investigation of these sites is recommended.

Vacant land adjacent to industrial areas can be susceptible to illegal dumping of rubbish and unwanted materials. Whilst no waste materials were able to be observed due to the dense vegetation within the designation behind the industrial area of Sector 3, further inspection of this area is recommended.

Sector 3

The section of the route passing adjacent to Otaihanga Landfill has the highest potential to be contaminated. From historical aerial photographs it appears that landfilling activities have not encroached into the land designated for the Expressway, and therefore an assessment of soil contamination is not considered necessary. The priority therefore would be to characterise any groundwater contamination present within this section of the route. Landfill gas assessment should also be carried out.

The intersection at Te Moana Road would pass directly through the property at 124-154 Te Moana Road and therefore further inspection of this property is recommended.

The collection of further information and detailed inspection of the properties listed in **Table 9** would likely be a precursor to intrusive investigations. Such investigations would aim to delineate and characterise any contamination so as to formulate appropriate mitigation of risks, establish any resource consent requirements and classify materials for off-site disposal, where necessary.

Appendix D

Independent Review Table

INDEPENDENT REVIEW OF Contaminated Soil and Groundwater Management Plan
Independently Reviewed by Rob Burden
Date of Independent Review: 09/05/2013
Signature of Independent Reviewer: RJB

Condition Reference	*Independent Reviewer's comment*	*Page/paragraph/section reference within Management Plan*	*Management Plan Author's response*
Condition G.32	Section 1.3 refers to Section 1.7 in the CEMP but there is no Section 1.7 in the CEMP. Should the reference be to Section 1.2 of the CEMP?	Section 1.3	Reference deleted.
Condition G.32	How will the zones of cleanfill, contaminated fill and highly contaminated fill be delineated in the field. Will boundaries be drawn mid-way between sampling locations?	Section 3.1.6	The two areas of highly contaminated fill at 55 Rata Road will be delineated in the field by using the anticipated hotspot radius from the sample location, as determined through the approach to the investigation (12m). This distance is similar to the mid-point between sample locations at this site. This approach will be taken for areas of contaminated fill/cleanfill on this site and other sites.
Condition G.32	The definition of imported materials should include the description ' natural uncontaminated material".	Section 3.1.10	Description included in definition.
Condition G.32	Should the first line in Section 4 refer to 'unexpected contaminated soils' not 'suspected' contaminated soils?	Section 4	Yes, correction made.
Condition G.32	Section 4.1 refers to Section 3.2 but there does not appear to be a Section 3.2 in the CSGMP.	Section 4.1	Should be referring to procedure in section 4 for unexpected soil contamination discovery. Correction made to section number.

Condition GD.8A f)	There needs to be a section of the CSGMP describing treatment measures or other remedial or mitigation measures	Section 5	Remedial or treatment measures for surface water or groundwater exceeding 10 times the maximum value in the last 3 years have not been included in the CSGMP because the options for treatment will depend on what the contaminant of concern is, its concentration, whether it is surface water or groundwater, and other variables. Rather than include in the CSGMP what could be a large amount of information on treatment options, we would prefer that this is worked through once the details of the issue are known and efforts can be applied in a more focussed fashion. The consent does not require this until a problem has been identified. The plan is essentially to cover management of real things that are going to happen during the process not theoretical scenarios that may never arise.
Condition G.32	Section 8 refers to Section 3.3 of the CEMP. There does not appear to be a Section 3.3 in the CEMP. Should it be Section 5 of the CEMP?	Section 8	Corrected to section 5 of the CEMP.

Appendix E

GWRC Review Table

GWRC REVIEW OF CONTAMINATED SOILS AND GROUNDWATER MANAGEMENT PLAN (CSGMP)
Reviewed by: DR CLAIRE CONWELL
Date of Review: 27 MAY 2013
Signature of Reviewer:

Condition Reference	*Condition Detail*	*GWRC Reviewer's comment*	*Management Plan Author's response*	
GD8A		It is therefore strongly recommended that the monitoring parameters listed under Table 3 of the CSGMP are consistent with and take into account the conditions under which the Otaihanga Landfill operates. Whilst comprehensive in terms of the key metals, nutrients and pathogens, the proposed suite does not include temperature, sulphates, TSS, chloride, sodium.	Table 3 includes an anion/cation suite analysis that includes chloride and sodium. Sulphates have been included in the nutrient suite analysis, but have been omitted from Table 3 in error. This has been corrected. TSS has been added to the Table. Temperature measurements will be taken in the field.	
		It is again re-iterated in this current memo the term 'trend' has been used in the context of detecting increases or decreases in groundwater contamination, however whether specific statistical trend analysis (e.g. Time Trends analysis) can be undertaken is limited by the number of samples analysed. Monitoring sites every 6 months to establish baseline state of groundwater quality, for the total length of a year, will most likely not provide sufficient data from which to determine statistical trend evaluation.	It is acknowledged that there is insufficient data collected by the Alliance to undertake a specific statistical trend analysis. The 'baseline' will be established from the historical KCDC monitoring data using the 95th percentile. A significant departure from this baseline will be assessed manually against the 'trends' and results of the KCDC historical data. Please see the monitoring protocol circulated to GWRC for further details.	
		Further clarification is also required regarding the establishment of what is defined as baseline water quality, especially in consideration of the updates to the landfill monitoring conditions. The period of data used (i.e. sample size, frequency, statistical analyses), the analytes, and definition of what constitutes "significant departure" from the baseline need to be clarified.	Please see the monitoring protocol for details on the definitions of 'baseline' and 'significant departure'	
		As stated above, GD8A(e) outlines the 'alert' and 'action' triggers on the basis of a 3 or 10 times departure, respectively, from the baseline. Monitoring conditions for the Otaihanga landfill, however, have outlined a system of advisory, alert and action trigger levels. These revisions have been proposed to allow for remedial actions to be undertaken to prevent further deteriorations in leachate contamination whilst providing for flexibility in actions based on the specific contaminant, location and severity of effects. It is therefore suggested that this monitoring approach proposed by KCDC be taken into account and incorporated as a "best-practice" style that will benefit both operations of the landfill and expressway construction.	It is acknowledged that there is a difference between the trigger levels in GD8Ae and the trigger levels being proposed by KCDC. However the two monitoring regimes and therefore trigger levels have two differing objectives - the Alliance monitoring is to determine whether the Expressway is having an effect on groundwater quality and is therefore interested in the change in quality attributed to Expressway construction, rather than the environmental effects of any leachate in the groundwater. Incorporating any reference to ANZECC values in the Alliance monitoring regime does not align with the objectives of the monitoring. Conversely is it correct that KCDC should reference ANZECC values as their monitoring objective is to determine the effects on groundwater quality from the discharge of leachate from Otaihanga Landfill.	

Appendix F

Iwi Consultation Record Table

CONSULTATION FOR: ***Contaminated Soils and Groundwater Management Plan***
Name of Management Plan Author: Genevieve Smith
Signature of M2PP Management Plan Author:

Signature of M2PP Compliance Manager:

Condition Reference No:	*Party/parties consulted*	*Consultation undertaken by*	*Date and location of consultation*	*Views of party/parties consulted*	*Have views been incorporated into the management plan?*	*Where and how views have been incorporated into the management plan?*	*If views have not been incorporated into the management plan, outline the reason/s why not*	*Has the condition been complied with?*
				Concerns relate to notation on leachate from Otaihanga Mountain bike Park, this area is a traditional mahinga kai therefore it is important that appropriate reporting processes are implemented that details contaminant levels and environmental risks;	Prior to works in this area a site specific environmental and health and safety plan will be prepared (as detailed in section 3.1.7 of the CSGMP). Ongoing monitoring of groundwater and surface water is continuing in this area (section 5.2 of CSGMP) with results reported to GWRC. Erosion and sediment controls will be in place to contain discharges, which will be tested prior to any stormwater release (section 3.1.4 of CSGMP)	Sections 3.1.7, 5.2 and 3.1.4 already included	No further additions are considered necessary	
				2.3 Risk Register is supported – request that it is provided periodically to TAA for review	Sentence added to Section 9 noting periodic review of risk register by TAA	Section 9		
				3.1.1 – Takamore Trust to be advised of excavations specifically within the Takamore Cultural Heritage Precinct, requirement to follow ADP where archaeological monitoring is not required ref: expressway sector archaeological authority conditions;	There are no known contaminated sites in the Takamore Cultural Heritage Precinct. However, if there is an accidental discovery the ADP process will be followed.		No additions are considered necessary.	
				3.1.2 TAA particularly iwi monitors to be invited to attend site inductions;	Sentence added to section 3.1.2 referring to CEMP section 5.7 regarding iwi monitoring training	section 3.1.2		

				3.1.5 Stockpiling of contaminated soils in wahi tapu/wahi taonga are is to be avoided, if there is uncertainty then contact with TAA is recommended;	Sentence added to section 3.1.5 regarding no stockpiling int wahi tapu/wahi taonga areas	section 3.1.5		
				4. Include TAA in respect of procedures for contamination occurances;	Sentence added in Section 4 relating to provision of information to TAA in the event of unexpected discovery	section 4		
				4.1. groundwater monitoring controls supported;			No changes considered necessary	
				5.2.1 and table 3 – TAA to be provided reports on groundwater quality monitoring;	Sentence added in Table 3 regarding prvision of groundwater quality monitoring to TAA.	Section 5.2.1		