Appendix G

Soil Analytical Results

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Table G1 - EB2 and EB3
Soil Analytical Results

Sample Location	DH102	DH103		DH104		DH107		DH108	DH109	EHA101	EHA102	Environmental Guideline Values		
AECOM Sample Reference	DH102_0.2	DH103_0.5	DH103_1.0	DH104_0.2	DH104_1.6	DH107_0.5	DH107_1.0	DH108_0.2	DH109_0.5	AME_EHA101_0.1	SAH013_0.3			
Laboratory Sample Reference	1991296.1	1979897.6	1979897.7	1979897.1	1979897.4	1979897.1	1979897.11	1984837.1	1985842.2	2035377.1	1981512.1	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Date	29-May-18	9-May-18		9-May-18		9-May-18		14-May-18	18-May-18	20-Aug-18	11-May-18			
Sample Depth	0.2	0.5	1.0	0.2	1.6	0.5	1.0	0.2	0.5	0.1-0.2	0.3	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Heavy Metals														
Total Recoverable Arsenic	< 2	2.0	3.0	2.0	3.0	< 2	3.0	3.0	4.0	3.0	4.0	0.4 - 12	**100**	70
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.2	< 0.10	< 0.10	< 0.10	<0.10	0.2	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	35.0	23.0	22.0	16.0	26.0	41.0	40.0	25.0	21.0	30.0	28.0	2 - 55	**400**	6300
Total Recoverable Copper	24.0	11.0	9.0	7.0	12.0	14.0	18.0	13.0	25.0	14.0	11.0	1 - 45	**325**	> 10000
Total Recoverable Lead	14.0	6.8	6.8	8.3	9.6	20.0	12.8	11.9	16.4	9.2	15.6	< 5 - 65	**250**	3300
Total Recoverable Mercury	-	-	-	-	-	-	-	-	-	-	-	< 0.03 - 0.45	**0.75**	
Total Recoverable Nickel	32.0	10.0	9.0	8.0	12.0	34.0	22.0	22.0	26.0	29.0	16.0	0.9 - 35	**105**	-
Total Recoverable Zinc	55.0	27.0	22.0	16.0	35.0	53.0	40.0	34.0	89.0	45.0	42.0	9 - 180	**400**	-

Sample Location	EHA103		EHA104	EHA105		EHA106	EHA107		EHA108		Environmental Guideline Values		
AECOM Sample Reference	AME_EHA103_0.1	AME_EHA103_0.9	AME_EHA104-0.1	AME_HA105_0.2	AME_HA105_0.8	AME_EHA106_0.5	AME_EHA107_0.1	AME_EHA107_0.5	AME_EHA108_0.5	AME_EHA108_1.1			
Laboratory Sample Reference	2035377.4	2035377.5	2035377.7	2035379.15	2035379.16	1981512.6	1981512.8	1981512.9	1981512.13	1981512.14	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Date	20-Aug-18		20-Aug-18	21-Aug-18		11-May-18	11-May-18		11-May-18				
Sample Depth	0.1-0.2	0.9-1.0	0.1-0.2	0.2-0.3	0.8-0.9	0.5	0.1	0.5	0.5	1.1	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Heavy Metals													
Total Recoverable Arsenic	3.0	2.0	2.0	< 2	< 2	4.0	3.0	4.0	4.0	< 2	0.4 - 12	**100**	70
Total Recoverable Cadmium	<0.10	<0.10	<0.10	0.1	0.1	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	32.0	7.0	27.0	23.0	23.0	32.0	30.0	36.0	36.0	8.0	2 - 55	**400**	6300
Total Recoverable Copper	7.0	6.0	9.0	13.0	13.0	19.0	19.0	10.0	12.0	3.0	1 - 45	**325**	> 10000
Total Recoverable Lead	10.0	13.8	13.8	17.2	9.5	12.9	103.0	12.8	10.4	5.3	< 5 - 65	**250**	3300
Total Recoverable Mercury	-	-	-	-	-	-	-	-	-	-	< 0.03 - 0.45	**0.75**	
Total Recoverable Nickel	15.0	10.0	14.0	16.0	12.0	31.0	33.0	19.0	17.0	6.0	0.9 - 35	**105**	-
Total Recoverable Zinc	38.0	16.0	36.0	36.0	30.0	47.0	61.0	32.0	32.0	5.0	9 - 180	**400**	-

Sample Location	EHA111			EHA112		EHA113	EHA114	EHA115	Environmental Guideline Values		
AECOM Sample Reference	AME_EHA111_0.2	AME_EHA111_0.5	AME_EHA111_0.9	AME_HA112_0.15	AME_HA112_0.9	AME_HA113_0.1	AME_HA114_0.1	AME_HA115_0.1			
Laboratory Sample Reference	2035377.11	2035377.12	2035377.13	2035379.4	2035379.5	2035379.11	2035379.8	2036105.1	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Date	20-Aug-18			21-Aug-18		21-Aug-18	21-Aug-18	22-Aug-18			
Sample Depth	0.2-0.3	0.5-0.6	0.9-1.0	0.15-0.3	0.9-1.0	0.1-0.2	0.1-0.2	0.1-0.2	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Heavy Metals											
Total Recoverable Arsenic	5.0	3.0	3.0	3.0	< 2	4.0	4.0	4.0	0.4 - 12	**100**	70
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.6	0.2	0.2	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	25.0	31.0	38.0	24.0	27.0	40.0	37.0	37.0	2 - 55	**400**	6300
Total Recoverable Copper	12.0	13.0	6.0	5.0	10.0	43.0	35.0	21.0	1 - 45	**325**	> 10000
Total Recoverable Lead	33.0	10.6	11.0	7.8	4.8	71.0	27.0	37.0	< 5 - 65	**250**	3300
Total Recoverable Nickel	20.0	18.0	7.0	8.0	21.0	61.0	55.0	27.0	0.9 - 35	**105**	-
Total Recoverable Zinc	44.0	30.0	10.0	25.0	25.0	157.0	96.0	80.0	9 - 180	**400**	-

Notes

All results are presented in mg/kg unless otherwise stated.

- Sample not analysed for compound and/or no criteria adopted.

Underlined, bolded, coloured and italicised text represents exceedances of adopted acceptance criteria.

1. Auckland Council, 2017. Auckland Unitary Plan - Operative in part (AUPOP). Table E30.6.1.4.2 Background ranges of trace elements in Auckland soils sources from Table 3 of TP153:2001 Background Concentrations of Inorganic Elements in Soils from the Auckland Region. (Auckland Background Concentrations).
2. Auckland Council, 2017. Auckland Unitary Plan - Operative in part (AUPOP). Table E30.6.1.4.1, Permitted Activity Soil Acceptance Criteria.
3. Ministry for the Environment, 2012. Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Values taken from Appendix B Soil Contaminant Standards, Tables B2 and B3 (NES Guidelines).

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Prepared by: SN
Reviewed by: ZL
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Table G2 - EB2 and EB3
Soil Analytical Results - Heavy Metals

Sample Location	EHA116		EHA117		EHA118	EHA119		EHA120	Environmental Guideline Values		
AECOM Sample Reference	AME_HA116_0.25	AME_HA116_0.8	AME_HA117_0.3	AME_HA117_1.7	AME_EHA118_0.5	AME_HA119_0.15	AME_HA119_1.2	AME_HA120_0.4			
Laboratory Sample Reference	2036105.6	2036105.7	2036105.3	2036105.4	1985842.7	2036105.1	2036105.11	2036105.13			
Sample Date	22-Aug-18		22-Aug-18		18-May-18	18-Aug-18		22-Aug-18	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Depth	0.25-0.35	0.8-0.9	0.3-0.4	1.7-1.8	0.5	0.15-0.25	1.2-1.3	0.4-0.5	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Heavy Metals											
Total Recoverable Arsenic	< 2	3.0	3.0	4.0	5.0	3.0	2.0	2.0	0.4 - 12	**100**	70
Total Recoverable Cadmium	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.12	< 0.10	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	13.0	3.0	47.0	51.0	32.0	32.0	31.0	41.0	2 - 55	**400**	6300
Total Recoverable Copper	7.0	9.0	15.0	23.0	12.0	11.0	12.0	9.0	1 - 45	**325**	> 10000
Total Recoverable Lead	11.3	42.0	11.1	16.9	16.0	14.0	22.0	12.3	< 5 - 65	**250**	3300
Total Recoverable Nickel	10.0	4.0	25.0	37.0	22.0	19.0	16.0	16.0	0.9 - 35	**105**	-
Total Recoverable Zinc	19.0	12.0	38.0	32.0	41.0	26.0	40.0	27.0	9 - 180	**400**	-

Sample Location	EHA121	EHA122	EHA123			HA1	HA4		Environmental Guideline Values		
AECOM Sample Reference	AME_EHA121_0.2	AME_HA122_0.15	AME_HA123_0.2	AME_HA123_0.85	AME_HA123_1.2	RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0			
Laboratory Sample Reference	2035377.2	2035379.1	2036105.16	2036105.17	2036105.18	19-05381-1	19-05381-12	19-05381-13			
Sample Date	20-Aug-18	21-Aug-18	22-Aug-18			19-Feb-19	20-Feb-19	20-Feb-19	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Depth	0.2-0.3	0.15-0.25	0.2-0.3	0.85-0.95	1.2-1.3	0.2-0.4	0.1-0.3	1.8-2.0	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	Soil	Soil	Soil	Soil	Soil	SAND	SILT	SiltyCLAY			
Heavy Metals											
Total Recoverable Arsenic	5.0	3.0	< 2	< 2	< 2	1.6	6.5	1.8	0.4 - 12	**100**	70
Total Recoverable Cadmium	0.3	< 0.10	< 0.10	< 0.10	< 0.10	0.024	0.150	0.031	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	31.0	30.0	13.0	13.0	11.0	16.4	30.0	24.9	2 - 55	**400**	6300
Total Recoverable Copper	50.0	11.0	8.0	3.0	3.0	6.3	10.3	10.8	1 - 45	**325**	> 10000
Total Recoverable Lead	58.0	39.0	9.6	5.7	4.4	8.7	14.8	6.9	< 5 - 65	**250**	3300
Total Recoverable Nickel	56.0	25.0	15.0	7.0	6.0	12.7	14.0	18.1	0.9 - 35	**105**	-
Total Recoverable Zinc	78.0	42.0	19.0	18.0	16.0	21.7	40.4	28.1	9 - 180	**400**	-

Sample Location	HA7	HA9		HA10	HA11	HA12		Environmental Guideline Values		
AECOM Sample Reference	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4	RH_HA12_0.1-0.3	RH_HA12_0.8-1.0			
Laboratory Sample Reference	19-05381-26	19-05381-28	19-05381-29	19-05381-17	19-05381-20	19-05381-23	19-05381-24			
Sample Date	21-Feb-19	21-Feb-19	21-Feb-19	20-Feb-19	21-Feb-19	21-Feb-19	21-Feb-19	Auckland Background Concentrations [1]	Auckland Council Permitted Activity Criteria [2]	NES Guidelines [3]
Sample Depth	0.2-0.4	0.2-0.4	0.6-0.8	0.3-0.5	0.2-0.4	0.1-0.3	0.8-1.0	Non Volcanic Range		Commercial / Industrial Outdoor Worker (Unpaved)
Sample Type	ClayeySILT	SILT	SiltyCLAY	SILT	SILT	SILT	SiltySAND			
Heavy Metals										
Total Recoverable Arsenic	1.3	5.0	2.0	1.1	2.1	3.8	1.2	0.4 - 12	**100**	70
Total Recoverable Cadmium	0.015	0.120	0.023	0.035	0.045	0.120	0.017	< 0.1 - 0.65	**7.5**	1300
Total Recoverable Chromium	20.7	25.4	18.1	29.2	20.3	30.8	16.1	2 - 55	**400**	6300
Total Recoverable Copper	5.3	8.2	4.4	5.7	6.8	9.4	5.7	1 - 45	**325**	> 10000
Total Recoverable Lead	6.0	11.6	9.3	10.9	6.7	11.0	4.7	< 5 - 65	**250**	3300
Total Recoverable Nickel	9.8	13.7	11.4	18.0	10.5	15.1	7.9	0.9 - 35	**105**	-
Total Recoverable Zinc	12.8	33.7	16.8	25.9	20.0	34.0	14.6	9 - 180	**400**	-

Notes
All results are presented in mg/kg unless otherwise stated.
- Sample not analysed for compound and/or no criteria adopted.
Underlined, bolded, coloured and italicised text represents exceedances of adopted acceptance criteria.

1. Auckland Council, 2017. Auckland Unitary Plan - Operative in part (AUPOP). Table E30.6.1.4.2 Background ranges of trace elements in Auckland soils sources from Table 3 of TP153:2001 Background Concentrations of Inorganic Elements in Soils from the Auckland Region. (Auckland Background Concentrations).
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Project Number: 60582939
Prepared by: SN
Reviewed by: ZL
Last modified: 13 September 2018

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Appendix H

Laboratory Documentation

Hill Laboratories
TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	2036105 SPv2
Contact:	N Macorison	**Date Received:**	23-Aug-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	12-Sep-2018 **(Amended)**
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.3.1
	Auckland 1140	**Client Reference:**	60563280/3.3.1
		Submitted By:	Suresh Nuthalapati

Sample Type: Soil

Sample Name:		AME_HA115_0.1-0.2 22-Aug-2018	AME_HA115_0.6-0.7 22-Aug-2018	AME_HA117_0.3-0.4 22-Aug-2018	AME_HA117_1.7-1.8 22-Aug-2018	AME_HA116_0.25-0.35 22-Aug-2018
Lab Number:		2036105.1	2036105.2	2036105.3	2036105.4	2036105.6
Individual Tests						
Dry Matter	g/100g as rcvd	-	73	-	71	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	3	4	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.20	-	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	37	-	47	51	13
Total Recoverable Copper	mg/kg dry wt	21	-	15	23	7
Total Recoverable Lead	mg/kg dry wt	37	-	11.1	16.9	11.3
Total Recoverable Nickel	mg/kg dry wt	27	-	25	37	10
Total Recoverable Zinc	mg/kg dry wt	80	-	38	32	19
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.06	-	-	-
Toluene	mg/kg dry wt	-	< 0.06	-	-	-
Ethylbenzene	mg/kg dry wt	-	< 0.06	-	-	-
m&p-Xylene	mg/kg dry wt	-	< 0.12	-	-	-
o-Xylene	mg/kg dry wt	-	< 0.06	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.014	-
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.014	-
Perylene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	< 0.04	-
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.014	-
Acenaphthene	mg/kg dry wt	-	-	-	< 0.014	-
Anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[e]pyrene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Chrysene	mg/kg dry wt	-	-	-	< 0.014	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Fluorene	mg/kg dry wt	-	-	-	< 0.014	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.014	-

Sample Type: Soil						
Sample Name:		AME_HA115_0.1-0.2 22-Aug-2018	AME_HA115_0.6-0.7 22-Aug-2018	AME_HA117_0.3-0.4 22-Aug-2018	AME_HA117_1.7-1.8 22-Aug-2018	AME_HA116_0.25-0.35 22-Aug-2018
Lab Number:		2036105.1	2036105.2	2036105.3	2036105.4	2036105.6
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Naphthalene	mg/kg dry wt	-	-	-	< 0.07	-
Phenanthrene	mg/kg dry wt	-	-	-	< 0.014	-
Pyrene	mg/kg dry wt	-	-	-	< 0.014	-
Total of Reported PAHs in Soil*	mg/kg	-	-	-	< 0.4	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 9	-	-	-
C10 - C14	mg/kg dry wt	-	< 20	-	-	-
C15 - C36	mg/kg dry wt	-	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 70	-	-	-
BTEX in VOC Soils by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.3	-	-	-
Ethylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
Toluene	mg/kg dry wt	-	< 0.3	-	-	-
m&p-Xylene	mg/kg dry wt	-	< 0.5	-	-	-
o-Xylene	mg/kg dry wt	-	< 0.3	-	-	-
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
Bromomethane (Methyl Bromide)	mg/kg dry wt	-	< 0.3	-	-	-
Carbon tetrachloride	mg/kg dry wt	-	< 0.3	-	-	-
Chloroethane	mg/kg dry wt	-	< 0.3	-	-	-
Chloromethane	mg/kg dry wt	-	< 0.3	-	-	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	-	< 0.5	-	-	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	-	< 0.3	-	-	-
Dibromomethane	mg/kg dry wt	-	< 0.3	-	-	-
1,3-Dichloropropane	mg/kg dry wt	-	< 0.3	-	-	-
Dichlorodifluoromethane	mg/kg dry wt	-	< 0.5	-	-	-
1,1-Dichloroethane	mg/kg dry wt	-	< 0.3	-	-	-
1,2-Dichloroethane	mg/kg dry wt	-	< 0.5	-	-	-
1,1-Dichloroethene	mg/kg dry wt	-	< 0.3	-	-	-
cis-1,2-Dichloroethene	mg/kg dry wt	-	< 0.3	-	-	-
trans-1,2-Dichloroethene	mg/kg dry wt	-	< 0.3	-	-	-
Dichloromethane (methylene chloride)	mg/kg dry wt	-	< 3	-	-	-
1,2-Dichloropropane	mg/kg dry wt	-	< 0.3	-	-	-
1,1-Dichloropropene	mg/kg dry wt	-	< 0.3	-	-	-
cis-1,3-Dichloropropene	mg/kg dry wt	-	< 0.3	-	-	-
trans-1,3-Dichloropropene	mg/kg dry wt	-	< 0.3	-	-	-
Hexachlorobutadiene	mg/kg dry wt	-	< 0.3	-	-	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	-	< 0.3	-	-	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	-	< 0.3	-	-	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	-	< 0.3	-	-	-
1,1,1-Trichloroethane	mg/kg dry wt	-	< 0.3	-	-	-
1,1,2-Trichloroethane	mg/kg dry wt	-	< 0.3	-	-	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	-	< 0.3	-	-	-
Trichlorofluoromethane	mg/kg dry wt	-	< 0.3	-	-	-
1,2,3-Trichloropropane	mg/kg dry wt	-	< 0.5	-	-	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	-	< 0.3	-	-	-
Vinyl chloride	mg/kg dry wt	-	< 0.3	-	-	-
Haloaromatics in VOC Soils by Headspace GC-MS						
Bromobenzene	mg/kg dry wt	-	< 0.3	-	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
4-Chlorotoluene	mg/kg dry wt	-	< 0.3	-	-	-

Sample Type: Soil						
Sample Name:		AME_HA115_0.1-0.2 22-Aug-2018	AME_HA115_0.6-0.7 22-Aug-2018	AME_HA117_0.3-0.4 22-Aug-2018	AME_HA117_1.7-1.8 22-Aug-2018	AME_HA116_0.25-0.35 22-Aug-2018
Lab Number:		2036105.1	2036105.2	2036105.3	2036105.4	2036105.6
Haloaromatics in VOC Soils by Headspace GC-MS						
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	-	< 0.3	-	-	-
1,2-Dichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
2-Chlorotoluene	mg/kg dry wt	-	< 0.3	-	-	-
1,2,3-Trichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
1,3,5-Trichlorobenzene	mg/kg dry wt	-	< 0.3	-	-	-
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
n-Butylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
tert-Butylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
Isopropylbenzene (Cumene)	mg/kg dry wt	-	< 0.3	-	-	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	-	< 0.3	-	-	-
n-Propylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
sec-Butylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
Styrene	mg/kg dry wt	-	< 0.3	-	-	-
1,2,4-Trimethylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
1,3,5-Trimethylbenzene	mg/kg dry wt	-	< 0.3	-	-	-
Ketones in VOC Soils by Headspace GC-MS						
2-Butanone (MEK)	mg/kg dry wt	-	< 50	-	-	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	-	< 9	-	-	-
Acetone	mg/kg dry wt	-	< 50	-	-	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	-	< 0.3	-	-	-
Trihalomethanes in VOC Soils by Headspace GC-MS						
Bromodichloromethane	mg/kg dry wt	-	< 0.3	-	-	-
Bromoform (tribromomethane)	mg/kg dry wt	-	< 0.5	-	-	-
Chloroform (Trichloromethane)	mg/kg as rcvd	-	< 0.3	-	-	-
Dibromochloromethane	mg/kg dry wt	-	< 0.3	-	-	-
Other VOC in Soils by Headspace GC-MS						
Carbon disulphide	mg/kg dry wt	-	< 0.3	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.3	-	-	-

Sample Name:		AME_HA116_0.8-0.9 22-Aug-2018	AME_HA119_0.15-0.25 22-Aug-2018	AME_HA119_1.2-1.3 22-Aug-2018	AME_HA120_0.4-0.5 22-Aug-2018	AME_HA123_0.2-0.3 22-Aug-2018
Lab Number:		2036105.7	2036105.10	2036105.11	2036105.13	2036105.16
Individual Tests						
Dry Matter	g/100g as rcvd	58	-	-	71	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	2	2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	3	32	31	41	13
Total Recoverable Copper	mg/kg dry wt	9	11	12	9	8
Total Recoverable Lead	mg/kg dry wt	42	14.0	22	12.3	9.6
Total Recoverable Nickel	mg/kg dry wt	4	19	16	16	15
Total Recoverable Zinc	mg/kg dry wt	12	26	40	27	19
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
Perylene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.05	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.05	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.017	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.017	-	-	-	-

Sample Type: Soil						
Sample Name:		AME_HA116_0.8-0.9 22-Aug-2018	AME_HA119_0.15-0.25 22-Aug-2018	AME_HA119_1.2-1.3 22-Aug-2018	AME_HA120_0.4-0.5 22-Aug-2018	AME_HA123_0.2-0.3 22-Aug-2018
Lab Number:		2036105.7	2036105.10	2036105.11	2036105.13	2036105.16
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Chrysene	mg/kg dry wt	< 0.017	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Fluorene	mg/kg dry wt	< 0.017	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.09	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.017	-	-	-	-
Pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Total of Reported PAHs in Soil*	mg/kg	< 0.4	-	-	-	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	-	-	-	-
C10 - C14	mg/kg dry wt	< 20	-	-	-	-
C15 - C36	mg/kg dry wt	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

Sample Name:		AME_HA123_0.85-0.95 22-Aug-2018	AME_HA123_1.2-1.3 22-Aug-2018			
Lab Number:		2036105.17	2036105.18			
Individual Tests						
Dry Matter	g/100g as rcvd	74	71	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	13	11	-	-	-
Total Recoverable Copper	mg/kg dry wt	3	3	-	-	-
Total Recoverable Lead	mg/kg dry wt	5.7	4.4	-	-	-
Total Recoverable Nickel	mg/kg dry wt	7	6	-	-	-
Total Recoverable Zinc	mg/kg dry wt	18	16	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Acenaphthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-

Sample Type: Soil						
Sample Name:		AME_HA123_0.85-0.95 22-Aug-2018	AME_HA123_1.2-1.3 22-Aug-2018			
Lab Number:		2036105.17	2036105.18			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Chrysene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluorene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	-	-	-
Phenanthrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Total of Reported PAHs in Soil*	mg/kg	< 0.4	< 0.4	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier certificate issued on 29 Aug 2018 at 4:50 pm
Reason for amendment: VOC analysis added to one sample.

Appendix No.1 - Chain of Custody

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**	**Sample No**
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 [KBIs:5786,2805,10734;2695]	-	7
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3-4, 6-7, 10-11, 13, 16-18
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	2
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. [KBIs:5786,2805,2695]	-	4, 17-18
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	13, 16
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	2
Volatile Organic Compounds Screening in Soil by Headspace GC-MS	Sonication extraction, Headspace, GC-MS SIM analysis. Tested on as received sample [KBIs:31662,37857,37921]	-	2
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 4, 7, 13, 16-18
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	4, 7, 17-18

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	4, 7, 17-18
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	4, 7, 17-18

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

Job No: 203 6105

Date Recv: 23-Aug-18 05:27

Received by: Nathaniel Sue

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

3120361056

Client

Name AECOM New Zealand Limited

Address 8 Mahuhu Crescent

Phone *Fax*

Client Reference

Quote No *Order Number* 60563280/3.3.1

Primary Contact Naomi Macorison

Submitted By Suresh Nuthalapati

Charge To Aecom Auckland

Results To ☑ Mail Client ☑ Mail Submitter

☐ Fax Results

☑ Email Results Naomi.Macorison@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 23/08/2018
Name: Suresh Nuthalapati
☑ *Please tick if you require COC to be faxed back*
Signature: S.N

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

Condition *Temp:*
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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/COWL/Initial/Final flow/Total Time*
1	AME_HA115_0.1-0.2	22/08/2018	ES	Metals
2	AME_HA115_0.6-0.7	22/08/2018	ES	TPH&BTEX
3	AME_HA117_0.3-0.4	22/08/2018	ES	Metals
3	AME_HA117_1.7-1.8	22/08/2018	ES	Metals & PAH
4	AME_HA117_2.5-2.6	22/08/2018	ES	Hold cold
5	AME_HA116_0.25-0.35	22/08/2018	ES	Metals
6	AME_HA116_0.8-0.9	22/08/2018	ES	Metals, TPH & PAH
7	AME_HA116_1.6-1.7	22/08/2018	ES	Hold cold
8	AME_HA116_1.9-2.0	22/08/2018	ES	Hold cold
9	AME_HA119_0.15-0.25	22/08/2018	ES	Metals
10	AME_HA119_1.2-1.3	22/08/2018	ES	Metals

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required/COWL/Initial/Final flow/Total Time
11	AME_HA119_2.5-2.6	22/08/2018	ES	Hold cold
12	AME_HA120_0.4-0.5	22/08/2018	ES	Metals & PCP
13	AME_HA120_1.1-1.2	22/08/2018	ES	Hold cold
14	AME_HA120_1.9-2.0	22/08/2018	ES	Hold cold
15	AME_HA123_0.2-0.3	22/08/2018	ES	Metals & PCP
16	AME_HA123_0.85-0.95	22/08/2018	ES	Metals & PAH
17	AME_HA123_1.2-1.3	22/08/2018	ES	Metals & PAH
18	AME_HA123_1.5-1.6	22/08/2018	ES	Hold cold
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

Report Date: 05 Mar 2019

Certificate Number: P1903011105

Analytica Laboratories
Ruakura Research Centre, 10 Bisley Road, Private Bag 3123

Client Reference: 19-05381

Dear Karla Chapman,

Re: Asbestos Soil Identification Analysis – 19-05381

5 sample(s) received on 01 Mar 2019 by Julie Saia.

The results of fibre analysis were performed by Georgina Jackson of Analytica Laboratories Limited on 05 Mar 2019.

The sample(s) were stated to be from 19-05381.

Sample analysis was performed using polarised light microscopy with dispersion staining in accordance with *AS4964-2004 Method for the qualitative identification of asbestos in soil samples.*

The results of the fibre analysis are presented in the appended table.

Should you require further information please contact Georgina Jackson.

Yours sincerely

Georgina Jackson
LABORATORY IDENTIFIER

Sample Analysis Results

Certificate Number: P1903011105
Report Date: 05 Mar 2019
Site Location: 19-05381

Note 1: The reporting limit for this analysis is 0.1g/kg (0.01%) by application of polarised light microscopy, dispersion staining and trace analysis techniques.

Note 2: If mineral fibres of unknown type are detected (UMF), by PLM and dispersion staining, these may or may not be asbestos fibres. To confirm the identity of this fibre, another independent analytical technique such as XRD analysis is advised.

Note 3: The samples in this report are "As Received". The laboratory does not take responsibility for the sampling procedure or accuracy of sample location description. This document may not be reproduced except in full.

Identified by:

Georgina Jackson

Approved Identifier: Georgina Jackson

Reviewed by:

Georgina Jackson

Key Technical Person: Georgina Jackson

Sample ID	Client Sample ID	Sample Location/Description/Dimensions	Analysis Results
S001	RH_HA1_0.2-0.4	- Non-Homogeneous Soil 144.5g	No Asbestos Detected Organic Fibres
S002	RH_HA4_0.1-0.3	- Non-Homogeneous Soil 119.5g	No Asbestos Detected Organic Fibres
S003	RH_HA4_1.8-2.0	- Non-Homogeneous Soil 124.0g	No Asbestos Detected Organic Fibres
S004	RH_HA12_0.8-1.0	- Non-Homogeneous Soil 103.5g	No Asbestos Detected Organic Fibres
S005	RH_HA7_0.2-0.4	- Non-Homogeneous Soil 134.5g	No Asbestos Detected Organic Fibres

Analytica Laboratories Limited
Unit 1, 30 Greenpark Road, Penrose, Auckland 8023

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W: www.analytica.co.nz

Appendix 1: Soil Analysis Raw Data

Certificate Number: P1903011105
Report Date: 05 Mar 2019
Site Location: 19-05381

Sample ID	Client Sample ID	Total Sample Weight (g)	ACM Approximate Dimensions (g)*	Form	Trace Asbestos Detected**
S001	RH_HA1_0.2-0.4	144.5	-	-	N
S002	RH_HA4_0.1-0.3	119.5	-	-	N
S003	RH_HA4_1.8-2.0	124.0	-	-	N
S004	RH_HA12_0.8-1.0	103.5	-	-	N
S005	RH_HA7_0.2-0.4	134.5	-	-	N

* The reporting limit for this standard is 0.1g/kg
** Trace asbestos present is indicative that freely liberated respirable fibres are present and dust control measures should be implemented or increased
*** Asbestos weights listed in this table are indicative only and are outside of IANZ accreditation and is therefore not endorsed by IANZ.

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Certificate of Analysis

AECOM New Zealand Ltd
PO Box 4241, Shortland Street
Auckland 1140
Attention: Matthew Hartley
Phone: 021 562538
Email: matthew.hartley@aecom.com

Lab Reference: 19-05381
Submitted by: Max Nightingale & Chad Salbert
Date Received: 25/02/2019
Date Completed: 7/03/2019
Order Number:
Reference: 60563280

Sampling Site: Ameti Riverhills

Report Comments

Samples were collected by yourselves (or your agent) and analysed as received at Analytica Laboratories. Samples were in acceptable condition unless otherwise noted on this report.

Heavy Metals in Soil

Client Sample ID			RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-1	19-05381-12	19-05381-13	19-05381-17	19-05381-20
Arsenic	mg/kg dry wt	*0.125*	1.60	6.48	1.79	1.14	2.11
Beryllium	mg/kg dry wt	*0.013*	0.60	0.54	0.52	0.73	0.34
Boron	mg/kg dry wt	*1.25*	1.28	2.08	1.52	<1.25	1.35
Cadmium	mg/kg dry wt	*0.005*	0.024	0.15	0.031	0.035	0.045
Chromium	mg/kg dry wt	*0.125*	16.4	30.0	24.9	29.2	20.3
Copper	mg/kg dry wt	*0.075*	6.32	10.3	10.8	5.72	6.78
Lead	mg/kg dry wt	*0.05*	8.65	14.8	6.94	10.9	6.73
Mercury	mg/kg dry wt	*0.025*	0.074	0.12	0.053	0.078	0.041
Nickel	mg/kg dry wt	*0.05*	12.7	14.0	18.1	18.0	10.5
Zinc	mg/kg dry wt	*0.05*	21.7	40.4	28.1	25.9	20.0

Heavy Metals in Soil

Client Sample ID			RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-23	19-05381-24	19-05381-26	19-05381-28	19-05381-29
Arsenic	mg/kg dry wt	*0.125*	3.81	1.17	1.26	5.02	1.95
Beryllium	mg/kg dry wt	*0.013*	0.62	0.28	0.34	0.57	0.40
Boron	mg/kg dry wt	*1.25*	1.90	<1.25	<1.25	1.43	1.35
Cadmium	mg/kg dry wt	*0.005*	0.12	0.017	0.015	0.12	0.023

IANZ ACCREDITED LABORATORY

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, with the exception of tests marked *, which are not accredited.

Heavy Metals in Soil

			Client Sample ID	RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
			Date Sampled					
Chromium	mg/kg dry wt	*0.125*		30.8	16.1	20.7	25.4	18.1
Copper	mg/kg dry wt	*0.075*		9.40	5.68	5.25	8.18	4.36
Lead	mg/kg dry wt	*0.05*		11.0	4.66	6.03	11.6	9.26
Mercury	mg/kg dry wt	*0.025*		0.059	0.033	0.12	0.072	0.058
Nickel	mg/kg dry wt	*0.05*		15.1	7.88	9.80	13.7	11.4
Zinc	mg/kg dry wt	*0.05*		34.0	14.6	12.8	33.7	16.8

Volatile Organic Compounds - Soil

			Client Sample ID	RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-05381-1	19-05381-12	19-05381-13	19-05381-17	19-05381-20
1,2-Dichloropropane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
2,2-Dichloropropane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Cis-1,3-Dichloropropene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Trans-1,3-Dichloropropene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,2-Dibromoethane	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Carbon disulfide	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Vinyl acetate	mg/kg dry wt	*0.50*		<0.50	<0.50	<0.50	<0.50	<0.50
4-Methyl-2-pentanone (MIBK)	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
2-Methoxy-2-methylpropane (MTBE)	mg/kg dry wt	*0.500*		<0.500	<0.500	<0.500	<0.500	<0.500
Benzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Toluene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
m,p-Xylene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Styrene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Isopropylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
n-Propylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,3,5-Trimethylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
sec-Butylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,2,4-Trimethylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
tert-Butylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
p-Isopropyltoluene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
n-Butylbenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Naphthalene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Bromobenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
2-Chlorotoluene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
4-Chlorotoluene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,2-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,3-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,4-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,4-Dioxane	mg/kg dry wt	*1.00*		<1.00	<1.00	<1.00	<1.00	<1.00
1,2,3-Trichlorobenzene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Carbon tetrachloride	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054

Volatile Organic Compounds - Soil

			Client Sample ID	RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
			Date Sampled					
Methylene chloride	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,2-Dichloroethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Acetone	mg/kg dry wt	*5.0*		<5.0	<5.0	<5.0	<5.0	<5.0
Trans-1,2-Dichloroethene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Cis-1,2-Dichloroethene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,1,1-Trichloroethane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Trichloroethene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Dibromomethane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Iodomethane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
2-Chloroethyl vinyl ether	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,1,2-Trichloroethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,1-Dichloropropene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,3-Dichloropropane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Tetrachloroethene	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
1,1,1,2-Tetrachloroethane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2,2-Tetrachloroethane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,2,3-Trichloropropane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromo-3-chloropropane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
Hexachlorobutadiene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Chloroform	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	0.09	<0.054
Bromodichloromethane	mg/kg dry wt	*0.05*		<0.064	<0.06	<0.07	<0.063	<0.054
Dibromochloromethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Bromoform	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorodifluoro methane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Vinyl chloride	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	mg/kg dry wt	*0.50*		<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane	mg/kg dry wt	*0.50*		<0.50	<0.50	<0.50	<0.50	<0.50
Trichlorofluoromethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethane-d4 (Surrogate)	%	*1*		89.1	91.8	89.0	128.7	89.9
p-Bromofluorobenzene (Surrogate)	%	*1*		100.4	98.7	102.8	105.7	97.6
Toluene-d8 (Surrogate)	%	*1*		99.5	99.2	101.0	102.6	100.7

Volatile Organic Compounds - Soil

			Client Sample ID	RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-05381-23	19-05381-24	19-05381-26	19-05381-28	19-05381-29
1,2-Dichloropropane	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
2,2-Dichloropropane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Cis-1,3-Dichloropropene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Trans-1,3-Dichloropropene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068

Volatile Organic Compounds - Soil

			Client Sample ID	RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
			Date Sampled					
1,2-Dibromoethane	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Carbon disulfide	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Vinyl acetate	mg/kg dry wt	*0.50*		<0.50	<0.50	<0.50	<0.50	<0.50
4-Methyl-2-pentanone (MIBK)	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
2-Hexanone	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
2-Methoxy-2-methylpropane (MTBE)	mg/kg dry wt	*0.500*		<0.500	<0.500	<0.500	<0.500	<0.500
Benzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Toluene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Ethylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
m,p-Xylene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
o-Xylene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Styrene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Isopropylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
n-Propylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,3,5-Trimethylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
sec-Butylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,2,4-Trimethylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
tert-Butylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
p-Isopropyltoluene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
n-Butylbenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Naphthalene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Chlorobenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Bromobenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
2-Chlorotoluene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
4-Chlorotoluene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,2-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,3-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,4-Dichlorobenzene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,4-Dioxane	mg/kg dry wt	*1.00*		<1.00	<1.00	<1.00	<1.00	<1.00
1,2,3-Trichlorobenzene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,2,4-Trichlorobenzene	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Carbon tetrachloride	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Methylene chloride	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethane	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,2-Dichloroethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
Acetone	mg/kg dry wt	*5.0*		<5.0	<5.0	<5.0	<5.0	<5.0
Trans-1,2-Dichloroethene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Cis-1,2-Dichloroethene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,1,1-Trichloroethane	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Trichloroethene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Dibromomethane	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Iodomethane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20
1,1-Dichloroethene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
2-Chloroethyl vinyl ether	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,1,2-Trichloroethane	mg/kg dry wt	*0.10*		<0.10	<0.10	<0.10	<0.10	<0.10
1,1-Dichloropropene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,3-Dichloropropane	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
Tetrachloroethene	mg/kg dry wt	*0.05*		<0.058	<0.066	<0.057	<0.064	<0.068
1,1,1,2-Tetrachloroethane	mg/kg dry wt	*0.20*		<0.20	<0.20	<0.20	<0.20	<0.20

Volatile Organic Compounds - Soil

Client Sample ID			RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
Date Sampled							
1,1,2,2-Tetrachloroethane	mg/kg dry wt	*0.20*	<0.20	<0.20	<0.20	<0.20	<0.20
1,2,3-Trichloropropane	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dibromo-3-chloropropane	mg/kg dry wt	*0.20*	<0.20	<0.20	<0.20	<0.20	<0.20
Hexachlorobutadiene	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Chloroform	mg/kg dry wt	*0.05*	<0.058	<0.066	<0.057	<0.064	<0.068
Bromodichloromethane	mg/kg dry wt	*0.05*	<0.058	<0.066	<0.057	<0.064	<0.068
Dibromochloromethane	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Bromoform	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Dichlorodifluoro methane	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Chloromethane	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Vinyl chloride	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
Bromomethane	mg/kg dry wt	*0.50*	<0.50	<0.50	<0.50	<0.50	<0.50
Chloroethane	mg/kg dry wt	*0.50*	<0.50	<0.50	<0.50	<0.50	<0.50
Trichlorofluoromethane	mg/kg dry wt	*0.10*	<0.10	<0.10	<0.10	<0.10	<0.10
1,2-Dichloroethane-d4 (Surrogate)	%	*1*	90.0	95.2	91.2	89.2	93.6
p-Bromofluorobenzene (Surrogate)	%	*1*	96.6	98.4	96.8	100.3	101.2
Toluene-d8 (Surrogate)	%	*1*	99.2	96.1	101.0	100.5	100.5

Semivolatile Organic Compounds - Soil

Client Sample ID			RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-1	19-05381-12	19-05381-13	19-05381-17	19-05381-20
Phenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2-Chlorophenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2-Methylphenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2-Nitrophenol	mg/kg dry wt	*1.0*	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2,6-Dichlorophenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
4-Chloro-3-methylphenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2,4,5-Trichlorophenol	mg/kg dry wt	*5*	<5	<5	<5	<5	<5
2,4,6-Trichlorophenol	mg/kg dry wt	*5*	<5.0	<5.0	<5.0	<5.0	<5.0
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	*5*	<5	<5	<5	<5	<5
4-Methylphenol	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
4-Nitrophenol	mg/kg dry wt	*5*	<5	<5	<5	<5	<5
Naphthalene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Acenaphthene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1
2-Phenylphenol	mg/kg dry wt	*0.5*	<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg dry wt	*0.1*	<0.1	<0.1	<0.1	<0.1	<0.1

Semivolatile Organic Compounds - Soil

			Client Sample ID	RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
			Date Sampled					
Benzo[a]anthracene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-ethylhexyl) adipate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo[b]fluoranthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[a]pyrene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo[a,h]anthracene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[g,h,i]perylene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg dry wt	*0.2*		<0.2	<0.2	<0.2	<0.2	<0.2
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.1*		0.2	0.2	0.2	0.2	0.2
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDD	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4,4'-DDE	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4,4'-DDT	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
beta-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
gamma-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
delta-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Aldrin	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
cis-Chlordane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
trans-Chlordane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Dieldrin	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan I	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Endosulfan II	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulphate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin ketone	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Heptachlor	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Heptachlor epoxide	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Methoxychlor	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl) phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Butyl benzyl phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	mg/kg dry wt	*1*		<1	<1	<1	<1	<1
Di-n-octyl phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Dimethyl phthalate	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
N-Nitrosodiphenylamine	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
N-Nitrosodi-n-propylamine	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dinitrotoluene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2,6-Dinitrotoluene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Azobenzene	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4-Bromophenyl phenyl ether	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3

Semivolatile Organic Compounds - Soil

			Client Sample ID	RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
			Date Sampled					
Bis(2-Chloroethyl) ether	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Bis(2-Chloro-1-methylethyl) ether	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Bis(2-Chloroethoxy) methane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
1,2-Dichlorobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
1,3-Dichlorobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
1,4-Dichlorobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Hexachlorobutadiene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Hexachlorocyclopentadiene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Hexachloroethane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4-Chloroaniline	mg/kg dry wt	*1.0*		<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitroaniline	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
3-Nitroaniline	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Aniline	mg/kg dry wt	*1.0*		<1.0	<1.0	<1.0	<1.0	<1.0
3,3'-Dichlorobenzidine	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Methyl methanesulfonate	mg/kg dry wt	*1.0*		<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl methanesulfonate	mg/kg dry wt	*1*		<1	<1	<1	<1	<1
Benzyl alcohol	mg/kg dry wt	*1*		<1	<1	<1	<1	<1
Phenol-d5 (Surrogate)	%	*1*		87.4	87.9	84.2	85.6	95.1
2-Fluorophenol (Surrogate)	%	*1*		94.3	97.2	87.8	91.2	99.6
2-Fluorobiphenyl (Surrogate)	%	*1*		102.7	97.5	95.8	103.2	98.1
2,4,6-Tribromophenol (Surrogate)	%	*1*		26.0	43.3	56.1	42.3	50.2
p-Terphenyl-d14 (Surrogate)	%	*1*		88.7	95.9	97.8	95.7	97.0
Nitrobenzene-d5 (Surrogate)	%	*1*		87.8	93.2	92.4	91.6	89.4

Semivolatile Organic Compounds - Soil

			Client Sample ID	RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
			Date Sampled					
Analyte	Unit	*Reporting Limit*		19-05381-23	19-05381-24	19-05381-26	19-05381-28	19-05381-29
Phenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2-Chlorophenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2-Methylphenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2-Nitrophenol	mg/kg dry wt	*1.0*		<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dimethylphenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dichlorophenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2,6-Dichlorophenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4-Chloro-3-methylphenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
2,4,5-Trichlorophenol	mg/kg dry wt	*5*		<5	<5	<5	<5	<5
2,4,6-Trichlorophenol	mg/kg dry wt	*5*		<5.0	<5.0	<5.0	<5.0	<5.0
2,3,4,6-Tetrachlorophenol	mg/kg dry wt	*5*		<5	<5	<5	<5	<5
4-Methylphenol	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4-Nitrophenol	mg/kg dry wt	*5*		<5	<5	<5	<5	<5

Semivolatile Organic Compounds - Soil

			Client Sample ID	RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
			Date Sampled					
Naphthalene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
2-Methylnaphthalene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
2-Chloronaphthalene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Acenaphthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Acenaphthylene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Fluorene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Phenanthrene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Anthracene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
2-Phenylphenol	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Fluoranthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[a]anthracene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Chrysene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Bis(2-ethylhexyl) adipate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Benzo[b]fluoranthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[k]fluoranthene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[a]pyrene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Dibenzo[a,h]anthracene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Benzo[g,h,i]perylene	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
Pyrene	mg/kg dry wt	*0.2*		<0.2	<0.2	<0.2	<0.2	<0.2
Benzo[a]pyrene TEQ (LOR)	mg/kg dry wt	*0.1*		0.2	0.2	0.2	0.2	0.2
Benzo[a]pyrene TEQ (Zero)	mg/kg dry wt	*0.1*		<0.1	<0.1	<0.1	<0.1	<0.1
4,4'-DDD	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4,4'-DDE	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
4,4'-DDT	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
alpha-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
beta-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
gamma-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
delta-BHC	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Aldrin	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
cis-Chlordane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
trans-Chlordane	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Dieldrin	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan I	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Endosulfan II	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endosulfan sulphate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin aldehyde	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Endrin ketone	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobenzene	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Heptachlor	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Heptachlor epoxide	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Methoxychlor	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Bis(2-ethylhexyl) phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Butyl benzyl phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Di-n-butyl phthalate	mg/kg dry wt	*1*		<1	<1	<1	<1	<1
Di-n-octyl phthalate	mg/kg dry wt	*0.5*		<0.5	<0.5	<0.5	<0.5	<0.5
Diethyl phthalate	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
Dimethyl phthalate	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3
N-Nitrosodiphenylamine	mg/kg dry wt	*0.3*		<0.3	<0.3	<0.3	<0.3	<0.3

Semivolatile Organic Compounds - Soil

Client Sample ID			RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
Date Sampled							
N-Nitrosodi-n-propylamine	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2,4-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
2,6-Dinitrotoluene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Azobenzene	mg/kg dry wt	*0.5*	<0.5	<0.5	<0.5	<0.5	<0.5
Isophorone	mg/kg dry wt	*0.5*	<0.5	<0.5	<0.5	<0.5	<0.5
Nitrobenzene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
4-Bromophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
4-Chlorophenyl phenyl ether	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Bis(2-Chloroethyl) ether	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Bis(2-Chloro-1-methylethyl) ether	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Bis(2-Chloroethoxy) methane	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
1,2-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
1,3-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
1,4-Dichlorobenzene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Hexachlorobutadiene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Hexachlorocylopentadiene	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Hexachloroethane	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
4-Chloroaniline	mg/kg dry wt	*1.0*	<1.0	<1.0	<1.0	<1.0	<1.0
2-Nitroaniline	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
3-Nitroaniline	mg/kg dry wt	*0.5*	<0.5	<0.5	<0.5	<0.5	<0.5
Aniline	mg/kg dry wt	*1.0*	<1.0	<1.0	<1.0	<1.0	<1.0
3,3'-Dichlorobenzidine	mg/kg dry wt	*0.5*	<0.5	<0.5	<0.5	<0.5	<0.5
Dibenzofuran	mg/kg dry wt	*0.3*	<0.3	<0.3	<0.3	<0.3	<0.3
Methyl methanesulfonate	mg/kg dry wt	*1.0*	<1.0	<1.0	<1.0	<1.0	<1.0
Ethyl methanesulfonate	mg/kg dry wt	*1*	<1	<1	<1	<1	<1
Benzyl alcohol	mg/kg dry wt	*1*	<1	<1	<1	<1	<1
Phenol-d5 (Surrogate)	%	*1*	88.7	90.0	89.4	88.9	80.1
2-Fluorophenol (Surrogate)	%	*1*	89.5	103.1	94.7	95.9	89.2
2-Fluorobiphenyl (Surrogate)	%	*1*	95.6	98.0	98.0	97.2	97.9
2,4,6-Tribromophenol (Surrogate)	%	*1*	47.8	51.9	49.3	56.6	55.3
p-Terphenyl-d14 (Surrogate)	%	*1*	96.0	96.3	95.2	97.0	95.1
Nitrobenzene-d5 (Surrogate)	%	*1*	92.3	94.5	92.3	90.8	93.7

Total Petroleum Hydrocarbons - Soil

Client Sample ID			RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-1	19-05381-12	19-05381-13	19-05381-17	19-05381-20
C7-C9	mg/kg dry wt	*10*	<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*	<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*	<25	<25	<25	<25	<25
C7-C36 (Total)	mg/kg dry wt	*50*	<50	<50	<50	<50	<50

Total Petroleum Hydrocarbons - Soil

Client Sample ID			RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-23	19-05381-24	19-05381-26	19-05381-28	19-05381-29
C7-C9	mg/kg dry wt	*10*	<10	<10	<10	<10	<10
C10-C14	mg/kg dry wt	*15*	<15	<15	<15	<15	<15
C15-C36	mg/kg dry wt	*25*	<25	<25	<25	62	<25
C7-C36 (Total)	mg/kg dry wt	*50*	<50	<50	<50	62	<50

Moisture Content

Client Sample ID			RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA10_0.3-0.5	RH_HA11_0.2-0.4
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-1	19-05381-12	19-05381-13	19-05381-17	19-05381-20
Moisture Content	%	*1*	19	15	29	20	13

Moisture Content

Client Sample ID			RH_HA12-0.1-0.3	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4	RH_HA9_0.2-0.4	RH_HA9_0.6-0.8
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-23	19-05381-24	19-05381-26	19-05381-28	19-05381-29
Moisture Content	%	*1*	12	18	14	13	23

Asbestos in Soil (Qualitative)

Client Sample ID			RH_HA1_0.2-0.4	RH_HA4_0.1-0.3	RH_HA4_1.8-2.0	RH_HA12_0.8-1.0	RH_HA7_0.2-0.4
Date Sampled							
Analyte	Unit	*Reporting Limit*	19-05381-1	19-05381-12	19-05381-13	19-05381-24	19-05381-26
Asbestos in Soil (Qualitative)			Complete	Complete	Complete	Complete	Complete

Total Heavy Metals in Water

Client Sample ID			RH_MW1	RH_MWD
Date Sampled				
Analyte	Unit	*Reporting Limit*	19-05381-30	19-05381-31
Arsenic	g/m^3	*0.0005*	0.0019	0.0018
Beryllium	g/m^3	*0.00001*	0.00006	0.00005
Boron	g/m^3	*0.005*	0.046	0.045
Cadmium	g/m^3	*0.00001*	0.00002	0.00002
Chromium	g/m^3	*0.0002*	0.0030	0.0018
Copper	g/m^3	*0.0002*	0.0051	0.0053
Lead	g/m^3	*0.00005*	0.00161	0.00139
Mercury	g/m^3	*0.0001*	<0.0001	<0.0001
Nickel	g/m^3	*0.0002*	0.0039	0.0034
Zinc	g/m^3	*0.001*	0.011	0.015

Semivolatile Organic Compounds - Water

			Client Sample ID	RH_MW1	RH_MWD
			Date Sampled		
Analyte	Unit	*Reporting Limit*		19-05381-30	19-05381-31
Phenol	g/m^3	*0.002*		<0.0020	<0.0020
2-Chlorophenol	g/m^3	*0.0003*		<0.0003	<0.0003
2-Methylphenol	g/m^3	*0.0003*		<0.0003	<0.0003
2-Nitrophenol	g/m^3	*0.0005*		<0.0005	<0.0005
2,4-Dimethylphenol	g/m^3	*0.0010*		<0.0010	<0.0010
2,4-Dichlorophenol	g/m^3	*0.0003*		<0.0003	<0.0003
2,6-Dichlorophenol	g/m^3	*0.0003*		<0.0003	<0.0003
4-Chloro-3-methylphenol	g/m^3	*0.0003*		<0.0003	<0.0003
2,4,5-Trichlorophenol	g/m^3	*0.0005*		<0.0005	<0.0005
2,4,6-Trichlorophenol	g/m^3	*0.0005*		<0.0005	<0.0005
2,3,4,6-Tetrachlorophenol	g/m^3	*0.0003*		<0.0003	<0.0003
4-Methylphenol	g/m^3	*0.0003*		<0.0003	<0.0003
4-Nitrophenol	g/m^3	*0.0010*		<0.0010	<0.0010
Naphthalene	g/m^3	*0.0003*		<0.0003	<0.0003
2-Methylnaphthalene	g/m^3	*0.0003*		<0.0003	<0.0003
2-Chloronaphthalene	g/m^3	*0.0003*		<0.0003	<0.0003
Acenaphthylene	g/m^3	*0.0003*		<0.0003	<0.0003
Acenaphthene	g/m^3	*0.0003*		<0.0003	<0.0003
Fluorene	g/m^3	*0.0003*		<0.0003	<0.0003
Phenanthrene	g/m^3	*0.0003*		<0.0003	<0.0003
Anthracene	g/m^3	*0.0003*		<0.0003	<0.0003
2-Phenylphenol	g/m^3	*0.005*		<0.005	<0.005
Fluoranthene	g/m^3	*0.0003*		<0.0003	<0.0003
Benzo[a]anthracene	g/m^3	*0.0003*		<0.0003	<0.0003
Chrysene	g/m^3	*0.0003*		<0.0003	<0.0003
Bis(2-ethylhexyl) adipate	g/m^3	*0.005*		<0.005	<0.005
Benzo[b]fluoranthene	g/m^3	*0.0005*		<0.0005	<0.0005
Benzo[k]fluoranthene	g/m^3	*0.0005*		<0.0005	<0.0005
Benzo[a]pyrene	g/m^3	*0.0003*		<0.0003	<0.0003
Indeno(1,2,3-c,d)pyrene	g/m^3	*0.0003*		<0.0003	<0.0003
Dibenzo[a,h]anthracene	g/m^3	*0.0003*		<0.0003	<0.0003
Benzo[g,h,i]perylene	g/m^3	*0.0003*		<0.0003	<0.0003
Pyrene	g/m^3	*0.0003*		<0.0003	<0.0003
Benzo[a]pyrene TEQ (LOR)	g/m^3	*0.0003*		0.0008	0.0008
Benzo[a]pyrene TEQ (Zero)	g/m^3	*0.0003*		<0.0003	<0.0003
4,4'-DDD	g/m^3	*0.0005*		<0.0005	<0.0005
4,4'-DDE	g/m^3	*0.0003*		<0.0003	<0.0003
4,4'-DDT	g/m^3	*0.0010*		<0.0010	<0.0010
alpha-BHC	g/m^3	*0.0003*		<0.0003	<0.0003
beta-BHC	g/m^3	*0.0003*		<0.0003	<0.0003
gamma-BHC	g/m^3	*0.0003*		<0.0003	<0.0003
delta-BHC	g/m^3	*0.0003*		<0.0003	<0.0003
Aldrin	g/m^3	*0.0005*		<0.0005	<0.0005
cis-Chlordane	g/m^3	*0.0003*		<0.0003	<0.0003
trans-Chlordane	g/m^3	*0.0005*		<0.0005	<0.0005
Dieldrin	g/m^3	*0.0005*		<0.0005	<0.0005
Endosulfan I	g/m^3	*0.0010*		<0.0010	<0.0010
Endosulfan II	g/m^3	*0.0010*		<0.0010	<0.0010
Endosulfan sulphate	g/m^3	*0.0005*		<0.0005	<0.0005

Semivolatile Organic Compounds - Water

		Client Sample ID	RH_MW1	RH_MWD
		Date Sampled		
Endrin	g/m³	*0.0010*	<0.0010	<0.0010
Endrin aldehyde	g/m³	*0.0003*	<0.0003	<0.0003
Endrin ketone	g/m³	*0.0003*	<0.0003	<0.0003
Hexachlorobenzene	g/m³	*0.0003*	<0.0003	<0.0003
Heptachlor	g/m³	*0.0003*	<0.0003	<0.0003
Heptachlor epoxide	g/m³	*0.0003*	<0.0003	<0.0003
Methoxychlor	g/m³	*0.0003*	<0.0003	<0.0003
Bis(2-ethylhexyl) phthalate	g/m³	*0.010*	<0.010	<0.010
Butyl benzyl phthalate	g/m³	*0.0010*	<0.0010	<0.0010
Di-n-butyl phthalate	g/m³	*0.010*	<0.010	<0.010
Di-n-octyl phthalate	g/m³	*0.0005*	<0.0005	<0.0005
Diethyl phthalate	g/m³	*0.0020*	<0.0020	<0.0020
Dimethyl phthalate	g/m³	*0.0003*	<0.002	<0.002
N-Nitrosodiphenylamine	g/m³	*0.0003*	<0.0003	<0.0003
N-Nitrosodi-n-propylamine	g/m³	*0.0003*	<0.0003	<0.0003
2,4-Dinitrotoluene	g/m³	*0.0010*	<0.0010	<0.0010
2,6-Dinitrotoluene	g/m³	*0.0010*	<0.0010	<0.0010
Azobenzene	g/m³	*0.0003*	<0.0003	<0.0003
Isophorone	g/m³	*0.0003*	<0.0003	<0.0003
Nitrobenzene	g/m³	*0.0003*	<0.0003	<0.0003
4-Bromophenyl phenyl ether	g/m³	*0.0003*	<0.0003	<0.0003
4-Chlorophenyl phenyl ether	g/m³	*0.0003*	<0.0003	<0.0003
Bis(2-Chloroethyl) ether	g/m³	*0.0003*	<0.0003	<0.0003
Bis(2-Chloro-1-methylethyl) ether	g/m³	*0.0003*	<0.0003	<0.0003
Bis(2-Chloroethoxy) methane	g/m³	*0.0003*	<0.0003	<0.0003
1,2-Dichlorobenzene	g/m³	*0.0003*	<0.0003	<0.0003
1,3-Dichlorobenzene	g/m³	*0.0003*	<0.0003	<0.0003
1,4-Dichlorobenzene	g/m³	*0.0003*	<0.0003	<0.0003
Hexachlorobutadiene	g/m³	*0.0003*	<0.0003	<0.0003
Hexachlorocylopentadiene	g/m³	*0.0003*	<0.0003	<0.0003
Hexachloroethane	g/m³	*0.0003*	<0.0003	<0.0003
4-Chloroaniline	g/m³	*0.0005*	<0.0005	<0.0005
2-Nitroaniline	g/m³	*0.0005*	<0.0005	<0.0005
3-Nitroaniline	g/m³	*0.0003*	<0.0003	<0.0003
3,3'-Dichlorobenzidine	g/m³	*0.0005*	<0.0005	<0.0005
Dibenzofuran	g/m³	*0.0003*	<0.0003	<0.0003
Methyl methanesulfonate	g/m³	*0.0003*	<0.0003	<0.0003
Ethyl methanesulfonate	g/m³	*0.010*	<0.0100	<0.0100
Benzyl alcohol	g/m³	*0.0003*	<0.0003	<0.0003
Phenol-d5 (Surrogate)	%	*1*	82.8	93.0
2-Fluorophenol (Surrogate)	%	*1*	102.5	115.1
2-Fluorobiphenyl (Surrogate)	%	*1*	99.0	95.7
2,4,6-Tribromophenol (Surrogate)	%	*1*	230.1	240.8
p-Terphenyl-d14 (Surrogate)	%	*1*	148.8	139.8
Nitrobenzene-d5 (Surrogate)	%	*1*	123.2	127.1

Volatile Organic Compounds - Water

			Client Sample ID	RH_MW1	RH_MWD
			Date Sampled		
Analyte	Unit	*Reporting Limit*		19-05381-30	19-05381-31
1,2-Dichloropropane	g/m^3	*0.0005*		<0.0005	<0.0005
2,2-Dichloropropane	g/m^3	*0.002*		<0.002	<0.002
Cis-1,3-Dichloropropene	g/m^3	*0.001*		<0.001	<0.001
Trans-1,3-Dichloropropene	g/m^3	*0.001*		<0.001	<0.001
1,2-Dibromoethane	g/m^3	*0.0005*		<0.0005	<0.0005
Carbon disulfide	g/m^3	*0.001*		<0.001	<0.001
Vinyl acetate	g/m^3	*0.008*		<0.008	<0.008
4-Methyl-2-pentanone (MIBK)	g/m^3	*0.001*		<0.001	<0.001
2-Hexanone	g/m^3	*0.008*		<0.008	<0.008
2-Methoxy-2-methylpropane (MTBE)	g/m^3	*0.005*		<0.005	<0.005
Benzene	g/m^3	*0.001*		<0.001	<0.001
Toluene	g/m^3	*0.001*		<0.001	<0.001
Ethylbenzene	g/m^3	*0.001*		<0.001	<0.001
m,p-Xylene	g/m^3	*0.001*		<0.001	<0.001
o-Xylene	g/m^3	*0.001*		<0.001	<0.001
Styrene	g/m^3	*0.001*		<0.001	<0.001
Isopropylbenzene	g/m^3	*0.001*		<0.001	<0.001
n-Propylbenzene	g/m^3	*0.001*		<0.001	<0.001
1,3,5-Trimethylbenzene	g/m^3	*0.001*		<0.001	<0.001
sec-Butylbenzene	g/m^3	*0.001*		<0.001	<0.001
1,2,4-Trimethylbenzene	g/m^3	*0.001*		<0.001	<0.001
tert-Butylbenzene	g/m^3	*0.001*		<0.001	<0.001
p-Isopropyltoluene	g/m^3	*0.001*		<0.001	<0.001
n-Butylbenzene	g/m^3	*0.001*		<0.001	<0.001
Naphthalene	g/m^3	*0.002*		<0.002	<0.002
Chlorobenzene	g/m^3	*0.0005*		<0.0005	<0.0005
Bromobenzene	g/m^3	*0.001*		<0.001	<0.001
2-Chlorotoluene	g/m^3	*0.001*		<0.001	<0.001
4-Chlorotoluene	g/m^3	*0.001*		<0.001	<0.001
1,2-Dichlorobenzene	g/m^3	*0.001*		<0.001	<0.001
1,3-Dichlorobenzene	g/m^3	*0.001*		<0.001	<0.001
1,4-Dichlorobenzene	g/m^3	*0.001*		<0.001	<0.001
1,4-Dioxane	g/m^3	*0.02*		<0.02	<0.02
1,2,3-Trichlorobenzene	g/m^3	*0.002*		<0.002	<0.002
1,2,4-Trichlorobenzene	g/m^3	*0.002*		<0.002	<0.002
Carbon tetrachloride	g/m^3	*0.001*		<0.001	<0.001
Methylene chloride	g/m^3	*0.002*		<0.002	<0.002
1,1-Dichloroethane	g/m^3	*0.0005*		<0.0005	<0.0005
1,2-Dichloroethane	g/m^3	*0.001*		<0.001	<0.001
Acetone	g/m^3	*0.25*		<0.25	<0.25
Trans-1,2-Dichloroethene	g/m^3	*0.001*		<0.001	<0.001
Cis-1,2-Dichloroethene	g/m^3	*0.001*		<0.001	<0.001
1,1,1-Trichloroethane	g/m^3	*0.0005*		<0.0005	<0.0005
Trichloroethene	g/m^3	*0.0005*		<0.0005	<0.0005
Dibromomethane	g/m^3	*0.001*		<0.001	<0.001
Iodomethane	g/m^3	*0.0005*		<0.0005	<0.0005
1,1-Dichloroethene	g/m^3	*0.001*		<0.001	<0.001

Volatile Organic Compounds - Water

	Client Sample ID		RH_MW1	RH_MWD
	Date Sampled			
2-Chloroethyl vinyl ether	g/m³	*0.008*	<0.008	<0.008
1,1,2-Trichloroethane	g/m³	*0.001*	<0.001	<0.001
1,1-Dichloropropene	g/m³	*0.001*	<0.001	<0.001
1,3-Dichloropropane	g/m³	*0.0005*	<0.0005	<0.0005
Tetrachloroethene	g/m³	*0.001*	<0.001	<0.001
1,1,1,2-Tetrachloroethane	g/m³	*0.001*	<0.001	<0.001
1,1,2,2-Tetrachloroethane	g/m³	*0.005*	<0.005	<0.005
1,2,3-Trichloropropane	g/m³	*0.001*	<0.001	<0.001
1,2-Dibromo-3-chloropropane	g/m³	*0.008*	<0.008	<0.008
Hexachlorobutadiene	g/m³	*0.002*	<0.002	<0.002
Chloroform	g/m³	*0.001*	<0.001	<0.001
Bromodichloromethane	g/m³	*0.0005*	<0.0005	<0.0005
Dibromochloromethane	g/m³	*0.001*	<0.001	<0.001
Bromoform	g/m³	*0.001*	<0.001	<0.001
Dichlorodifluoro methane	g/m³	*0.001*	<0.001	<0.001
Chloromethane	g/m³	*0.001*	<0.001	<0.001
Vinyl chloride	g/m³	*0.001*	<0.001	<0.001
Bromomethane	g/m³	*0.008*	<0.008	<0.008
Chloroethane	g/m³	*0.008*	<0.008	<0.008
Trichlorofluoromethane	g/m³	*0.001*	<0.001	<0.001
1,2-Dichloroethane-d4 (Surrogate)	%	*1*	96.6	94.2
p-Bromofluorobenzene (Surrogate)	%	*1*	100.1	101.8
Toluene-d8 (Surrogate)	%	*1*	99.2	100.2

Total Petroleum Hydrocarbons - Water

	Client Sample ID		RH_MW1	RH_MWD	RH_MWB1	RH_MWB2
	Date Sampled					
Analyte	Unit	*Reporting Limit*	19-05381-30	19-05381-31	19-05381-32	19-05381-33
C7-C9	g/m³	*0.2*	<0.2	<0.2	<0.2	<0.2
C10-C14	g/m³	*0.2*	<0.2	<0.2	<0.2	<0.2
C15-C36	g/m³	*0.3*	<0.3	<0.3	<0.3	<0.3
C7-C36 (Total)	g/m³	*0.5*	<0.5	<0.5	<0.5	<0.5

Method Summary

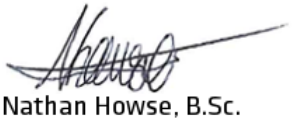
Elements in Soil	Acid digestion followed by ICP-MS analysis. (US EPA method 200.8). Results are based on a dried sample passed through a 2 mm sieve.
VOC in Soil	Methanol extraction using US-EPA 5030A, analysis by US-EPA Method 5021A (modified) using GCMS with headspace sample introduction.
SVOC in Soil	Solvent extraction, followed by GC-MS analysis.(In-house based on US EPA 8270).
TPH in Soil	Solvent extraction, silica cleanup, followed by GC-FID analysis. (C7-C36)
Moisture	Moisture content is determined gravimetrically by drying at 103 °C.
Recoverable Trace Elements	Samples were analysed as received by the laboratory using ICP-MS following an acid digestion. US EPA method 200.8.

Method Summary

SVOC in Water	Dichloromethane extraction followed by GC-MS analysis. (In-house method based on US-EPA 8270).
VOC in Water	Analysis by US-EPA Method 5021A (modified) using GCMS analysis with headspace sample introduction.
TPH in Water	Solvent extraction, silica cleanup, followed by GC-FID analysis (C7-C36). MFE Petroleum Industry Guidelines.

Elizabeth Fitzgerald, B.Sc.
Inorganics Team Leader

Tom Featonby, M.Sc.
Technologist



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Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1979897 SPv1
Contact:	N Macorison	**Date Received:**	11-May-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	22-May-2018
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.7.5
	Auckland 1140	**Client Reference:**	60563280/3.7.5
		Submitted By:	Max Nightingale

Sample Type: Soil

Sample Name:		SAH010_0.2 09-May-2018 8:10 am	SAH010_1.6 09-May-2018 9:00 am	SAH011_0.5 09-May-2018 11:45 am	SAH011_1.0 [12:00-12:15] 09-May-2018	SAH012_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Individual Tests						
Dry Matter	g/100g as rcvd	72	-	76	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	2	3	2	3	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.24
Total Recoverable Chromium	mg/kg dry wt	16	26	23	22	41
Total Recoverable Copper	mg/kg dry wt	7	12	11	9	14
Total Recoverable Lead	mg/kg dry wt	8.3	9.6	6.8	6.8	20
Total Recoverable Nickel	mg/kg dry wt	8	12	10	9	34
Total Recoverable Zinc	mg/kg dry wt	16	35	27	22	53
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	-	-	814.8	-	827.0
Dry Weight	g	-	-	605.2	-	538.2
Ashed Weight	g	-	-	592.2	-	512.4
Moisture	%	-	-	26	-	35
Dry Sample Fraction >10mm	g ashed wt	-	-	< 0.1	-	75.0
Sample Fraction <10mm to >2mm	g ashed wt	-	-	348.3	-	227.9
Sample Fraction <2mm	g ashed wt	-	-	242.2	-	207.5
<2mm Subsample Weight	g ashed wt	-	-	55.2	-	53.4
Asbestos Presence / Absence		-	-	Asbestos NOT detected.	-	Asbestos NOT detected.
Description of Asbestos Form		-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos in ACM as % of Total Sample*	% w/w	-	-	< 0.001	-	< 0.001
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	-	-	< 0.001	-	< 0.001
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	-	-	< 0.001	-	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	-	-	< 0.001	-	< 0.001

Sample Type: Soil						
Sample Name:		SAH010_0.2 09-May-2018 8:10 am	SAH010_1.6 09-May-2018 9:00 am	SAH011_0.5 09-May-2018 11:45 am	SAH011_1.0 [12:00-12:15] 09-May-2018	SAH012_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.014	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.09	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.014	-	-	-	-
Endrin	mg/kg dry wt	< 0.014	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.014	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.014	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.014	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.014	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		SAH010_0.2 09-May-2018 8:10 am	SAH010_1.6 09-May-2018 9:00 am	SAH011_0.5 09-May-2018 11:45 am	SAH011_1.0 [12:00-12:15] 09-May-2018	SAH012_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		SAH010_0.2 09-May-2018 8:10 am	SAH010_1.6 09-May-2018 9:00 am	SAH011_0.5 09-May-2018 11:45 am	SAH011_1.0 [12:00-12:15] 09-May-2018	SAH012_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-

Sample Name:		SAH012_1.0 09-May-2018 1:20 pm				
Lab Number:		1979897.11				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	40	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	18	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	12.8	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	22	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	40	-	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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**	**Sample No**
Individual Tests			
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 6
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4, 6-7, 10-11
New Zealand Guidelines Semi Quantitative Asbestos in Soil*		-	6, 10
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS FS analysis. Tested on as received sample	0.002 - 30 mg/kg dry wt	6
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	6, 10
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	6, 10
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	6, 10
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

Job No: 197 9897 Date Recv: 11-May-18 05:56

ANALYSIS

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

Received by: Sachet Sharma

3119798973

Client

Name: AECOM New Zealand Limited
Address: PO Box 4241, Shortland Street
AUCKLAND 1140
Phone: 09 967 9200 Fax: 09 960 9201
Client Reference: 60563280/3.7.5
Quote No: Order Number:

Primary Contact Naomi Macpherson
Submitted By Max Nightingale
Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results Naomi.macpherson@aecom.com
☑ Email Results max.nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 10/5/18
Name: Max Nightingale
☑ Please tick if you require COC to be faxed back
Signature: M. Nightingale

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

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 5.9
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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	SAH010_0.2	9/5/18	ES	Metals, OCP
2	SAH010_0.5			HOLD COLD
3	SAH010_1.0			HOLD COLD
4	SAH010_1.6			Metals
5				
6	SAH011_0.2			~~metals, SVOC, Asbestos (WA)~~ HOLD COLD
7	SAH011_0.5			Metals, SVOC, Asbestos (WA)
8	SAH011_1.0			Metals
9	SAH011_2.0			HOLD COLD
10				

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	SAH012_0.2			HOLD COLD
12	SAH012_0.5			Metals, Asbestos (WA)
13	SAH012_1.0			Metals
14	SAH012_2.0			HOLD COLD
15				
16				
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Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1979897 SPv2
Contact:	N Macorison	**Date Received:**	11-May-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	02-May-2019 **(Amended)**
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.7.5
	Auckland 1140	**Client Reference:**	60563280/3.7.5
		Submitted By:	Max Nightingale

Sample Type: Soil

Sample Name:	DH104_0.2 09-May-2018 8:10 am	DH104_1.6 09-May-2018 9:00 am	DH103_0.5 09-May-2018 11:45 am	DH103_1.0 [12:00-12:15] 09-May-2018	DH107_0.5 09-May-2018 1:00 pm
Lab Number:	1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Individual Tests					
Dry Matter g/100g as rcvd	72	-	76	-	-
Heavy Metals, Screen Level					
Total Recoverable Arsenic mg/kg dry wt	2	3	2	3	< 2
Total Recoverable Cadmium mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	0.24
Total Recoverable Chromium mg/kg dry wt	16	26	23	22	41
Total Recoverable Copper mg/kg dry wt	7	12	11	9	14
Total Recoverable Lead mg/kg dry wt	8.3	9.6	6.8	6.8	20
Total Recoverable Nickel mg/kg dry wt	8	12	10	9	34
Total Recoverable Zinc mg/kg dry wt	16	35	27	22	53
New Zealand Guidelines Semi Quantitative Asbestos in Soil					
As Received Weight g	-	-	814.8	-	827.0
Dry Weight g	-	-	605.2	-	538.2
Ashed Weight g	-	-	592.2	-	512.4
Moisture %	-	-	26	-	35
Dry Sample Fraction >10mm g ashed wt	-	-	< 0.1	-	75.0
Sample Fraction <10mm to >2mm g ashed wt	-	-	348.3	-	227.9
Sample Fraction <2mm g ashed wt	-	-	242.2	-	207.5
<2mm Subsample Weight g ashed wt	-	-	55.2	-	53.4
Asbestos Presence / Absence	-	-	Asbestos NOT detected.	-	Asbestos NOT detected.
Description of Asbestos Form	-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable) g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos in ACM as % of Total Sample* % w/w	-	-	< 0.001	-	< 0.001
Weight of Asbestos as Fibrous Asbestos (Friable) g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos as Fibrous Asbestos as % of Total Sample* % w/w	-	-	< 0.001	-	< 0.001
Weight of Asbestos as Asbestos Fines (Friable)* g ashed wt	-	-	< 0.00001	-	< 0.00001
Asbestos as Asbestos Fines as % of Total Sample* % w/w	-	-	< 0.001	-	< 0.001
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample* % w/w	-	-	< 0.001	-	< 0.001

Sample Type: Soil						
Sample Name:		DH104_0.2 09-May-2018 8:10 am	DH104_1.6 09-May-2018 9:00 am	DH103_0.5 09-May-2018 11:45 am	DH103_1.0 [12:00-12:15] 09-May-2018	DH107_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.014	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.014	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.014	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.014	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.014	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.014	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.014	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.09	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan II	mg/kg dry wt	< 0.014	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.014	-	-	-	-
Endrin	mg/kg dry wt	< 0.014	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.014	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.014	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.014	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.014	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.014	-	-	-	-
Haloethers in SVOC Soil Samples by GC-MS						
Bis(2-chloroethoxy) methane	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroethyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
Bis(2-chloroisopropyl)ether	mg/kg dry wt	-	-	< 0.5	-	-
4-Bromophenyl phenyl ether	mg/kg dry wt	-	-	< 0.4	-	-
4-Chlorophenyl phenyl ether	mg/kg dry wt	-	-	< 0.5	-	-
Nitrogen containing compounds in SVOC Soil Samples by GC-MS						
2,4-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
2,6-Dinitrotoluene	mg/kg dry wt	-	-	< 1.0	-	-
Nitrobenzene	mg/kg dry wt	-	-	< 0.5	-	-
N-Nitrosodi-n-propylamine	mg/kg dry wt	-	-	< 0.8	-	-
N-Nitrosodiphenylamine + Diphenylamine	mg/kg dry wt	-	-	< 0.8	-	-
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Aldrin	mg/kg dry wt	-	-	< 0.5	-	-
alpha-BHC	mg/kg dry wt	-	-	< 0.5	-	-
beta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
delta-BHC	mg/kg dry wt	-	-	< 0.5	-	-
gamma-BHC (Lindane)	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDD	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDE	mg/kg dry wt	-	-	< 0.5	-	-
4,4'-DDT	mg/kg dry wt	-	-	< 1.0	-	-
Dieldrin	mg/kg dry wt	-	-	< 0.5	-	-
Endosulfan I	mg/kg dry wt	-	-	< 1.0	-	-
Endosulfan II	mg/kg dry wt	-	-	< 2	-	-
Endosulfan sulphate	mg/kg dry wt	-	-	< 1.0	-	-
Endrin	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		DH104_0.2 09-May-2018 8:10 am	DH104_1.6 09-May-2018 9:00 am	DH103_0.5 09-May-2018 11:45 am	DH103_1.0 [12:00-12:15] 09-May-2018	DH107_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Organochlorine Pesticides in SVOC Soil Samples by GC-MS						
Endrin ketone	mg/kg dry wt	-	-	< 1.0	-	-
Heptachlor	mg/kg dry wt	-	-	< 0.5	-	-
Heptachlor epoxide	mg/kg dry wt	-	-	< 0.5	-	-
Hexachlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Polycyclic Aromatic Hydrocarbons in SVOC Soil Samples by GC-MS						
Acenaphthene	mg/kg dry wt	-	-	< 0.5	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.5	-	-
Anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
1&2-Chloronaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Chrysene	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.5	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.5	-	-
Fluorene	mg/kg dry wt	-	-	< 0.5	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.5	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Naphthalene	mg/kg dry wt	-	-	< 0.5	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.5	-	-
Pyrene	mg/kg dry wt	-	-	< 0.5	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	< 1.3	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	< 1.3	-	-
Phenols in SVOC Soil Samples by GC-MS						
4-Chloro-3-methylphenol	mg/kg dry wt	-	-	< 5	-	-
2-Chlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4-Dimethylphenol	mg/kg dry wt	-	-	< 3	-	-
3 & 4-Methylphenol (m- + p-cresol)	mg/kg dry wt	-	-	< 3	-	-
2-Methylphenol (o-Cresol)	mg/kg dry wt	-	-	< 1.0	-	-
2-Nitrophenol	mg/kg dry wt	-	-	< 5	-	-
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	< 30	-	-
Phenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,5-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
2,4,6-Trichlorophenol	mg/kg dry wt	-	-	< 1.0	-	-
Plasticisers in SVOC Soil Samples by GC-MS						
Bis(2-ethylhexyl)phthalate	mg/kg dry wt	-	-	< 5	-	-
Butylbenzylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di(2-ethylhexyl)adipate	mg/kg dry wt	-	-	< 1.0	-	-
Diethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Dimethylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-butylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Di-n-octylphthalate	mg/kg dry wt	-	-	< 1.0	-	-
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachlorobutadiene	mg/kg dry wt	-	-	< 0.8	-	-
Hexachloroethane	mg/kg dry wt	-	-	< 0.8	-	-

Sample Type: Soil						
Sample Name:		DH104_0.2 09-May-2018 8:10 am	DH104_1.6 09-May-2018 9:00 am	DH103_0.5 09-May-2018 11:45 am	DH103_1.0 [12:00-12:15] 09-May-2018	DH107_0.5 09-May-2018 1:00 pm
Lab Number:		1979897.1	1979897.4	1979897.6	1979897.7	1979897.10
Other Halogenated compounds in SVOC Soil Samples by GC-MS						
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	< 0.5	-	-
Other compounds in SVOC Soil Samples by GC-MS						
Benzyl alcohol	mg/kg dry wt	-	-	< 10	-	-
Carbazole	mg/kg dry wt	-	-	< 0.5	-	-
Dibenzofuran	mg/kg dry wt	-	-	< 0.5	-	-
Isophorone	mg/kg dry wt	-	-	< 0.5	-	-

Sample Name:		DH107_1.0 09-May-2018 1:20 pm				
Lab Number:		1979897.11				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	40	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	18	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	12.8	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	22	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	40	-	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier report issued on 22 May 2018 at 3:17 pm
Reason for amendment: Sample IDs amended as requested.

Appendix No.1 - Chain of Custody

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.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Individual Tests			
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 6
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4, 6-7, 10-11
New Zealand Guidelines Semi Quantitative Asbestos in Soil*		-	6, 10
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1
Semivolatile Organic Compounds Screening in Soil by GC-MS	Sonication extraction, GC-MS FS analysis. Tested on as received sample	0.002 - 30 mg/kg dry wt	6
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	6, 10
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	6, 10

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	6, 10
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	6, 10
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	6, 10
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	6, 10
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	6, 10

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

Job No: 197 9897 Date Recv: 11-May-18 05:56

ANALYSIS

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

Received by: Sachet Sharma

3119798973

Client

Name: AECOM New Zealand Limited
Address: PO Box 4241, Shortland Street
AUCKLAND 1140
Phone: 09 967 9200 Fax: 09 960 9201
Client Reference: 60563280/3.7.5
Quote No: Order Number:

Primary Contact Naomi Macpherson
Submitted By Max Nightingale
Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results Naomi.macpherson@aecom.com
☑ Email Results max.nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 10/5/18
Name: Max Nightingale
☑ Please tick if you require COC to be faxed back
Signature: M. Nightingale

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

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 5.9
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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	SAH010_0.2	9/5/18	ES	Metals, OCP
2	SAH010_0.5			HOLD COLD
3	SAH010_1.0			HOLD COLD
4	SAH010_1.6			Metals
5				
6	SAH011_0.2			~~metals, SVOC, Asbestos (WA)~~ HOLD COLD
7	SAH011_0.5			Metals, SVOC, Asbestos (WA)
8	SAH011_1.0			Metals
9	SAH011_2.0			HOLD COLD
10				

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	SAH012_0.2			HOLD COLD
12	SAH012_0.5			Metals, Asbestos (WA)
13	SAH012_1.0			Metals
14	SAH012_2.0			HOLD COLD
15				
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Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1981512 SPv1
Contact:	N Macorison	**Date Received:**	14-May-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	22-May-2018
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.7.5
	Auckland 1140	**Client Reference:**	60563280/3.75
		Submitted By:	Max Nightingale

Sample Type: Soil

Sample Name:		SAH013_0.3 11-May-2018 7:55 am	SAH014_0.5 11-May-2018 9:50 am	SAH015_0.1 11-May-2018 10:45 am	SAH015_0.5 11-May-2018 10:45 am	SAH016_0.5 11-May-2018 11:45 am
Lab Number:		1981512.1	1981512.6	1981512.8	1981512.9	1981512.13
Individual Tests						
Dry Matter	g/100g as rcvd	77	80	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	4	3	4	4
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	32	30	36	36
Total Recoverable Copper	mg/kg dry wt	-	19	19	10	12
Total Recoverable Lead	mg/kg dry wt	-	12.9	103	12.8	10.4
Total Recoverable Nickel	mg/kg dry wt	-	31	33	19	17
Total Recoverable Zinc	mg/kg dry wt	-	47	61	32	32
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.15	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	28	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	11	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	15.6	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	16	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	42	-	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.013	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.013	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.013	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.013	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.013	-	-	-	-

Sample Type: Soil						
Sample Name:		SAH013_0.3 11-May-2018 7:55 am	SAH014_0.5 11-May-2018 9:50 am	SAH015_0.1 11-May-2018 10:45 am	SAH015_0.5 11-May-2018 10:45 am	SAH016_0.5 11-May-2018 11:45 am
Lab Number:		1981512.1	1981512.6	1981512.8	1981512.9	1981512.13
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	< 0.013	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	-	-	-	-
Endrin	mg/kg dry wt	< 0.013	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.013	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.013	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.013	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	0.042	-	-	-
2-Methylnaphthalene	mg/kg dry wt	-	0.031	-	-	-
Perylene	mg/kg dry wt	-	1.45	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	7.8	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	7.7	-	-	-
Acenaphthylene	mg/kg dry wt	-	0.137	-	-	-
Acenaphthene	mg/kg dry wt	-	0.37	-	-	-
Anthracene	mg/kg dry wt	-	1.97	-	-	-
Benzo[a]anthracene	mg/kg dry wt	-	5.8	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	5.0	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	6.9	-	-	-
Benzo[e]pyrene	mg/kg dry wt	-	3.3	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	3.4	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	2.6	-	-	-
Chrysene	mg/kg dry wt	-	4.4	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.67	-	-	-
Fluoranthene	mg/kg dry wt	-	11.7	-	-	-
Fluorene	mg/kg dry wt	-	0.26	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	4.0	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.07	-	-	-
Phenanthrene	mg/kg dry wt	-	5.7	-	-	-
Pyrene	mg/kg dry wt	-	8.5	-	-	-

Sample Name:		SAH016_1.1 11-May-2018 11:55 am				
Lab Number:		1981512.14				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	8	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	3	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	5.3	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	6	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	5	-	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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	Sample No
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	6, 8-9, 13-14
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1
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. [KBIs:5786,2805,2695]	0.002 - 0.05 mg/kg dry wt	6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 6
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	6
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

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

Client

Name AECOM New Zealand Limited
Address PO Box 4241, Shortland Street
AUCKLAND 1140
Phone 09 967 9200 *Fax* 09 960 9201
Client Reference 60563280/3.7.5
Quote No *Order Number*

Primary Contact Naomi Macorison
Submitted By Max Nightingale
Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results Naomi.Macorison@aecom.com
☑ Email Results Max.Nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/05/2018
Name: Max Nightingale
☑ *Please tick if you require COC to be faxed back*
Signature:

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

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

ADDITIONAL INFORMATION

Please email CoC on arrival at Lab reception

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	SAH013_0.3	11/05/2018	ES	Metals (Incl Mecrury), OCP
2	SAH013_0.9	11/05/2018	ES	Hold Cold
3	SAH013_1.3-1.5	11/05/2018	ES	Hold Cold
4	SAH013_1.8-2.0	11/05/2018	ES	Hold Cold
5				
6	SAH014_0.1	11/05/2018	ES	Hold Cold
7	SAH014_0.5	11/05/2018	ES	Metals , PAH
8	SAH014_1.5	11/05/2018	ES	Hold Cold
9	SAH014_1.8-2.0	11/05/2018	ES	Hold Cold
10				

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	SAH015_0.1	11/05/2018	ES	Metals
12	SAH015_0.5	11/05/2018	ES	Metals
13	SAH015_0.9	11/05/2018	ES	Hold Cold
14	SAH015_1.8-2.0	11/05/2018	ES	Hold Cold
15				
16	SAH016_0.1	11/05/2018	ES	Hold Cold
17	SAH016_0.5	11/05/2018	ES	Metals
18	SAH016_1.1	11/05/2018	ES	Metals
19	SAH016_2.3	11/05/2018	ES	Hold Cold
20	SAH016_3.0-3.4	11/05/2018	ES	Hold Cold
21				
22				
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33				
34				
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36				
37				
38				
39				
40				

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1981512	SPv2
Contact:	N Macorison	**Date Received:**	14-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	02-May-2019	**(Amended)**
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280/3.7.5	
	Auckland 1140	**Client Reference:**	60563280/3.75	
		Submitted By:	Max Nightingale	

Sample Type: Soil

Sample Name:		AME_EHA102_0.3 11-May-2018 7:55 am	AME_EHA106_0.5 11-May-2018 9:50 am	AME_EHA107_0.1 11-May-2018 10:45 am	AME_EHA107_0.5 11-May-2018 10:45 am	AME_EHA108_0.5 11-May-2018 11:45 am
Lab Number:		1981512.1	1981512.6	1981512.8	1981512.9	1981512.13
Individual Tests						
Dry Matter	g/100g as rcvd	77	80	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	4	3	4	4
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	32	30	36	36
Total Recoverable Copper	mg/kg dry wt	-	19	19	10	12
Total Recoverable Lead	mg/kg dry wt	-	12.9	103	12.8	10.4
Total Recoverable Nickel	mg/kg dry wt	-	31	33	19	17
Total Recoverable Zinc	mg/kg dry wt	-	47	61	32	32
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.15	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	28	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	11	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	15.6	-	-	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	16	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	42	-	-	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.013	-	-	-	-
alpha-BHC	mg/kg dry wt	< 0.013	-	-	-	-
beta-BHC	mg/kg dry wt	< 0.013	-	-	-	-
delta-BHC	mg/kg dry wt	< 0.013	-	-	-	-
gamma-BHC (Lindane)	mg/kg dry wt	< 0.013	-	-	-	-
cis-Chlordane	mg/kg dry wt	< 0.013	-	-	-	-
trans-Chlordane	mg/kg dry wt	< 0.013	-	-	-	-
Total Chlordane [(cis+trans)* 100/42]	mg/kg dry wt	< 0.04	-	-	-	-
2,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDD	mg/kg dry wt	< 0.013	-	-	-	-
2,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDE	mg/kg dry wt	< 0.013	-	-	-	-
2,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	-
4,4'-DDT	mg/kg dry wt	< 0.013	-	-	-	-
Total DDT Isomers	mg/kg dry wt	< 0.08	-	-	-	-
Dieldrin	mg/kg dry wt	< 0.013	-	-	-	-
Endosulfan I	mg/kg dry wt	< 0.013	-	-	-	-

Sample Type: Soil						
Sample Name:		AME_EHA102_0.3 11-May-2018 7:55 am	AME_EHA106_0.5 11-May-2018 9:50 am	AME_EHA107_0.1 11-May-2018 10:45 am	AME_EHA107_0.5 11-May-2018 10:45 am	AME_EHA108_0.5 11-May-2018 11:45 am
Lab Number:		1981512.1	1981512.6	1981512.8	1981512.9	1981512.13
Organochlorine Pesticides Screening in Soil						
Endosulfan II	mg/kg dry wt	< 0.013	-	-	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.013	-	-	-	-
Endrin	mg/kg dry wt	< 0.013	-	-	-	-
Endrin aldehyde	mg/kg dry wt	< 0.013	-	-	-	-
Endrin ketone	mg/kg dry wt	< 0.013	-	-	-	-
Heptachlor	mg/kg dry wt	< 0.013	-	-	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.013	-	-	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.013	-	-	-	-
Methoxychlor	mg/kg dry wt	< 0.013	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	0.042	-	-	-
2-Methylnaphthalene	mg/kg dry wt	-	0.031	-	-	-
Perylene	mg/kg dry wt	-	1.45	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	7.8	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	7.7	-	-	-
Acenaphthylene	mg/kg dry wt	-	0.137	-	-	-
Acenaphthene	mg/kg dry wt	-	0.37	-	-	-
Anthracene	mg/kg dry wt	-	1.97	-	-	-
Benzo[a]anthracene	mg/kg dry wt	-	5.8	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	5.0	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	6.9	-	-	-
Benzo[e]pyrene	mg/kg dry wt	-	3.3	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	3.4	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	2.6	-	-	-
Chrysene	mg/kg dry wt	-	4.4	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	0.67	-	-	-
Fluoranthene	mg/kg dry wt	-	11.7	-	-	-
Fluorene	mg/kg dry wt	-	0.26	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	4.0	-	-	-
Naphthalene	mg/kg dry wt	-	< 0.07	-	-	-
Phenanthrene	mg/kg dry wt	-	5.7	-	-	-
Pyrene	mg/kg dry wt	-	8.5	-	-	-

Sample Name:		AME_EHA108_1.1 11-May-2018 11:55 am
Lab Number:		1981512.14
Heavy Metals, Screen Level		
Total Recoverable Arsenic	mg/kg dry wt	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10
Total Recoverable Chromium	mg/kg dry wt	8
Total Recoverable Copper	mg/kg dry wt	3
Total Recoverable Lead	mg/kg dry wt	5.3
Total Recoverable Nickel	mg/kg dry wt	6
Total Recoverable Zinc	mg/kg dry wt	5

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier report issued on 22 May 2018 at 9:49 am
Reason for amendment: Sample IDs amended as requested.

Appendix No.1 - Chain of Custody

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.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	6, 8-9, 13-14
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1
Organochlorine Pesticides Screening in Soil	Sonication extraction, SPE cleanup, dual column GC-ECD analysis (modified US EPA 8082). Tested on as recieved sample	0.010 - 0.06 mg/kg dry wt	1
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. [KBIs:5786,2805,2695]	0.002 - 0.05 mg/kg dry wt	6
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1, 6
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	6
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	6

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

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

Client

Name AECOM New Zealand Limited
Address PO Box 4241, Shortland Street
AUCKLAND 1140
Phone 09 967 9200 *Fax* 09 960 9201
Client Reference 60563280/3.7.5
Quote No *Order Number*

Primary Contact Naomi Macorison
Submitted By Max Nightingale
Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter
☐ Fax Results Naomi.Macorison@aecom.com
☑ Email Results Max.Nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 14/05/2018
Name: Max Nightingale
☑ *Please tick if you require COC to be faxed back*
Signature:

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

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

ADDITIONAL INFORMATION

Please email CoC on arrival at Lab reception

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	SAH013_0.3	11/05/2018	ES	Metals (Incl Mecrury), OCP
2	SAH013_0.9	11/05/2018	ES	Hold Cold
3	SAH013_1.3-1.5	11/05/2018	ES	Hold Cold
4	SAH013_1.8-2.0	11/05/2018	ES	Hold Cold
5				
6	SAH014_0.1	11/05/2018	ES	Hold Cold
7	SAH014_0.5	11/05/2018	ES	Metals , PAH
8	SAH014_1.5	11/05/2018	ES	Hold Cold
9	SAH014_1.8-2.0	11/05/2018	ES	Hold Cold
10				

Continued on next page

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required
11	SAH015_0.1	11/05/2018	ES	Metals
12	SAH015_0.5	11/05/2018	ES	Metals
13	SAH015_0.9	11/05/2018	ES	Hold Cold
14	SAH015_1.8-2.0	11/05/2018	ES	Hold Cold
15				
16	SAH016_0.1	11/05/2018	ES	Hold Cold
17	SAH016_0.5	11/05/2018	ES	Metals
18	SAH016_1.1	11/05/2018	ES	Metals
19	SAH016_2.3	11/05/2018	ES	Hold Cold
20	SAH016_3.0-3.4	11/05/2018	ES	Hold Cold
21				
22				
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40				

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1984837	SPv1
Contact:	N Macorison	**Date Received:**	18-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	24-May-2018	
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280/3.7.5	
	Auckland 1140	**Client Reference:**	60563280/3.7.5	
		Submitted By:	Kate Feickert	

Sample Type: Soil

Sample Name:		SAH017_0.2 14-May-2018 2:30 pm				
Lab Number:		1984837.1				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	25	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	13	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	11.9	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	22	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	34	-	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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	Sample No
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Carole Rodgers-Carroll BA, NZCS
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

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

Job No: **198 4837**
Date Recv: 18-May-18 11:38
Received by: Nathaniel Sue

3119848374

Client

Name AECOM New Zealand Limited
Address PO Box 4241, Shortland Street
AUCKLAND 1140
Phone 09 967 9200 *Fax* 09 960 9201
Client Reference 60563280/3.7.5
Quote No *Order Number*

Primary Contact Naomi Macorison
Submitted By Kate Feickert
Charge To AECOM New Zealand Limited

Results To
☑ Mail Client ☑ Mail Submitter
☐ Fax Results
☑ Email Results Max.Nightingale@aecom.com

Office use only Job N

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name:
☑ *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:* 4.0°C
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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	SAH017_0.2	5/14/2018	Soil	Metals
2	SAH017_0.6	5/14/2018	Soil	Hold Cold
3	SAH017_1.1	5/14/2018	Soil	Hold Cold
4	SAH017_3.0-3.4	5/14/2018	Soil	Hold Cold
5				
6				
7				
8				
9				
10				

Continued on next page

Hill Laboratories
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R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1984837	SPv2
Contact:	N Macorison	**Date Received:**	18-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	02-May-2019	**(Amended)**
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280/3.7.5	
	Auckland 1140	**Client Reference:**	60563280/3.7.5	
		Submitted By:	Kate Feickert	

Sample Type: Soil

Sample Name:		DH108_0.2 14-May-2018 2:30 pm				
Lab Number:		1984837.1				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	25	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	13	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	11.9	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	22	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	34	-	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier report issued on 24 May 2018 at 12:34 pm
Reason for amendment: Sample IDs amended as requested.

Appendix No.1 - Chain of Custody

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.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
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ANALYSIS REQUEST

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

Job No: **198 4837**
Date Recv: 18-May-18 11:38
Received by: Nathaniel Sue

3119848374

Client

Name AECOM New Zealand Limited
Address PO Box 4241, Shortland Street
AUCKLAND 1140
Phone 09 967 9200 *Fax* 09 960 9201
Client Reference 60563280/3.7.5
Quote No *Order Number*

Primary Contact Naomi Macorison
Submitted By Kate Feickert
Charge To AECOM New Zealand Limited

Results To
☑ Mail Client ☑ Mail Submitter
☐ Fax Results
☑ Email Results Max.Nightingale@aecom.com

Office use only Job N

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name:
☑ *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:* 4.0°C
☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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	SAH017_0.2	5/14/2018	Soil	Metals
2	SAH017_0.6	5/14/2018	Soil	Hold Cold
3	SAH017_1.1	5/14/2018	Soil	Hold Cold
4	SAH017_3.0-3.4	5/14/2018	Soil	Hold Cold
5				
6				
7				
8				
9				
10				

Continued on next page

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Hamilton 3240 New Zealand

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Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1985842	SPv1
Contact:	N Macorison	**Date Received:**	21-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	28-May-2018	
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280/3.7.5	
	Auckland 1140	**Client Reference:**	AMETI	
		Submitted By:	Max Nightingale	

Sample Type: Soil

Sample Name:		SAH030_0.5 18-May-2018	SAH030_2.0 18-May-2018	SAH031_0.5 18-May-2018	SAH031_1.3 18-May-2018	
Lab Number:		1985842.2	1985842.5	1985842.7	1985842.9	
Individual Tests						
Dry Matter	g/100g as rcvd	87	82	-	74	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	5	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	21	-	32	-	-
Total Recoverable Copper	mg/kg dry wt	25	-	12	-	-
Total Recoverable Lead	mg/kg dry wt	16.4	-	16.0	-	-
Total Recoverable Nickel	mg/kg dry wt	26	-	22	-	-
Total Recoverable Zinc	mg/kg dry wt	89	-	41	-	-
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Toluene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	-	-	-
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	-	-	-
BTEX in VOC Soils by Headspace GC-MS						
Benzene	mg/kg dry wt	-	-	-	< 0.3	-
Ethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Toluene	mg/kg dry wt	-	-	-	< 0.3	-
m&p-Xylene	mg/kg dry wt	-	-	-	< 0.5	-
o-Xylene	mg/kg dry wt	-	-	-	< 0.3	-
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
Bromomethane (Methyl Bromide)	mg/kg dry wt	-	-	-	< 0.3	-
Carbon tetrachloride	mg/kg dry wt	-	-	-	< 0.3	-
Chloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Chloromethane	mg/kg dry wt	-	-	-	< 0.3	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	-	-	-	< 0.5	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	-	-	-	< 0.3	-
Dibromomethane	mg/kg dry wt	-	-	-	< 0.3	-
1,3-Dichloropropane	mg/kg dry wt	-	-	-	< 0.3	-
Dichlorodifluoromethane	mg/kg dry wt	-	-	-	< 0.5	-

Sample Type: Soil							
	Sample Name:	SAH030_0.5 18-May-2018	SAH030_2.0 18-May-2018	SAH031_0.5 18-May-2018	SAH031_1.3 18-May-2018	
	Lab Number:	1985842.2	1985842.5	1985842.7	1985842.9	
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
1,1-Dichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,2-Dichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
cis-1,2-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
trans-1,2-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
Dichloromethane (methylene chloride)	mg/kg dry wt	-	-	-	< 3	-
1,2-Dichloropropane	mg/kg dry wt	-	-	-	< 0.3	-
1,1-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
cis-1,3-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
trans-1,3-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.3	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	-	-	-	< 0.3	-
1,1,1-Trichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1,2-Trichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	-	-	-	< 0.3	-
Trichlorofluoromethane	mg/kg dry wt	-	-	-	< 0.3	-
1,2,3-Trichloropropane	mg/kg dry wt	-	-	-	< 0.5	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	-	-	-	< 0.3	-
Vinyl chloride	mg/kg dry wt	-	-	-	< 0.3	-
Haloaromatics in VOC Soils by Headspace GC-MS						
Bromobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
4-Chlorotoluene	mg/kg dry wt	-	-	-	< 0.3	-
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	-	-	-	< 0.3	-
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
2-Chlorotoluene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,3-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3,5-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
n-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
tert-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Isopropylbenzene (Cumene)	mg/kg dry wt	-	-	-	< 0.3	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	-	-	-	< 0.3	-
n-Propylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
sec-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Styrene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,4-Trimethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3,5-Trimethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Ketones in VOC Soils by Headspace GC-MS						
2-Butanone (MEK)	mg/kg dry wt	-	-	-	< 50	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	-	-	-	< 9	-
Acetone	mg/kg dry wt	-	-	-	< 50	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	-	-	-	< 0.3	-
Trihalomethanes in VOC Soils by Headspace GC-MS						
Bromodichloromethane	mg/kg dry wt	-	-	-	< 0.3	-
Bromoform (tribromomethane)	mg/kg dry wt	-	-	-	< 0.5	-
Chloroform (Trichloromethane)	mg/kg as rcvd	-	-	-	< 0.3	-

Sample Type: Soil						
Sample Name:		SAH030_0.5 18-May-2018	SAH030_2.0 18-May-2018	SAH031_0.5 18-May-2018	SAH031_1.3 18-May-2018	
Lab Number:		1985842.2	1985842.5	1985842.7	1985842.9	
Trihalomethanes in VOC Soils by Headspace GC-MS						
Dibromochloromethane	mg/kg dry wt	-	-	-	< 0.3	-
Other VOC in Soils by Headspace GC-MS						
Carbon disulphide	mg/kg dry wt	-	-	-	0.08	-
Naphthalene	mg/kg dry wt	-	-	-	< 0.3	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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**	**Sample No**
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2, 7
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	2, 5
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	2, 5
Volatile Organic Compounds Screening in Soil by Headspace GC-MS	Sonication extraction, Headspace, GC-MS SIM analysis. Tested on as received sample [KBIs:31662,37857,37921]	-	9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 5, 9

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

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ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

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T +64 7 858 2000
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Job No: **198 5842**

Date Recv: 21-May-18 12:36

Received by: Jason Meadows

3119858425

Quote No

Primary Contact Naomi Macpherson

Submitted By Max Nightingale

Client Name AECOM New Zealand LTD

Address 8 Mahuhu Crescent

Auckland *Postcode* 1010

Phone *Mobile* 0212527293

Email

Charge To

Client Reference AMETI

Order No 60563280/3.7.5

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*

☑ Email Primary Contact ☑ Email Submitter ☐ Email Client

☐ Email Other naom.macpherson@aecom.com

☐ Other max.nightingale@aecom.com

ADDITIONAL INFORMATION

CHAIN OF CUS

Sent to Hill Laboratories

Date & Time: 0900 21/5/18

Name: Max Nightingale

☑ *Tick if you require COC to be emailed back*

Signature: M. Ny/m

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 11.3

☐ *Sample and Analysis details checked*

Signature:

Priority ☐ Low ☑ Normal ☐ High

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

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	SAH030_0.2	18/5/18		ES	HOLD COLD
2	SAH030_0.5	"		"	Metals/TPH/BTEX
3	SAH030_1.0	"		"	Hold Cold
4	SAH030_1.5	"		"	Hold Cold
5	SAH030_2.0	"		"	TPH/BTEX
6	SAH031_0.2	"		"	Hold Cold
7	SAH031_0.5	"		"	Metals
8	SAH031_0.9	"		"	Hold Cold
9	SAH031_1.3	"		"	VOC
10	SAH031_2.5	"		"	Hold Cold
11					
12					

Continued on next page

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Private Bag 3205
Hamilton 3240 New Zealand

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E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1985842	SPv3
Contact:	N Macorison	**Date Received:**	21-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	02-May-2019	**(Amended)**
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280/3.7.5	
	Auckland 1140	**Client Reference:**	AMETI	
		Submitted By:	Max Nightingale	

Sample Type: Soil

Sample Name:		DH109_0.5 18-May-2018	DH109_2.0 18-May-2018	AME_EHA118_0.5 18-May-2018	AME_EHA118_1.3 18-May-2018	
Lab Number:		1985842.2	1985842.5	1985842.7	1985842.9	
Individual Tests						
Dry Matter	g/100g as rcvd	87	82	-	74	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	5	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	< 0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	21	-	32	-	-
Total Recoverable Copper	mg/kg dry wt	25	-	12	-	-
Total Recoverable Lead	mg/kg dry wt	16.4	-	16.0	-	-
Total Recoverable Nickel	mg/kg dry wt	26	-	22	-	-
Total Recoverable Zinc	mg/kg dry wt	89	-	41	-	-
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Toluene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Ethylbenzene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
m&p-Xylene	mg/kg dry wt	< 0.10	< 0.10	-	-	-
o-Xylene	mg/kg dry wt	< 0.05	< 0.05	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 8	< 8	-	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	-
C15 - C36	mg/kg dry wt	< 40	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	< 70	-	-	-
BTEX in VOC Soils by Headspace GC-MS						
Benzene	mg/kg dry wt	-	-	-	< 0.3	-
Ethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Toluene	mg/kg dry wt	-	-	-	< 0.3	-
m&p-Xylene	mg/kg dry wt	-	-	-	< 0.5	-
o-Xylene	mg/kg dry wt	-	-	-	< 0.3	-
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
Bromomethane (Methyl Bromide)	mg/kg dry wt	-	-	-	< 0.3	-
Carbon tetrachloride	mg/kg dry wt	-	-	-	< 0.3	-
Chloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Chloromethane	mg/kg dry wt	-	-	-	< 0.3	-
1,2-Dibromo-3-chloropropane	mg/kg dry wt	-	-	-	< 0.5	-
1,2-Dibromoethane (ethylene dibromide, EDB)	mg/kg dry wt	-	-	-	< 0.3	-
Dibromomethane	mg/kg dry wt	-	-	-	< 0.3	-
1,3-Dichloropropane	mg/kg dry wt	-	-	-	< 0.3	-
Dichlorodifluoromethane	mg/kg dry wt	-	-	-	< 0.5	-
1,1-Dichloroethane	mg/kg dry wt	-	-	-	< 0.3	-

Sample Type: Soil						
Sample Name:		DH109_0.5 18-May-2018	DH109_2.0 18-May-2018	AME_EHA118_0.5 18-May-2018	AME_EHA118_1.3 18-May-2018	
Lab Number:		1985842.2	1985842.5	1985842.7	1985842.9	
Halogenated Aliphatics in VOC Soils by Headspace GC-MS						
1,2-Dichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
cis-1,2-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
trans-1,2-Dichloroethene	mg/kg dry wt	-	-	-	< 0.3	-
Dichloromethane (methylene chloride)	mg/kg dry wt	-	-	-	< 3	-
1,2-Dichloropropane	mg/kg dry wt	-	-	-	< 0.3	-
1,1-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
cis-1,3-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
trans-1,3-Dichloropropene	mg/kg dry wt	-	-	-	< 0.3	-
Hexachlorobutadiene	mg/kg dry wt	-	-	-	< 0.3	-
1,1,1,2-Tetrachloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1,2,2-Tetrachloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Tetrachloroethene (tetrachloroethylene)	mg/kg dry wt	-	-	-	< 0.3	-
1,1,1-Trichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
1,1,2-Trichloroethane	mg/kg dry wt	-	-	-	< 0.3	-
Trichloroethene (trichloroethylene)	mg/kg dry wt	-	-	-	< 0.3	-
Trichlorofluoromethane	mg/kg dry wt	-	-	-	< 0.3	-
1,2,3-Trichloropropane	mg/kg dry wt	-	-	-	< 0.5	-
1,1,2-Trichlorotrifluoroethane (Freon 113)	mg/kg dry wt	-	-	-	< 0.3	-
Vinyl chloride	mg/kg dry wt	-	-	-	< 0.3	-
Haloaromatics in VOC Soils by Headspace GC-MS						
Bromobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
4-Chlorotoluene	mg/kg dry wt	-	-	-	< 0.3	-
Chlorobenzene (monochlorobenzene)	mg/kg dry wt	-	-	-	< 0.3	-
1,2-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,4-Dichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
2-Chlorotoluene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,3-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3,5-Trichlorobenzene	mg/kg dry wt	-	-	-	< 0.3	-
Monoaromatic Hydrocarbons in VOC Soils by Headspace GC-MS						
n-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
tert-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Isopropylbenzene (Cumene)	mg/kg dry wt	-	-	-	< 0.3	-
4-Isopropyltoluene (p-Cymene)	mg/kg dry wt	-	-	-	< 0.3	-
n-Propylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
sec-Butylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Styrene	mg/kg dry wt	-	-	-	< 0.3	-
1,2,4-Trimethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
1,3,5-Trimethylbenzene	mg/kg dry wt	-	-	-	< 0.3	-
Ketones in VOC Soils by Headspace GC-MS						
2-Butanone (MEK)	mg/kg dry wt	-	-	-	< 50	-
4-Methylpentan-2-one (MIBK)	mg/kg dry wt	-	-	-	< 9	-
Acetone	mg/kg dry wt	-	-	-	< 50	-
Methyl tert-butylether (MTBE)	mg/kg dry wt	-	-	-	< 0.3	-
Trihalomethanes in VOC Soils by Headspace GC-MS						
Bromodichloromethane	mg/kg dry wt	-	-	-	< 0.3	-
Bromoform (tribromomethane)	mg/kg dry wt	-	-	-	< 0.5	-
Chloroform (Trichloromethane)	mg/kg as rcvd	-	-	-	< 0.3	-
Dibromochloromethane	mg/kg dry wt	-	-	-	< 0.3	-

Sample Type: Soil						
Sample Name:		DH109_0.5 18-May-2018	DH109_2.0 18-May-2018	AME_EHA118_0.5 18-May-2018	AME_EHA118_1.3 18-May-2018	
Lab Number:		1985842.2	1985842.5	1985842.7	1985842.9	
Other VOC in Soils by Headspace GC-MS						
Carbon disulphide	mg/kg dry wt	-	-	-	0.08	-
Naphthalene	mg/kg dry wt	-	-	-	< 0.3	-

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier report issued on 02 May 2019 at 3:47 pm
Reason for amendment: Sample IDs amended as per request.

Appendix No.1 - Chain of Custody

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.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	2, 7
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	2, 5
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	2, 5
Volatile Organic Compounds Screening in Soil by Headspace GC-MS	Sonication extraction, Headspace, GC-MS SIM analysis. Tested on as received sample [KBIs:31662,37857,37921]	-	9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 5, 9

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

ANALYSIS REQUEST

R J Hill Laboratories Limited
28 Duke Street, Hamilton 3204
Private Bag 3205
Hamilton 3240, New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Job No: **198 5842**

Date Recv: 21-May-18 12:36

Received by: Jason Meadows

3119858425

Quote No

Primary Contact Naomi Macpherson

Submitted By Max Nightingale

Client Name AECOM New Zealand LTD

Address 8 Mahuhu Crescent

Auckland *Postcode* 1010

Phone *Mobile* 0212527293

Email

Charge To

Client Reference AMETI

Order No 60563280/3.7.5

Results To *Reports will be emailed to Primary Contact by default. Additional Reports will be sent as specified below.*

☑ Email Primary Contact ☑ Email Submitter ☐ Email Client

☐ Email Other naom.macpherson@aecom.com

☐ Other max.nightingale@aecom.com

ADDITIONAL INFORMATION

CHAIN OF CUS

Sent to Hill Laboratories

Date & Time: 0900 21/5/18

Name: Max Nightingale

☑ *Tick if you require COC to be emailed back*

Signature: M. Ny/m

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ Room Temp ☐ Chilled ☐ Frozen Temp: 11.3

☐ *Sample and Analysis details checked*

Signature:

Priority ☐ Low ☑ Normal ☐ High

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

Requested Reporting Date:

No.	Sample Name	Sample Date	Sample Time	Sample Type	Tests Required (if not as per Quote)
1	SAH030_0.2	18/5/18		ES	HOLD COLD
2	SAH030_0.5	"		"	Metals/TPH/BTEX
3	SAH030_1.0	"		"	Hold Cold
4	SAH030_1.5	"		"	Hold Cold
5	SAH030_2.0	"		"	TPH/BTEX
6	SAH031_0.2	"		"	Hold Cold
7	SAH031_0.5	"		"	Metals
8	SAH031_0.9	"		"	Hold Cold
9	SAH031_1.3	"		"	VOC
10	SAH031_2.5	"		"	Hold Cold
11					
12					

Continued on next page

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

T 0508 HILL LAB (44 555 22)
T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1991296	SPv1
Contact:	N Macorison	**Date Received:**	30-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	12-Jun-2018	
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	12638	
	Auckland 1140	**Client Reference:**	60563280	
		Submitted By:	Max Nightingale	

Sample Type: Soil

Sample Name:		SAH035_0.2 29-May-2018 12:00 pm				
Lab Number:		1991296.1				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	35	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	24	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	14.0	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	32	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	55	-	-	-	-
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	331.2	-	-	-	-
Dry Weight	g	225.1	-	-	-	-
Ashed Weight	g	216.1	-	-	-	-
Moisture	%	32	-	-	-	-
Dry Sample Fraction >10mm	g ashed wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g ashed wt	147.7	-	-	-	-
Sample Fraction <2mm	g ashed wt	67.6	-	-	-	-
<2mm Subsample Weight	g ashed wt	57.9	-	-	-	-
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	-	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	-	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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	Sample No
Individual Tests			
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1
New Zealand Guidelines Semi Quantitative Asbestos in Soil*		-	1
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Ara Heron BSc (Tech)
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

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

ANALYSIS

Job No: **199 1296**

Date Recv: 30-May-18 06:40

Received by: Nathaniel Sue

3119912964

Client

Name AECOM New Zealand Limited

Address PO Box 4241, Shortland Street

AUCKLAND 1140

Phone 09 967 9200 *Fax* 09 960 9201

Client Reference 60563280

Quote No 12638 *Order Number* 12638

Primary Contact Naomi Macorison

Submitted By Max Nightingale

Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results Naomi.Macorison@aecom.com

☑ Email Results Max.Nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 29/05/2018

Name: Max Nightingale

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

Signature: M. Nightingale

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 2.5

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please email CoC on arrival at Lab reception. PO Number 12638

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	SAH035_0.2	29/05/2018	ES	Metals + Asbestos (WA)
2	SAH035_0.5	29/05/2018	ES	Hold Cold
3	SAH035_1.4	29/05/2018	ES	Hold Cold
4	SAH035_2.2	29/05/2018	ES	Hold Cold
5				
6				
7				
8				
9				
10				

Continued on next page

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	1991296	SPv2
Contact:	N Macorison	**Date Received:**	30-May-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	02-May-2019	**(Amended)**
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	12638	
	Auckland 1140	**Client Reference:**	60563280	
		Submitted By:	Max Nightingale	

Sample Type: Soil

Sample Name:		DH102_0.2 29-May-2018 12:00 pm				
Lab Number:		1991296.1				
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	35	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	24	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	14.0	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	32	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	55	-	-	-	-
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	331.2	-	-	-	-
Dry Weight	g	225.1	-	-	-	-
Ashed Weight	g	216.1	-	-	-	-
Moisture	%	32	-	-	-	-
Dry Sample Fraction >10mm	g ashed wt	< 0.1	-	-	-	-
Sample Fraction <10mm to >2mm	g ashed wt	147.7	-	-	-	-
Sample Fraction <2mm	g ashed wt	67.6	-	-	-	-
<2mm Subsample Weight	g ashed wt	57.9	-	-	-	-
Asbestos Presence / Absence		Asbestos NOT detected.	-	-	-	-
Description of Asbestos Form		-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	-	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	-	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	-	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	-	-	-	-

Analyst's Comments

Amended Report: This certificate of analysis replaces an earlier report issued on 12 Jun 2018 at 2:43 pm
Reason for amendment: Sample IDs amended as requested.

Appendix No.1 - Chain of Custody

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.
Unless otherwise indicated, analyses were performed at Hill Laboratories, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1
New Zealand Guidelines Semi Quantitative Asbestos in Soil*		-	1
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

Kim Harrison MSc
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

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

ANALYSIS

Job No: **199 1296**

Date Recv: 30-May-18 06:40

Received by: Nathaniel Sue

3119912964

Client

Name AECOM New Zealand Limited

Address PO Box 4241, Shortland Street

AUCKLAND 1140

Phone 09 967 9200 *Fax* 09 960 9201

Client Reference 60563280

Quote No 12638 *Order Number* 12638

Primary Contact Naomi Macorison

Submitted By Max Nightingale

Charge To AECOM New Zealand Limited

Results To ☐ Mail Client ☐ Mail Submitter

☐ Fax Results Naomi.Macorison@aecom.com

☑ Email Results Max.Nightingale@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories

Date & Time: 29/05/2018

Name: Max Nightingale

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

Signature: M. Nightingale

Received at Hill Laboratories

Date & Time:

Name:

Signature:

Condition ☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

Temp: 2.5

☐ Sample Analysis details checked

Signature:

ADDITIONAL INFORMATION

Please email CoC on arrival at Lab reception. PO Number 12638

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	SAH035_0.2	29/05/2018	ES	Metals + Asbestos (WA)
2	SAH035_0.5	29/05/2018	ES	Hold Cold
3	SAH035_1.4	29/05/2018	ES	Hold Cold
4	SAH035_2.2	29/05/2018	ES	Hold Cold
5				
6				
7				
8				
9				
10				

Continued on next page

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

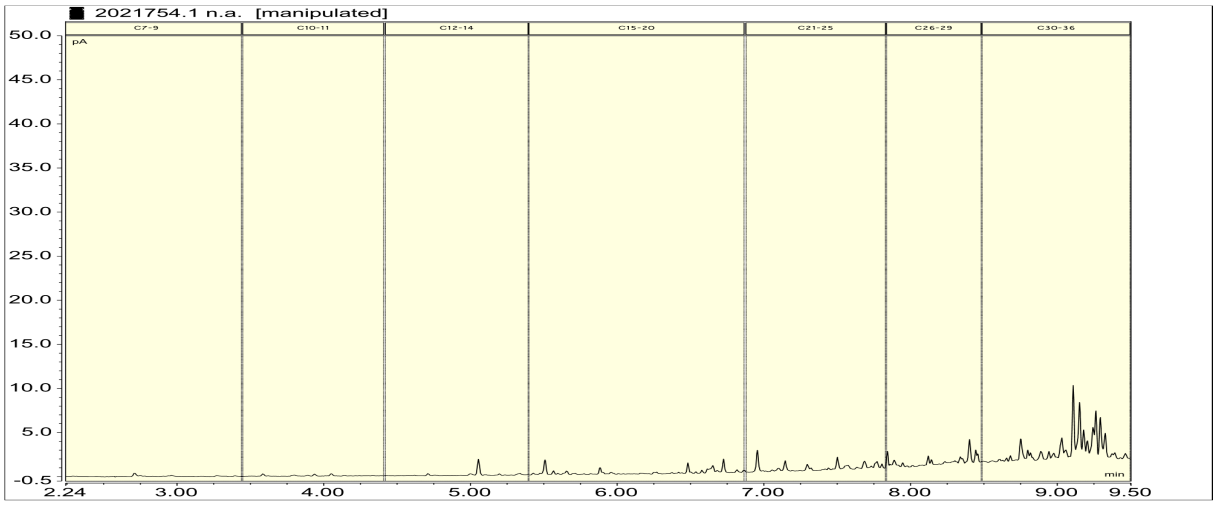
Client:	AECOM New Zealand Limited	**Lab No:**	2021754	SPv1
Contact:	N Macorison	**Date Received:**	27-Jul-2018	
	C/- AECOM New Zealand Limited	**Date Reported:**	03-Aug-2018	
	PO Box 4241	**Quote No:**	81048	
	Shortland Street	**Order No:**	60563280	
	Auckland 1140	**Client Reference:**	AMETI	
		Submitted By:	Max Nightingale	

Sample Type: Sediment

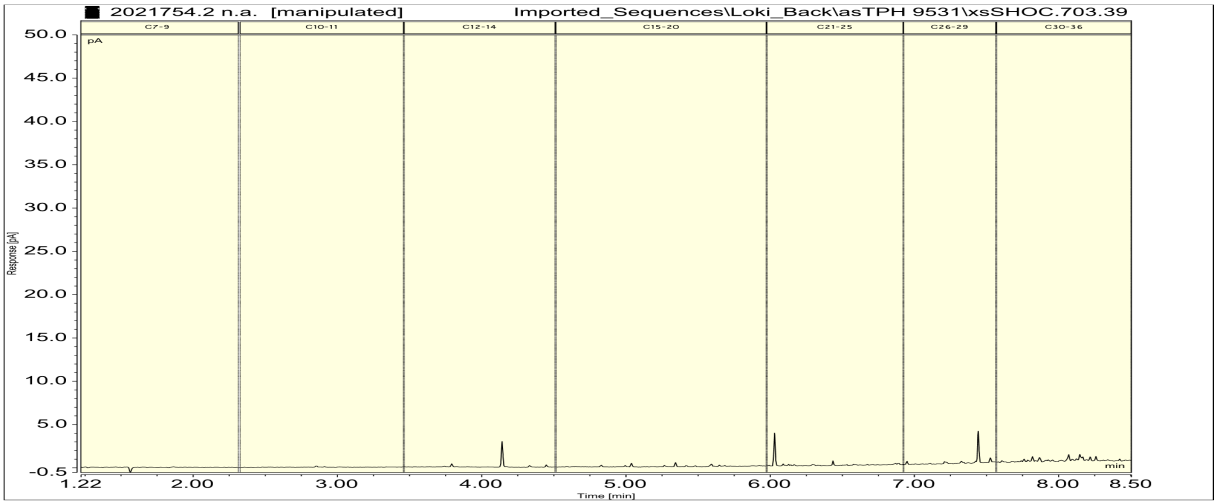
Sample Name:		AMETI_SED01 26-Jul-2018	AMETI_SED02 26-Jul-2018			
Lab Number:		2021754.1	2021754.2			
Individual Tests						
Dry Matter	g/100g as rcvd	46	44	-	-	-
Heavy metal, trace level As,Cd,Cr,Cu,Ni,Pb,Zn						
Total Recoverable Arsenic	mg/kg dry wt	8.1	9.7	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.093	0.067	-	-	-
Total Recoverable Chromium	mg/kg dry wt	27	27	-	-	-
Total Recoverable Copper	mg/kg dry wt	47	32	-	-	-
Total Recoverable Lead	mg/kg dry wt	57	34	-	-	-
Total Recoverable Nickel	mg/kg dry wt	21	12.6	-	-	-
Total Recoverable Zinc	mg/kg dry wt	220	220	-	-	-
New Zealand Guidelines Semi Quantitative Asbestos in Soil						
As Received Weight	g	509.1	417.4	-	-	-
Dry Weight	g	403.0	310.4	-	-	-
Ashed Weight	g	198.3	177.2	-	-	-
Moisture	%	21	26	-	-	-
Dry Sample Fraction >10mm	g ashed wt	< 0.1	< 0.1	-	-	-
Sample Fraction <10mm to >2mm	g ashed wt	115.8	112.5	-	-	-
Sample Fraction <2mm	g ashed wt	81.5	63.4	-	-	-
<2mm Subsample Weight	g ashed wt	51.3	63.4	-	-	-
Asbestos Presence / Absence		Asbestos NOT detected.	Asbestos NOT detected.	-	-	-
Description of Asbestos Form		-	-	-	-	-
Weight of Asbestos in ACM (Non-Friable)	g ashed wt	< 0.00001	< 0.00001	-	-	-
Asbestos in ACM as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Weight of Asbestos as Fibrous Asbestos (Friable)	g ashed wt	< 0.00001	< 0.00001	-	-	-
Asbestos as Fibrous Asbestos as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Weight of Asbestos as Asbestos Fines (Friable)*	g ashed wt	< 0.00001	< 0.00001	-	-	-
Asbestos as Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	% w/w	< 0.001	< 0.001	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Perylene	mg/kg dry wt	0.05	0.02	-	-	-

Sample Type: Sediment						
Sample Name:		AMETI_SED01 26-Jul-2018	AMETI_SED02 26-Jul-2018			
Lab Number:		2021754.1	2021754.2			
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	0.09	< 0.06	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	0.09	< 0.06	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Acenaphthene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Anthracene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Benzo[a]anthracene	mg/kg dry wt	0.04	0.03	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	0.05	0.02	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	0.08	0.03	-	-	-
Benzo[e]pyrene	mg/kg dry wt	0.05	< 0.03	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	0.08	0.04	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	0.03	< 0.03	-	-	-
Chrysene	mg/kg dry wt	0.04	0.02	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Fluoranthene	mg/kg dry wt	0.08	0.04	-	-	-
Fluorene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	0.05	0.02	-	-	-
Naphthalene	mg/kg dry wt	< 0.11	< 0.11	-	-	-
Phenanthrene	mg/kg dry wt	< 0.03	< 0.03	-	-	-
Pyrene	mg/kg dry wt	0.09	0.04	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 13	< 13	-	-	-
C10 - C14	mg/kg dry wt	< 30	< 30	-	-	-
C15 - C36	mg/kg dry wt	580	144	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	580	144	-	-	-

2021754.1
AMETI_SED01 26-Jul-2018
Client Chromatogram for TPH by FID



2021754.2
AMETI_SED02 26-Jul-2018
Client Chromatogram for TPH by FID



Analyst's Comments

Appendix No.1 - Chain of Custody

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: Sediment

Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
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
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-2
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	1-2
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	1-2
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	1-2
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 [KBIs:5786,2805,10734;2695]	0.002 - 60 mg/kg dry wt	1-2
Heavy metal, trace level As,Cd,Cr,Cu,Ni,Pb,Zn	Dried sample, <2mm fraction. Nitric/Hydrochloric acid digestion, ICP-MS, trace level.	0.010 - 0.4 mg/kg dry wt	1-2
New Zealand Guidelines Semi Quantitative Asbestos in Soil*		-	1-2
New Zealand Guidelines Semi Quantitative Asbestos in Soil			
As Received Weight	Measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-2
Dry Weight	Sample dried at 100 to 105°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-2

Sample Type: Sediment			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
Ashed Weight	Sample ashed at 400°C, measurement on balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g	1-2
Moisture	Sample dried at 100 to 105°C. Calculation = (As received weight - Dry weight) / as received weight x 100. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	1 %	1-2
Sample Fraction >10mm	Sample ashed at 400°C, 10mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-2
Sample Fraction <10mm and >2mm	Sample ashed at 400°C, 10mm and 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-2
Sample Fraction <2mm	Sample ashed at 400°C, 2mm sieve, measurement on analytical balance. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch.	0.1 g ashed wt	1-2
Asbestos Presence / Absence	Examination using Low Powered Stereomicroscopy followed by 'Polarised Light Microscopy' including 'Dispersion Staining Techniques'. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. AS 4964 (2004) - Method for the Qualitative Identification of Asbestos in Bulk Samples.	-	1-2
Description of Asbestos Form	Description of asbestos form and/or shape if present.	-	1-2
Weight of Asbestos in ACM (Non-Friable)	Measurement on analytical balance, from the >10mm Fraction. Weight of asbestos based on assessment of ACM form. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-2
Asbestos in ACM as % of Total Sample*	Calculated from weight of asbestos in ACM and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Fibrous Asbestos (Friable)	Measurement on analytical balance, from the >10mm Fraction. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-2
Asbestos as Fibrous Asbestos as % of Total Sample*	Calculated from weight of fibrous asbestos and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Weight of Asbestos as Asbestos Fines (Friable)*	Measurement on analytical balance, from the <10mm Fractions. Analysed at Hill Laboratories - Asbestos; 101c Waterloo Road, Christchurch. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.00001 g ashed wt	1-2
Asbestos as Asbestos Fines as % of Total Sample*	Calculated from weight of asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2
Combined Fibrous Asbestos + Asbestos Fines as % of Total Sample*	Calculated from weight of fibrous asbestos plus asbestos fines and sample dry weight. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, November 2017.	0.001 % w/w	1-2

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

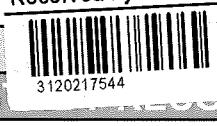
Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

Hill Laboratories
A WORLD LEADER IN ANALYTICAL SERVICES

ANALYSIS REQUEST

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

Job No: **202 1754**
Date Recv: 27-Jul-18 05:39
Received by: Sachet Sharma



Office use only Job No:

Client

Name AECOM New Zealand Limited
Address PO Box 4241, Shortland Street
AUCKLAND 1140
Phone 09 967 9200 *Fax* 09 960 9201
Client Reference AMETI
Quote No *Order Number* 60563280

Primary Contact Naomi.macorison@aecom.com
Submitted By Max Nightingale
Charge To AECOM New Zealand Limited

Results To
☐ Mail Client ☑ Mail Submitter
☐ Fax Results
☑ Email Results Kate.feickert@aecom.com

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time:
Name:
☑ *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: 1.6

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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	AMETI_SED01	26.07.18	SE SE	TPH, PAH, metals, ACM
2	AMETI_SED02	26.07.18	SE	" "
3				
4				
5				
6				
7				
8				
9				
10				

Continued on next page

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Private Bag 3205
Hamilton 3240 New Zealand

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E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	2035377 SPv1
Contact:	N Macorison	**Date Received:**	22-Aug-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	29-Aug-2018
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.3.1
	Auckland 1140	**Client Reference:**	60563280/3.3.1
		Submitted By:	Suresh Nuthalapati

Sample Type: Soil

Sample Name:		AME_EHA101_0.1-0.2 20-Aug-2018	AME_EHA101_0.8-0.9 20-Aug-2018	AME_EHA103_0.1-0.2 20-Aug-2018	AME_EHA103_0.9-1.0 20-Aug-2018	AME_EHA104_0.1-0.2 20-Aug-2018
Lab Number:		2035377.1	2035377.2	2035377.4	2035377.5	2035377.7
Individual Tests						
Dry Matter	g/100g as rcvd	-	75	-	67	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	-	3	2	2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	-	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	30	-	32	7	27
Total Recoverable Copper	mg/kg dry wt	14	-	7	6	9
Total Recoverable Lead	mg/kg dry wt	9.2	-	10.0	13.8	13.8
Total Recoverable Nickel	mg/kg dry wt	29	-	15	10	14
Total Recoverable Zinc	mg/kg dry wt	45	-	38	16	36
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.06	-	-	-
Toluene	mg/kg dry wt	-	< 0.06	-	-	-
Ethylbenzene	mg/kg dry wt	-	< 0.06	-	-	-
m&p-Xylene	mg/kg dry wt	-	< 0.11	-	-	-
o-Xylene	mg/kg dry wt	-	< 0.06	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.015	-
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.015	-
Perylene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	< 0.04	-
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.015	-
Acenaphthene	mg/kg dry wt	-	-	-	< 0.015	-
Anthracene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[e]pyrene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.015	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.015	-
Chrysene	mg/kg dry wt	-	-	-	< 0.015	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.015	-
Fluoranthene	mg/kg dry wt	-	-	-	< 0.015	-
Fluorene	mg/kg dry wt	-	-	-	< 0.015	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.015	-

Sample Type: Soil						
Sample Name:		AME_EHA101_0.1-0.2 20-Aug-2018	AME_EHA101_0.8-0.9 20-Aug-2018	AME_EHA103_0.1-0.2 20-Aug-2018	AME_EHA103_0.9-1.0 20-Aug-2018	AME_EHA104_0.1-0.2 20-Aug-2018
Lab Number:		2035377.1	2035377.2	2035377.4	2035377.5	2035377.7
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Naphthalene	mg/kg dry wt	-	-	-	< 0.08	-
Phenanthrene	mg/kg dry wt	-	-	-	< 0.015	-
Pyrene	mg/kg dry wt	-	-	-	< 0.015	-
Total of Reported PAHs in Soil*	mg/kg	-	-	-	< 0.4	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 8	-	-	-
C10 - C14	mg/kg dry wt	-	< 20	-	-	-
C15 - C36	mg/kg dry wt	-	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 70	-	-	-

Sample Name:		AME_EHA104_0.8-0.9 20-Aug-2018	AME_EHA111_0.2-0.3 20-Aug-2018	AME_EHA111_0.5-0.6 20-Aug-2018	AME_EHA111_0.9-1.0 20-Aug-2018	
Lab Number:		2035377.9	2035377.11	2035377.12	2035377.13	
Individual Tests						
Dry Matter	g/100g as rcvd	61	-	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	5	3	3	-
Total Recoverable Cadmium	mg/kg dry wt	-	< 0.10	< 0.10	< 0.10	-
Total Recoverable Chromium	mg/kg dry wt	-	25	31	38	-
Total Recoverable Copper	mg/kg dry wt	-	12	13	6	-
Total Recoverable Lead	mg/kg dry wt	-	33	10.6	11.0	-
Total Recoverable Nickel	mg/kg dry wt	-	20	18	7	-
Total Recoverable Zinc	mg/kg dry wt	-	44	30	10	-
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.08	-	-	-	-
Toluene	mg/kg dry wt	< 0.08	-	-	-	-
Ethylbenzene	mg/kg dry wt	< 0.08	-	-	-	-
m&p-Xylene	mg/kg dry wt	< 0.16	-	-	-	-
o-Xylene	mg/kg dry wt	< 0.08	-	-	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	-	-	-	-
C10 - C14	mg/kg dry wt	< 20	-	-	-	-
C15 - C36	mg/kg dry wt	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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**	**Sample No**
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4-5, 7, 11-13
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	2, 9
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. [KBIs:5786,2805,2695]	-	5

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	2, 9
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 5, 9
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	5
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	5
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	5

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

Hill Laboratories
BETTER TESTING **BETTER RESULTS**

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

ANALYSIS Job No: **203 5377** Date Recv: 22-Aug-18 05:20

Received by: Nathaniel Sue

3120353770

Client

Name AECOM New Zealand Limited

Address 8 Mahuhu Crescent

Phone *Fax*

Client Reference

Quote No *Order Number* 605628280/3.3.1

Primary Contact NAOMI MACORISON

Submitted By SURESH NUTHALAPATI

Charge To Aecom Auckland

Results To ☑ Mail Client ☑ Mail Submitter

☐ Fax Results

☑ Email Results Naomi.macorison@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 21/8/18 09:15 am
Name: SURESH.N
☑ *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:* 9.1

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

HOLD COLD ALL SAMPLES

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/COWL/Initial/Final flow/Total Time*
1	AME_HA101_0.1-0.2	20/8/18	ES	
2	AME_HA101_0.8-0.9	20/8/18	ES	TO BE CONFIRMED
3	AME_HA101_1.4-1.5	20/8/18	ES	
4	AME_HA103_0.1-0.2	20/8/18	ES	
5	AME_HA103_0.9-1.0	20/8/18	ES	
6	AME_HA103_1.7-1.8	20/8/18	ES	
7	AME_HA104_0.1-0.2	20/8/18	ES	
8	AME_HA104_0.4-0.5	20/8/18	ES	
9	AME_HA104_0.8-0.9	20/8/18	ES	
10	AME_HA104_1.8-2.0	20/8/18	ES	

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required/COWL/Initial/Final flow/Total Time
11	AME_HA111_0.2-0.3	20/8/18	ES	
12	AME_HA111_0.5-0.6	20/8/18	ES	
13	AME_HA111_0.9-1.0	20/8/18	ES	
14	AME_HA111_1.75-1.85	20/8/18	ES	
15	AME_HA110_0.2-0.3	20/8/18	ES	
16	AME_HA110_0.5-0.6	20/8/18	ES	
17	AME_HA110_1.3-1.4	20/8/18	ES	
18	AME_HA110_1.7-1.8	20/8/18	ES	
19	AME_HA110_1.9-2.0	20/8/18	ES	
20	AME_HA121_0.2-0.3	20/8/18	ES	
21	AME_HA121_0.8-0.9	20/8/18	ES	
22	AME_HA121_1.4-1.5	20/8/18	ES	
23	AME_HA121_1.9-2.0	20/8/18	ES	

TO BE CONFIRMED

Hill Laboratories
TRIED, TESTED AND TRUSTED

R J Hill Laboratories Limited
28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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T +64 7 858 2000
E mail@hill-labs.co.nz
W www.hill-laboratories.com

Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	2035379 SPv1
Contact:	N Macorison	**Date Received:**	22-Aug-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	29-Aug-2018
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.3.1
	Auckland 1140	**Client Reference:**	
		Submitted By:	Suresh Nuthalapati

Sample Type: Soil

Sample Name:		AME - HA122 - 0.15-0.25	AME - HA112 - 0.15-0.3	AME - HA112 - 0.9-1.0	AME - HA114 - 0.1-0.2	AME - HA114 - 0.7-0.8
Lab Number:		2035379.1	2035379.4	2035379.5	2035379.8	2035379.9
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	77	-	77
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	< 2	4	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	< 0.10	0.23	-
Total Recoverable Chromium	mg/kg dry wt	30	24	27	37	-
Total Recoverable Copper	mg/kg dry wt	11	5	10	35	-
Total Recoverable Lead	mg/kg dry wt	39	7.8	4.8	27	-
Total Recoverable Nickel	mg/kg dry wt	25	8	21	55	-
Total Recoverable Zinc	mg/kg dry wt	42	25	25	96	-
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	-	-	-	< 0.06
Toluene	mg/kg dry wt	-	-	-	-	< 0.06
Ethylbenzene	mg/kg dry wt	-	-	-	-	< 0.06
m&p-Xylene	mg/kg dry wt	-	-	-	-	< 0.11
o-Xylene	mg/kg dry wt	-	-	-	-	< 0.06
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	-	-
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	-	-
Perylene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	< 0.04	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	< 0.04	-	-
Acenaphthylene	mg/kg dry wt	-	-	< 0.013	-	-
Acenaphthene	mg/kg dry wt	-	-	< 0.013	-	-
Anthracene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.013	-	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.013	-	-
Chrysene	mg/kg dry wt	-	-	< 0.013	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.013	-	-
Fluoranthene	mg/kg dry wt	-	-	< 0.013	-	-
Fluorene	mg/kg dry wt	-	-	< 0.013	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.013	-	-

Sample Type: Soil						
Sample Name:		AME - HA122 - 0.15-0.25	AME - HA112 - 0.15-0.3	AME - HA112 - 0.9-1.0	AME - HA114 - 0.1-0.2	AME - HA114 - 0.7-0.8
Lab Number:		2035379.1	2035379.4	2035379.5	2035379.8	2035379.9
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Naphthalene	mg/kg dry wt	-	-	< 0.07	-	-
Phenanthrene	mg/kg dry wt	-	-	< 0.013	-	-
Pyrene	mg/kg dry wt	-	-	< 0.013	-	-
Total of Reported PAHs in Soil*	mg/kg	-	-	< 0.4	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	-	< 8
C10 - C14	mg/kg dry wt	-	-	-	-	< 20
C15 - C36	mg/kg dry wt	-	-	-	-	< 40
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	-	< 70

Sample Name:		AME - HA114 - 1.4-1.5	AME - HA113 - 0.1-0.2	AME - HA113 - 0.9-1.0	AME - HA105 - 0.2-0.3	AME - HA105 - 0.8-0.9
Lab Number:		2035379.10	2035379.11	2035379.12	2035379.15	2035379.16
Individual Tests						
Dry Matter	g/100g as rcvd	62	-	72	-	70
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	4	-	< 2	< 2
Total Recoverable Cadmium	mg/kg dry wt	-	0.59	-	0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	-	40	-	23	23
Total Recoverable Copper	mg/kg dry wt	-	43	-	13	13
Total Recoverable Lead	mg/kg dry wt	-	71	-	17.2	9.5
Total Recoverable Nickel	mg/kg dry wt	-	61	-	16	12
Total Recoverable Zinc	mg/kg dry wt	-	157	-	36	30
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	< 0.08	-	< 0.06	-	-
Toluene	mg/kg dry wt	< 0.08	-	< 0.06	-	-
Ethylbenzene	mg/kg dry wt	< 0.08	-	< 0.06	-	-
m&p-Xylene	mg/kg dry wt	< 0.16	-	< 0.12	-	-
o-Xylene	mg/kg dry wt	< 0.08	-	< 0.06	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.015
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.015
Perylene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	-	< 0.04
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	-	< 0.04
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.015
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.015
Anthracene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	< 0.015
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.015
Chrysene	mg/kg dry wt	-	-	-	-	< 0.015
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.015
Fluoranthene	mg/kg dry wt	-	-	-	-	< 0.015
Fluorene	mg/kg dry wt	-	-	-	-	< 0.015
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	< 0.015
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.08
Phenanthrene	mg/kg dry wt	-	-	-	-	< 0.015
Pyrene	mg/kg dry wt	-	-	-	-	< 0.015
Total of Reported PAHs in Soil*	mg/kg	-	-	-	-	< 0.4

Sample Type: Soil						
Sample Name:		AME - HA114 - 1.4-1.5	AME - HA113 - 0.1-0.2	AME - HA113 - 0.9-1.0	AME - HA105 - 0.2-0.3	AME - HA105 - 0.8-0.9
Lab Number:		2035379.10	2035379.11	2035379.12	2035379.15	2035379.16
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	-	< 9	-	-
C10 - C14	mg/kg dry wt	< 20	-	< 20	-	-
C15 - C36	mg/kg dry wt	< 40	-	< 40	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	< 70	-	-

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**	**Sample No**
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 4-5, 8, 11, 15-16
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	9-10, 12
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. [KBIs:5786,2805,2695]	-	5, 16
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	9-10, 12
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	5, 9-10, 12, 16
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	5, 16
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	5, 16
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	5, 16

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

Hill Laboratories
TRIED, TESTED AND TRUSTED

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Certificate of Analysis

Client:	AECOM New Zealand Limited	**Lab No:**	2036105 SPv1
Contact:	N Macorison	**Date Received:**	23-Aug-2018
	C/- AECOM New Zealand Limited	**Date Reported:**	29-Aug-2018
	PO Box 4241	**Quote No:**	81048
	Shortland Street	**Order No:**	60563280/3.3.1
	Auckland 1140	**Client Reference:**	60563280/3.3.1
		Submitted By:	Suresh Nuthalapati

Sample Type: Soil

Sample Name:		AME_HA115_0.1-0.2 22-Aug-2018	AME_HA115_0.6-0.7 22-Aug-2018	AME_HA117_0.3-0.4 22-Aug-2018	AME_HA117_1.7-1.8 22-Aug-2018	AME_HA116_0.25-0.35 22-Aug-2018
Lab Number:		2036105.1	2036105.2	2036105.3	2036105.4	2036105.6
Individual Tests						
Dry Matter	g/100g as rcvd	-	73	-	71	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	-	3	4	< 2
Total Recoverable Cadmium	mg/kg dry wt	0.20	-	< 0.10	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	37	-	47	51	13
Total Recoverable Copper	mg/kg dry wt	21	-	15	23	7
Total Recoverable Lead	mg/kg dry wt	37	-	11.1	16.9	11.3
Total Recoverable Nickel	mg/kg dry wt	27	-	25	37	10
Total Recoverable Zinc	mg/kg dry wt	80	-	38	32	19
BTEX in Soil by Headspace GC-MS						
Benzene	mg/kg dry wt	-	< 0.06	-	-	-
Toluene	mg/kg dry wt	-	< 0.06	-	-	-
Ethylbenzene	mg/kg dry wt	-	< 0.06	-	-	-
m&p-Xylene	mg/kg dry wt	-	< 0.12	-	-	-
o-Xylene	mg/kg dry wt	-	< 0.06	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.014	-
2-Methylnaphthalene	mg/kg dry wt	-	-	-	< 0.014	-
Perylene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	-	-	-	< 0.04	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	-	-	-	< 0.04	-
Acenaphthylene	mg/kg dry wt	-	-	-	< 0.014	-
Acenaphthene	mg/kg dry wt	-	-	-	< 0.014	-
Anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[e]pyrene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	< 0.014	-
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Chrysene	mg/kg dry wt	-	-	-	< 0.014	-
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	< 0.014	-
Fluoranthene	mg/kg dry wt	-	-	-	< 0.014	-
Fluorene	mg/kg dry wt	-	-	-	< 0.014	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	< 0.014	-

Sample Type: Soil						
Sample Name:		AME_HA115_0.1-0.2 22-Aug-2018	AME_HA115_0.6-0.7 22-Aug-2018	AME_HA117_0.3-0.4 22-Aug-2018	AME_HA117_1.7-1.8 22-Aug-2018	AME_HA116_0.25-0.35 22-Aug-2018
Lab Number:		2036105.1	2036105.2	2036105.3	2036105.4	2036105.6
Polycyclic Aromatic Hydrocarbons Screening in Soil						
Naphthalene	mg/kg dry wt	-	-	-	< 0.07	-
Phenanthrene	mg/kg dry wt	-	-	-	< 0.014	-
Pyrene	mg/kg dry wt	-	-	-	< 0.014	-
Total of Reported PAHs in Soil*	mg/kg	-	-	-	< 0.4	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	< 9	-	-	-
C10 - C14	mg/kg dry wt	-	< 20	-	-	-
C15 - C36	mg/kg dry wt	-	< 40	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	< 70	-	-	-

Sample Name:		AME_HA116_0.8-0.9 22-Aug-2018	AME_HA119_0.15-0.25 22-Aug-2018	AME_HA119_1.2-1.3 22-Aug-2018	AME_HA120_0.4-0.5 22-Aug-2018	AME_HA123_0.2-0.3 22-Aug-2018
Lab Number:		2036105.7	2036105.10	2036105.11	2036105.13	2036105.16
Individual Tests						
Dry Matter	g/100g as rcvd	58	-	-	71	81
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	2	2	< 2
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	0.12	< 0.10	< 0.10
Total Recoverable Chromium	mg/kg dry wt	3	32	31	41	13
Total Recoverable Copper	mg/kg dry wt	9	11	12	9	8
Total Recoverable Lead	mg/kg dry wt	42	14.0	22	12.3	9.6
Total Recoverable Nickel	mg/kg dry wt	4	19	16	16	15
Total Recoverable Zinc	mg/kg dry wt	12	26	40	27	19
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
Perylene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.05	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.05	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.017	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.017	-	-	-	-
Anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Chrysene	mg/kg dry wt	< 0.017	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Fluorene	mg/kg dry wt	< 0.017	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.09	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.017	-	-	-	-
Pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Total of Reported PAHs in Soil*	mg/kg	< 0.4	-	-	-	-
Pentachlorophenol Screening in Soil by LCMSMS						
Pentachlorophenol (PCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05
2,3,4,6-Tetrachlorophenol (TCP)	mg/kg dry wt	-	-	-	< 0.05	< 0.05

Sample Type: Soil						
Sample Name:		AME_HA116_0.8-0.9 22-Aug-2018	AME_HA119_0.15-0.25 22-Aug-2018	AME_HA119_1.2-1.3 22-Aug-2018	AME_HA120_0.4-0.5 22-Aug-2018	AME_HA123_0.2-0.3 22-Aug-2018
Lab Number:		2036105.7	2036105.10	2036105.11	2036105.13	2036105.16
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 10	-	-	-	-
C10 - C14	mg/kg dry wt	< 20	-	-	-	-
C15 - C36	mg/kg dry wt	< 40	-	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	< 70	-	-	-	-

Sample Name:		AME_HA123_0.85-0.95 22-Aug-2018	AME_HA123_1.2-1.3 22-Aug-2018			
Lab Number:		2036105.17	2036105.18			
Individual Tests						
Dry Matter	g/100g as rcvd	74	71	-	-	-
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	< 2	< 2	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	< 0.10	-	-	-
Total Recoverable Chromium	mg/kg dry wt	13	11	-	-	-
Total Recoverable Copper	mg/kg dry wt	3	3	-	-	-
Total Recoverable Lead	mg/kg dry wt	5.7	4.4	-	-	-
Total Recoverable Nickel	mg/kg dry wt	7	6	-	-	-
Total Recoverable Zinc	mg/kg dry wt	18	16	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil						
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)	mg/kg dry wt	< 0.04	< 0.04	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Acenaphthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Chrysene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluoranthene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Fluorene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	-	-	-
Phenanthrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Pyrene	mg/kg dry wt	< 0.014	< 0.014	-	-	-
Total of Reported PAHs in Soil*	mg/kg	< 0.4	< 0.4	-	-	-

Analyst's Comments

Appendix No.1 - Chain of Custody

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**	**Sample No**

Sample Type: Soil			
Test	**Method Description**	**Default Detection Limit**	**Sample No**
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 [KBIs:5786,2805,10734;2695]	-	7
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1, 3-4, 6-7, 10-11, 13, 16-18
BTEX in Soil by Headspace GC-MS	Solvent extraction, Headspace GC-MS analysis US EPA 8260B. Tested on as received sample [KBIs:5782,26687,3629]	0.05 - 0.10 mg/kg dry wt	2
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. [KBIs:5786,2805,2695]	-	4, 17-18
Pentachlorophenol Screening in Soil by LCMSMS	Solvent extraction with sonication, dilution, analysis by LCMSMS with online SPE. Tested on dried sample	0.010 mg/kg dry wt	13, 16
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 [KBIs:5786,2805,10734]	8 - 60 mg/kg dry wt	2
Dry Matter (Env)	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	2, 4, 7, 13, 16-18
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES	BaP Potency Equivalence calculated from Benz(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1 + Chrysene x 0.01 + Dibenz(a,h)anthracene x 1 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.002 mg/kg dry wt	4, 7, 17-18
Benzo[a]pyrene Toxic Equivalence (TEF)	BaP Toxic Equivalence calculated from Benzo(a)anthracene x 0.1 + BaP x 1 + Benzo(b)fluoranthene x 0.1 + Benzo(k) fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.1 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.002 mg/kg dry wt	4, 7, 17-18
Total of Reported PAHs in Soil*	Sonication extraction, SPE cleanup, GC-MS SIM analysis.	0.3 mg/kg	4, 7, 17-18

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Samples are held at the laboratory after reporting for a length of time depending on the preservation used and the stability of the analytes being tested. Once the storage period is completed the samples are discarded unless otherwise advised by the client.

Graham Corban MSc Tech (Hons)
Client Services Manager - Environmental

Hill Laboratories
BETTER TESTING BETTER RESULTS

ANALYSIS

Job No: 203 6105

Date Recv: 23-Aug-18 05:27

Received by: Nathaniel Sue

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

3120361056

Client

Name AECOM New Zealand Limited

Address 8 Mahuhu Crescent

Phone *Fax*

Client Reference

Quote No *Order Number* 60563280/3.3.1

Primary Contact Naomi Macorison

Submitted By Suresh Nuthalapati

Charge To Aecom Auckland

Results To ☑ Mail Client ☑ Mail Submitter

☐ Fax Results

☑ Email Results Naomi.Macorison@aecom.com

Office use only Job No:

CHAIN OF CUSTODY RECORD

Sent to Hill Laboratories
Date & Time: 23/08/2018
Name: Suresh Nuthalapati
☑ *Please tick if you require COC to be faxed back*
Signature: S.N

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

Condition *Temp:*
☐ *Room Temp* ☐ *Chilled* ☐ *Frozen*

☐ Sample Analysis details checked
Signature:

ADDITIONAL INFORMATION

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/COWL/Initial/Final flow/Total Time*
1	AME_HA115_0.1-0.2	22/08/2018	ES	Metals
2	AME_HA115_0.6-0.7	22/08/2018	ES	TPH&BTEX
3	AME_HA117_0.3-0.4	22/08/2018	ES	Metals
3	AME_HA117_1.7-1.8	22/08/2018	ES	Metals & PAH
4	AME_HA117_2.5-2.6	22/08/2018	ES	Hold cold
5	AME_HA116_0.25-0.35	22/08/2018	ES	Metals
6	AME_HA116_0.8-0.9	22/08/2018	ES	Metals, TPH & PAH
7	AME_HA116_1.6-1.7	22/08/2018	ES	Hold cold
8	AME_HA116_1.9-2.0	22/08/2018	ES	Hold cold
9	AME_HA119_0.15-0.25	22/08/2018	ES	Metals
10	AME_HA119_1.2-1.3	22/08/2018	ES	Metals

No.	Sample Name	Sample Date & Time	Sample Type	Tests Required/COWL/Initial/Final flow/Total Time
11	AME_HA119_2.5-2.6	22/08/2018	ES	Hold cold
12	AME_HA120_0.4-0.5	22/08/2018	ES	Metals & PCP
13	AME_HA120_1.1-1.2	22/08/2018	ES	Hold cold
14	AME_HA120_1.9-2.0	22/08/2018	ES	Hold cold
15	AME_HA123_0.2-0.3	22/08/2018	ES	Metals & PCP
16	AME_HA123_0.85-0.95	22/08/2018	ES	Metals & PAH
17	AME_HA123_1.2-1.3	22/08/2018	ES	Metals & PAH
18	AME_HA123_1.5-1.6	22/08/2018	ES	Hold cold
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				

About AECOM

AECOM is built to deliver a better world. We design, build, finance and operate infrastructure assets for governments, businesses and organizations in more than 150 countries. As a fully integrated firm, we connect knowledge and experience across our global network of experts to help clients solve their most complex challenges. From high-performance buildings and infrastructure, to resilient communities and environments, to stable and secure nations, our work is transformative, differentiated and vital. A Fortune 500 firm, AECOM had revenue of approximately $18.2 billion during fiscal year 2017. See how we deliver what others can only imagine at aecom.com and @AECOM.

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