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Environmental Site Assessment: Detailed Site Investigation for

538 Karangahape Road, Newton

Rev A **29 August 2023** **Job No. 220086**

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ENVIRONMENTAL SITE ASSESSMENT: DETAILED SITE INVESTIGATION FOR 538 KARANGAHAPE ROAD, NEWTON

Job Number:	220086
Name of Project:	538 Karangahape Road, Newton
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Executive Summary

Soil & Rock Consultants completed a field investigation and prepared a Detailed Site Investigation for the proposed redevelopment at 538 Karangahape Road, Newton.

Soil samples were collected from across the site and analysed for Contaminants of Concern. Laboratory analytical results reported:

- All Contaminants of Concern concentrations complied with Ministry for the Environment National Environmental Standards and/or Petroleum Hydrocarbon Guidelines Human Health criteria;
- Heavy Metals concentrations in three soil samples exceeded Auckland Unitary Plan Environmental Discharge criteria;
- Asbestos was detected in two soil samples, but at concentrations below Asbestos Human Health Soil Guideline Values; and
- Heavy Metals concentrations were above Background Levels or Total Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons concentrations were above laboratory Method Detection Limits in most soil samples.

Based on these findings:

- A Site Management Plan / Remediation Action Plan has been prepared for the site;
- Soil/fill material with Contaminants of Concern concentrations above applicable Environmental Discharge criteria should be remediated (excavated and disposed of off-site or otherwise isolated);
- Any fill material/soil with Heavy Metals concentrations above Background Levels or Total Petroleum Hydrocarbons or Polycyclic Aromatic Hydrocarbons concentrations above laboratory Method Detection Limits is not considered 'Cleanfill' for disposal purposes and must be disposed of at a facility licensed to accept such materials; and
- Any visual/olfactory evidence of contamination discovered during site works must be segregated and analysed prior to disposal.

Our findings, conclusion and recommendations are detailed in the following report and appendices.

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1.0 Introduction

Soil & Rock Consultants (S&RC) were engaged by James Kirkpatrick Group Limited to carry out a Detailed Site Investigation (DSI) in association with the proposed redevelopment at 538 Karangahape Road, Newton, the 'site' shown in Figure 1 below and in S&RC Drawing 220086/1 provided in Appendix A.

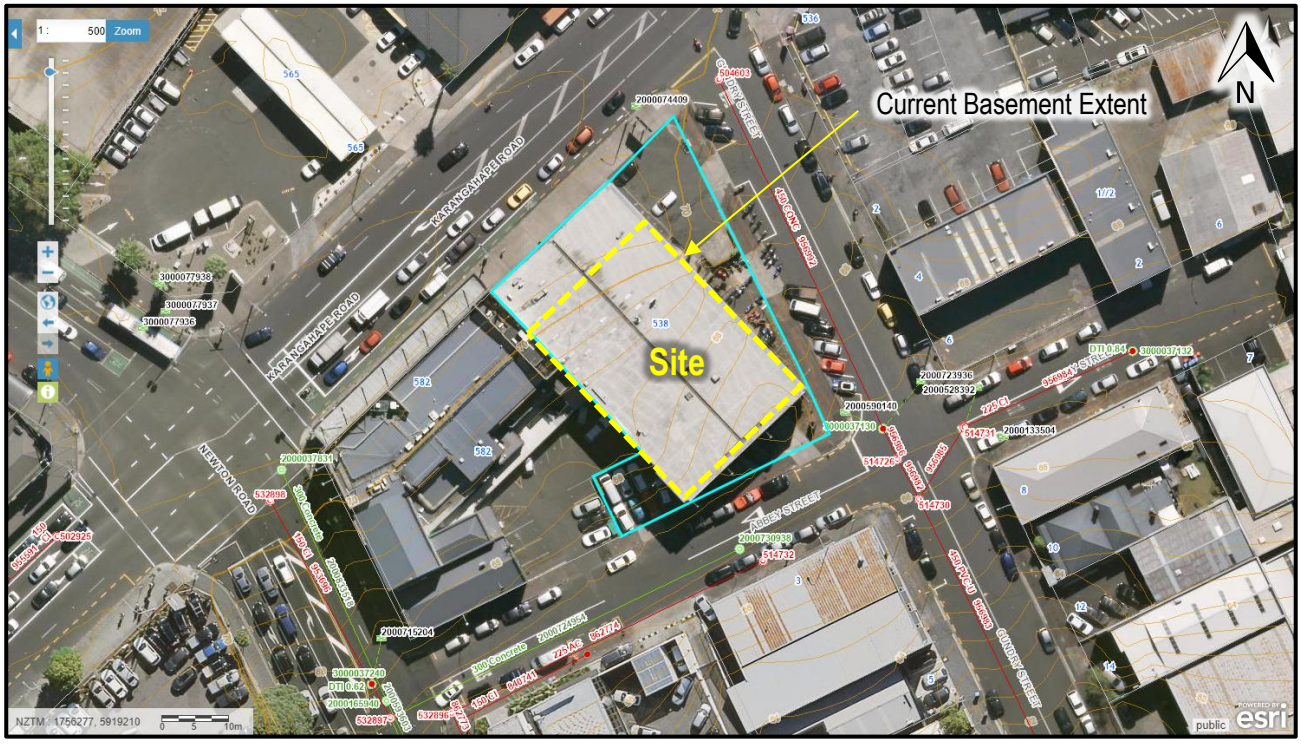

Figure 1: Site Location *(Source: Auckland Council GeoMaps Website)*

This report comprises a DSI prepared in accordance with Ministry for the Environment's (MfE) guidelines for contaminated site investigations, National Environmental Standard (NES) for contaminated sites and Auckland Council requirements. This investigation and reporting have been prepared, reviewed and authorised by Suitably Qualified and Experienced Practitioners (SQEP), as required under the NES.

1.1 Limitations

This report has been prepared by Soil & Rock Consultants for the sole benefit of James Kirkpatrick Group Limited (the client), with respect to the proposed redevelopment at 538 Karangahape Road, Newton and the brief given to us. This report may be used by Auckland Council or their appointed Consultants, if required, and may be relied upon when considering a Resource Consent application in association with the proposed redevelopment.

The data and/or opinions contained in this report may not be used in other contexts or for any other purpose or by any other party without our prior review and agreement. This report may only be read or transmitted in its entirety, including the appendices.

1.2 Site Description

The subject site is legally described as Lot 1 DP 570848, covering an area of 1,597m^2. Under the Auckland Unitary Plan (AUP), the site is zoned 'Business – City Centre Zone'.

Built development onsite previously comprises a three-storey commercial building. At the time of this report, only the basement slab (66.13mRL) and retaining walls remained. Current retained heights extend to a maximum of approximately 5.0m in the northwestern corner of the basement (see Figure 1). The remainder of the site is covered in gravel or asphalt.

1.3 Proposed Redevelopment

Drawings prepared by Fearon Hay Architects show the proposed redevelopment will comprise construction of a ten-level building, with two basement levels below as shown in Figure 2. Cuts to a maximum depth of 7.5m are required to form the basement levels. Minimal filling is expected to be required.

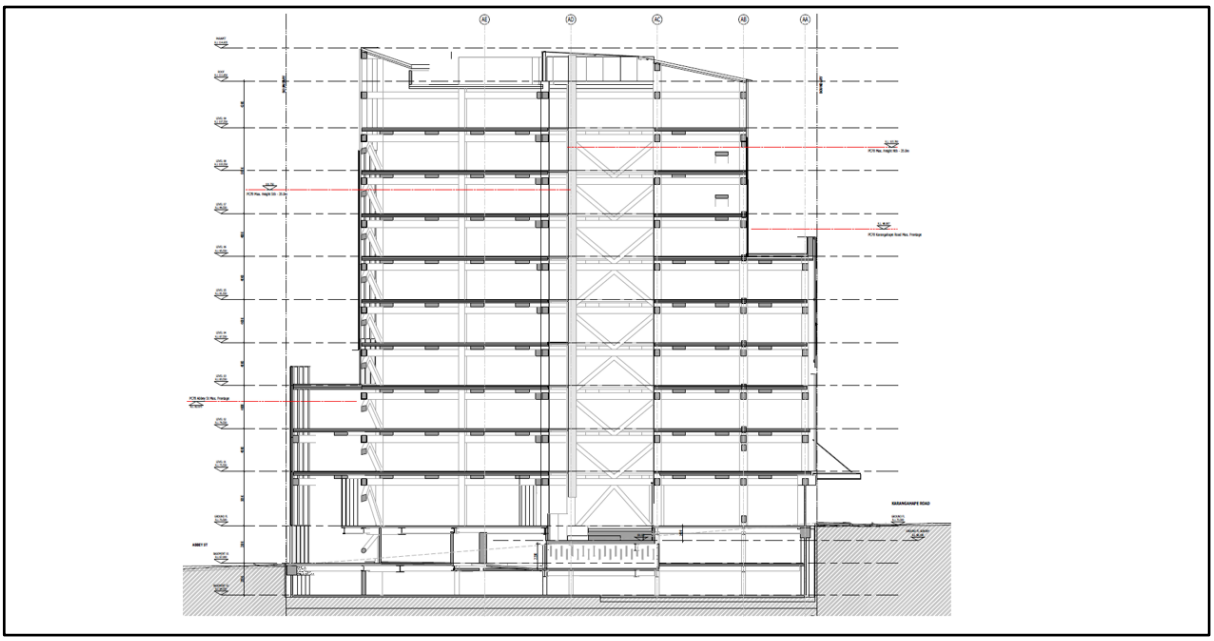

Figure 2: Proposed Development (Source: Basement 2 Reference Plan by Feron Hay Architects)

1.4 Project Scope

This investigation comprises a DSI, including the following:

- Review from S&RC's previous environmental investigation (Ref. 220086, *Soil Benchmarking Report – 538 Karangahape Road, Auckland City*, 18 March 2022);
- Collection and laboratory analyses of soil samples for identified Contaminants of Concern (CoC);
- Interpretation of laboratory analytical results; and
- DSI reporting (this report).

2.0 Geology, Surface Water and Groundwater

According to the GNS Science New Zealand Geology Web Map, 1:250,000 Scale, the site is underlain by the East Coast Bays Formation sediments of the Waitemata Group (Non-Volcanic Soils).

A geologic map of the site and surrounding area is provided in Figure 2 below.

Figure 3: Geological Map *(Source: GNS WebMaps Website)*

During S&RC's geotechnical investigation completed concurrently with this investigation, fill material was encountered beneath the site (underneath concrete/asphalt pavement) to depths between 0.3m below ground level (blg) and 5.9m bgl, underlain by Weathered Waitemata Group Soils and Waitemata Group Rock to the termination depths of the borehole (maximum termination depth of 19.7m bgl) (Ref. 20111, *Geotechnical Investigation for Multi-Level Commercial Building at 538 Karangahape Road, Newton*, 22 August 2023). Bore logs are attached in Appendix B.

An overview of the Auckland Council Geomaps did not identify any surface water receptor within 500m radius of the site. The nearest surface water to the site is Waitemata Harbour, located approximately 1.7km to the north of the site.

The site surface and surrounding area slopes gently to the south and southeast at inclinations to less than 10°. Auckland Council Geomaps indicates the presence of reticulated service lines (e.g. stormwater and wastewater) surrounding the site's perimeter.

As the site is located in an urban area, any surface water runoff from onsite is anticipated to flow towards the nearby municipal drain located on Abbey Street to the south of the site.

During S&RC's geotechnical investigation completed in August 2023, groundwater was encountered beneath the site at depths between 1.5m bgl and 5.4m bgl. Based on the site and surrounding topography, groundwater flow direction beneath the site is anticipated to be to the north towards the Waitemata Harbour.

3.0 Previous Environmental Investigations

An overview of previous built development onsite is shown in Figure 4.

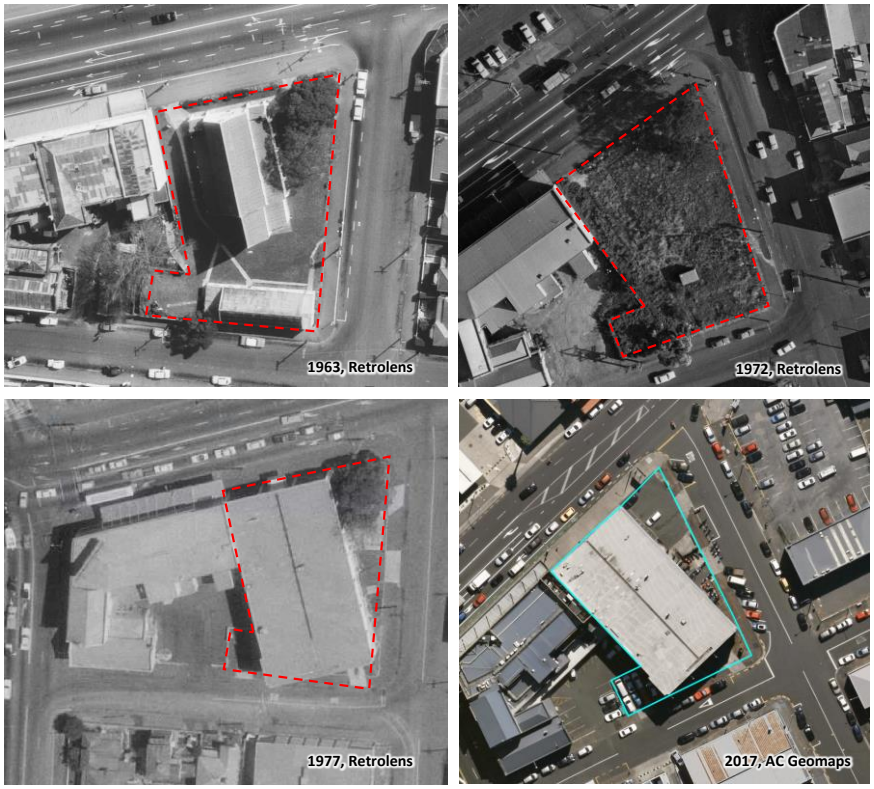

Figure 4: Previous Built Development

Preliminary Site Investigation, 2020, GHD Limited

In 2020, GHD Limited completed a Preliminary Site Investigation (PSI) for the site (Ref. 12/54/2917, *Preliminary Site Investigation – 538 Karangahape Road, Auckland*, November 2020). The PSI identified the following potential Hazardous Activities and Industries List (HAIL) activities or former activities at the site:

- Storage of tanks or drums for fuel, chemicals or liquid waste (HAIL Cat. A. 17);
- Asbestos products manufacture or disposal including sites with buildings containing Asbestos products known to be in a deteriorated condition (HAIL Cat. E. 1); and
- Motor vehicle workshops (HAIL Cat. F. 4).

Two structures were present onsite between 1940 and 1959 (cleared by 1970). The existing (as of the 2020 PSI) building onsite was constructed between 1970 and 1985 (already built from the 1985 aerial image). Property Files (i.e. Building Consent plan, dated 1973) and a Council Contamination Enquiry indicated the installation of underground waste oil tanks onsite. No further information was provided in the report regarding the tank removal.

More recent use of the existing building includes commercial tenancies including a bicycle showroom and workshop within the third floor (northern section), showroom and workshop for motor vehicles within the second floor, and an auto mechanical shop within the first floor (southern section of the building).

The GHD PSI recommended that further investigation (including sampling of underlying soils onsite) be carried out in relation to future site works.

Soil Benchmarking Assessment, March 2022, S&RC

In March 2022, S&RC completed a Soil Benchmarking Assessment at the site in support of a previous development scheme (Ref. 220086, *Soil Benchmarking Report – 538 Karangahape Road, Auckland City*, 18 March 2022). Limited soil sampling was undertaken to assess potential site contamination. Five soil samples were analysed for Heavy Metals, Total Petroleum Hydrocarbons (TPH), Polycyclic Aromatic Hydrocarbons (PAH) and/or Asbestos. Analytical results reported:

- All CoC concentrations complied with applicable MfE NES and Petroleum Hydrocarbon Guidelines (PHG) Commercial/Industrial Human Health criteria;
- Heavy Metals (Lead) concentrations in three soil samples (SS1, SS4 and SS5) exceeded AUP Environmental Discharge criteria;
- Asbestos was detected in two soil samples, but with Fibrous Asbestos/Asbestos Fines (FA/AF) concentrations below applicable Human Health Soil Guideline Values (SGV); and
- Heavy Metals concentrations were above Background Levels and/or TPH and PAH concentrations were above laboratory Method Detection Limits (MDL) in all soil samples.

Full tabulated results are provided in Table 2 in Section 7.0 of this document.

4.0 Soil Contamination Investigation

4.1 Identified Contaminants of Concern

The site was identified for potential soil contamination during the review of historical information and previous investigation reports. Of relevance to the site history, identified potential CoC for the site included Heavy Metals, TPH, PAH, and Asbestos.

4.2 Soil Investigation

Soil sampling was completed on two occasions at the site. Initial soil sampling was undertaken on 18 February 2022 as part of a Soil Benchmarking Assessment and Supplementary Soil Sampling was undertaken between 3 and 5 July 2023 as part of this DSI (this report).

Across the two sampling events, a total of 16 soil samples (seven shallow soil samples and nine deeper soil samples) were collected. All soil samples were submitted to the subcontract laboratory (Eurofins) for analysis of potential CoC, including Heavy Metals, TPH, PAH and/or Asbestos. Soil sampling details are described in Table 1 below. Sampling locations are shown on S&RC Drawing 220086/1 provided in Appendix A.

Table 1 – Sample Descriptions

Location ID	Sample ID	Fieldwork Date	Depth (m bgl)	Soil Description	Analyses Performed
SS1	SS1	18 Feb 2022	0.35	Fill (Silt)	Heavy Metals, TPH, PAH, Asbestos
	SS1-1		0.8 – 1.0	PF (Silt)	Heavy Metals, TPH, PAH
SS3	SS3		0.1	Fill (Silt)	Heavy Metals, TPH, PAH, Asbestos
SS4	SS4		0.1	Fill (Silt)	Heavy Metals, TPH, PAH, Asbestos
SS5	SS5		0.1	Fill (Silt)	Heavy Metals, TPH, PAH, Asbestos
MB04*	MB01-1	4 Jul 2023	0.1 – 0.2	Fill (Gravel)	Heavy Metals, TPH, PAH, Asbestos
	MB01-2		0.8 – 1.1	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB01-3		2.0 – 2.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB01-4		3.0 – 3.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
MB05*	MB02-2	3 Jul 2023	1.0 – 1.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB02-3		2.0 – 2.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB02-4		3.0 – 3.2	WWGS (Silt)	Heavy Metals, TPH, PAH, Asbestos
MB06*	MB03-1	5 Jul 2023	0.1 – 0.2	Fill (Gravel)	Heavy Metals, TPH, PAH, Asbestos
	MB03-2		1.0 – 1.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB03-3		2.0 – 2.2	PF (Silt)	Heavy Metals, TPH, PAH, Asbestos
	MB03-4		3.0 – 3.2	WWGS (Silt)	Heavy Metals, TPH, PAH, Asbestos

ID = Identifier
m bgl = metres below ground level
PF = Puketoka Formation Soils (Natural)
WWGS = Weathered Waitemata Group Soils (Natural)
PAH = Polycyclic Aromatic Hydrocarbons
TPH = Total Petroleum Hydrocarbons
** MB04, MB05 & MB06 – corresponding Machine bores, as referred from S&RC's 2023 Geotechnical Investigation.*

4.3 Soil Sampling Protocol

The DSI field investigation (3-5 July 2023) was carried out in conjunction with S&RC's Geotechnical Investigation (GIR Ref. 20111, *Geotechnical Investigation for Multi-Level Commercial Building at 538 Karangahape Road, Newton*, 22 August 2023) with soil samples collected from machine bores advanced at three locations.

Soil sampling equipment was decontaminated between sampling locations and disposable nitrile gloves were used and replaced between sampling locations in order to prevent cross contamination. All samples were collected in accordance with strict environmental sampling protocols to ensure reliable and representative results.

All sample containers were supplied by the subcontract laboratory and were consistent with specifications provided in Section 6.4 (Sample Handling) of Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis of Soils (MfE, Revised 2021). All samples were labelled with unique identifiers indicating the sampling location. Samples were couriered directly to the laboratory (Eurofins) under continuous Chain of Custody (COC) documentation. Each COC form had a unique laboratory number.

5.0 Regulations

Within the Auckland Region, investigations of contaminated and potentially contaminated sites are governed by rules under:

- MfE NES and PHG – National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (MfE, revised 2021) and Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (MfE, revised 2011);
- AUP – Auckland Unitary Plan Operative in part (notified 15 November 2016); and
- New Zealand Guidelines for Assessing and Managing Asbestos in Soil (Building Research Association New Zealand [BRANZ], 2017).

While part of our report assesses potential planning and Resource Consent requirements from relevant authorities, these sections are provided for reference only. Guidance/clarification should be sought from an Environmental Planning Specialist.

5.1 National Environmental Standard – Contaminants in Soil

The Resource Management Regulations 2011, National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) came into force on 1 January 2012, with Contaminated Land Management Guidelines revised in 2011 and 2021. The NES for contaminants in soil incorporates by

reference MfE contaminated land documents, including MfE Contaminated Land Management Guidelines for the investigation, assessment and reporting of contaminated land within New Zealand. These documents are aimed to provide national consistency in the reporting of contaminated site information. These documents are:

- Contaminated Land Management Guidelines (No. 1, 2 and 5);
- HAIL;
- Methodology of Deriving Soil Guideline Values Protective of Human Health; and
- Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.

Copies of the above guideline documents are available at www.mfe.govt.nz.

5.2 Auckland Unitary Plan

The AUP (notified 15 November 2016) is Auckland's key resource management document under the Resource Management Act (RMA, 1991). Matters relating to contaminated land can be referred from:

- Regional Policy Statement (B10.4 Land – Contamination); and
- Chapter E Auckland-wide, Environmental Risk (E.30 Contaminated Land).

5.3 New Zealand Guidelines for Assessing and Managing Asbestos in Soil

The New Zealand Guidelines for Assessing and Managing Asbestos in Soil were published in 2017. The guidelines provide direction around identifying, assessing and managing Asbestos in soil in New Zealand and establish Human Health SGV.

6.0 Assessment Criteria

The site is zoned 'Business – City Centre Zone'. The proposed redevelopment for the site comprises construction of a new commercial building. For this assessment, soil analytical results were compared against:

- NES Commercial/Industrial Human Health criteria;
- PHG Human Health criteria for Commercial/Industrial use;
- AUP Environmental Discharge criteria; and
- Asbestos SGV for Commercial and Industrial sites.

Due to the Puketoka Formation soils and Waitemata Group sediments mapped and encountered beneath the site, soil analytical results were also compared against:

- Auckland Region Background Levels for Non-Volcanic soils.

7.0 Analytical Results

Sixteen soil samples (seven shallow soil samples and nine deeper soil samples) were collected across two sampling events and analysed for CoC, including Heavy Metals, TPH, PAH and/or Asbestos. Laboratory analytical results reported:

- All CoC concentrations complied with MfE NES and PHG Commercial/Industrial Human Health criteria;
- Heavy Metals (Lead) concentrations in three soil samples (SS1, SS4 and SS5), comprising shallow (less than 0.4m bgl) fill material, exceeded AUP Environmental Discharge criteria;
- Asbestos was detected in two soil samples (SS1 and SS4), but with FA/AF concentrations below applicable Asbestos Human Health SGV; and
- Heavy Metals concentrations were above Background Levels and/or TPH and PAH concentrations were above laboratory MDL in most soil samples.

Laboratory analytical results are summarised in Tables 2 and 2a below. Soil sampling locations are shown on S&RC Drawing 220086/1 provided in Appendix A. Laboratory analytical results and COC documentation are provided in Appendix C.

Table 2: Soil Analytical Results (S&RC Soil Benchmarking Report, March 2022)

		Test Analysis Levels (mg/kg)					MfE			AUP [3]	Asbestos SGV [4]	Background Level (Non-Volcanic) [5]
Sample ID		SS1	SS1-1	SS3	SS4	SS5	NES [1]	PHG [2]				
Sample Soil Type		Fill (Silt)	PF (Silt)	Fill (Silt)	Fill (Silt)	Fill (Silt)		Sandy Silt				
Sample Depth (m)		0.35	0.8 – 1.0	0.1	0.1	0.1		<1m	1m – 4m			
Heavy Metals	As	4.8	3.3	12	8.8	11	70	-	-	100	-	12
	Cd	0.17	< MDL	0.34	0.39	0.74	1,300	-	-	7.5	-	0.65
	Cr	25	17	47	72	50	6,300	-	-	400	-	55
	Cu	59	6.3	57	44	150	10,000	-	-	325	-	45
	Pb	**830**	14	170	**250**	**260**	3,300	-	-	250	-	65
	Hg	0.32	0.16	0.15	0.29	0.21	4,200	-	-	0.75	-	0.45
	Ni	43	7.1	67	51	51	3,000 [6]	-	-	105	-	35
	Zn	110	9.8	200	190	280	35,000 [6]	-	-	400	-	180
TPH	C_7-C_9	< MDL	< MDL	< MDL	< MDL	< MDL	-	(500) [m]	(500) [m]	-	-	-
	C_{10}-C_{14}	< MDL	< MDL	< MDL	< MDL	< MDL	-	(1,700) [x]	(2,200) [x]	-	-	-
	C_{15}-C_{36}	< MDL	< MDL	46	23	62	-	(20,000)	(20,000)	-	-	-
PAH	BaP Eq.	14	0.04	2.2	6.1	0.88	35	- [7]	- [7]	20	-	-
	Naphthalene	0.2	< MDL	< MDL	0.2	< MDL	-	(210) [v]	(270) [v]	-	-	-
	Pyrene	14	0.05	3.9	9.9	1.4	-	(20,000)	(20,000)	-	-	-
Asbestos	D/ND	**D**	-	ND	**D**	ND	-	-	-	-	-	-
	ACM	-	-	-	-	-	-	-	-	-	0.05	-
	FA/AF	0.0000059	-	-	0.00064	-	-	-	-	-	0.001	-

Table 2a: Soil Analytical Results (S&RC Detailed Site Investigation – July 2023)

		Test Analysis Levels (mg/kg)											MfE					AUP [3]	Asbestos SGV [4]	Background Level (Non-Volcanic) [5]
Sample ID		MB01-1	MB01-2	MB01-3	MB01-4	MB02-2	MB02-3	MB02-4	MB03-1	MB03-2	MB03-3	MB03-4	NES [1]	PHG [2]						
Sample Soil Type		Gravel	Silt	Silt	Silt	Silt	Silt	Silt	Gravel	Silt	Silt	Silt		Sandy Silt						
Sample Depth (m)		0.1	0.8	2.0	3.0	1.0	2.0	3.0	0.1	1.0	2.0	3.0		<1m	1m – 4m					
Heavy Metals	As	3.3	3.3	1.7	1	12	1.2	8.8	6.6	1	1.1	1.7	70	-	-				100	-	12
	Cd	0.11	< MDL	0.11	< MDL	0.01	0.02	0.06	0.19	< MDL	< MDL	< MDL	1,300	-	-				7.5	-	0.65
	Cr	39	17	13	12	23	24	25	28	21	28	24	6,300	-	-				400	-	55
	Cu	57	2.9	4.2	3.9	8.7	5.6	16	31	4.1	5.8	7.5	10,000	-	-				325	-	45
	Pb	32	7.3	6	3.2	19	5.2	5.1	31	6.2	5.1	5.2	3,300	-	-				250	-	65
	Hg	0.08	0.11	0.15	0.07	0.18	0.06	0.08	0.07	0.14	0.09	0.06	4,200	-	-				0.75	-	0.45
	Ni	110	5.5	5.4	1.1	10	3.8	2.7	34	6.3	3.2	3.3	3,000 [6]	-	-				105	-	35
	Zn	87	6.9	5.5	< MDL	15	16	17	110	5.8	< MDL	5.4	35,000 [6]	-	-				400	-	180
TPH	C_7-C_9	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	-	(500) [m]	(500) [m]				-	-	-
	C_{10}-C_{14}	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	-	(1,700) [x]	(2,200) [x]				-	-	-
	C_{15}-C_{36}	140	110	33	< MDL	150	69	74	140	77	< MDL	< MDL	-	(20,000)	(20,000)				-	-	-
PAH	BaP Eq.	1.8	0.99	0.08	0.04	0.5	0.04	0.05	0.5	0.24	0.04	0.05	35	- [7]	- [7]				20	-	-
	Naphthalene	< MDL	0.8	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	< MDL	-	(210) [v]	(270) [v]				-	-	-
	Pyrene	< MDL	0.77	0.28	< MDL	0.71	< MDL	< MDL	0.95	0.62	< MDL	< MDL	-	(20,000)	(20,000)				-	-	-
Asbestos	D/ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	-	-	-				-	-	-
	ACM	-	-	-	-	-	-	-	-	-	-	-	-	-	-				-	0.05	-
	FA/AF	-	-	-	-	-	-	-	-	-	-	-	-	-	-				-	0.001	-

Notes: Concentration: Values below accepted Background Levels (Heavy Metals) and/or laboratory MDL (TPH, PAH)
Concentration: Values above accepted Background Levels and/or laboratory MDL but in compliance with relevant criteria
Concentration: Values above relevant acceptance criteria
ND = Asbestos Not Detected **D** = Asbestos Detected

[1] NES – MfE NES Human Health Criteria for Commercial/Industrial Use (MfE, 2012)
[2] PHG – Soil MfE Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (2011) Tier 1 Soil Acceptance Criteria for Commercial/Industrial Use (All Pathways), 'Sandy Silt' soil types, <1m. Brackets denote values exceed threshold likely to correspond to formation of residual separate phase hydrocarbons. Limiting pathway for each criterion: v = volatilisation, s = soil ingestion, d = dermal, p = produce, m = maintenance/excavation, x = PAH surrogate
[3] AUP – AUP Permitted Activity Soil Acceptance Criteria for Environmental Discharge: Auckland Unitary Plan Operative in part (AUP, 2016)
[4] Asbestos SGV – Asbestos Soil Guidelines Values (%w/w) for Asbestos Containing Material (ACM) and Fibrous Asbestos/Asbestos Fines (FA/AF) for Commercial and Industrial sites, New Zealand Guidelines for Assessing and Managing Asbestos in Soil (BRANZ, 2017).
[5] Auckland Region Background Level – Schedule 11: Auckland Regional Plan (Non-Volcanic Soils)
[6] Australian Health Investigation Levels for Commercial/Industrial use (NEPC, 1999), applied in accordance with MfE Contaminated Land Guidelines No. 2
[7] Where NES and/or Regional Council acceptance criteria values are available, NES and/or Regional Council values are applied over PHG criteria

8.0 Discussion

8.1 Conceptual Site Model

A Conceptual Site Model (CSM) was developed for the site to provide a preliminary assessment of potential effects on Human Health and the Environment. The CSM is presented in Table 3 below:

Table 3 – Conceptual Site Model

Exposure Pathway	Potential Receptors	Risk Assessment	
Human Health Soil Ingestion, Inhalation (Dust), Dermal Contact, Produce	During Construction Subsurface Construction / Maintenance Workers	• CoC concentrations in all soil samples were below MfE NES and PHG Human Health criteria; • Asbestos was detected in two soil samples, but at concentrations below Human Health SGV; and • A Site Management Plan/Remediation Action Plan (SMP/RAP) has been prepared for the site, outlining remediation and control measures to be implemented prior to/during redevelopment.	Minimal Risk / Risk Must be Managed
	After Construction Subsurface Construction / Maintenance Workers, On-site Users		
Environmental Discharge Contaminant Migration	During Construction Groundwater, Flora / Fauna	• CoC concentrations exceeded applicable AUP Environmental Discharge criteria; • Asbestos was detected in two soil samples, but at concentrations below applicable Human Health SGV and therefore not considered a risk to the Environment; • Heavy Metals concentrations were above Background Levels and TPH and/or PAH concentrations were above laboratory MDL in most soil samples; • The nearest surface water to the site is located 1.7km north of the site; • Groundwater was encountered onsite at depths between 1.5m bgl and 5.4 m bgl beneath the site; • A SMP/RAP has been prepared for the site, outlining remediation and control measures to be implemented prior to/during redevelopment; and • Any fill material disposed of off-site will be disposed of at a facility licenced to accept such materials.	Risk Must be Managed
	During Construction Groundwater, Flora / Fauna		

8.2 Regulatory Implications

Based on findings from this investigation, Table 4 presents potential Resource Consent requirements for the proposed activity under the provisions of the NES and AUP. This investigation presents factual information for the site. Matters of control and discretion, however, rest with the consenting authority (Auckland Council) based on their assessment of this report. It would be appropriate to seek clarification of Auckland Council or an Environmental Planning Specialist for further information on resource consenting requirements.

Table 4 – Current Regulations and Potential Resource Consent Requirements

	Potential Applicable Planning Rules
National Environmental Standard (NES)	CONTROLLED ACTIVITY, subject to requirements under Rule 9 • A DSI (this investigation) has been prepared for the site; • Concentrations of target contaminants complied with NES Human Health criteria; • Asbestos was detected, but at concentrations below Human Health SGV; • Controlled Activity status assumes a SMP will be prepared for the site and the site will be managed; and • Conditions of Rule 9 must be complied with.
Auckland Unitary Plan Operative in part (AUP)	CONTROLLED ACTIVITY (Chapter E30.6.2) • A DSI (this investigation) has been prepared for the site; • Concentrations of target contaminants exceeded AUP Environmental Discharge criteria; • Asbestos was detected in soil samples, but at concentrations below Human Health SGV and therefore not considered a risk to the Environment; • Controlled Activity status assumes a SMP/RAP will be prepared for the site and the site will be managed/remediated; and • Conditions of Chapter E30.6.2 must be complied with.
Asbestos Regulations 2016, WorkSafe Guidelines	UNLICENSED ASBESTOS WORK • Asbestos was detected, but with FA/AF concentrations ≤0.001% and/or ACM concentrations ≤0.01%; and • Asbestos Regulations 2016 and WorkSafe Guidelines must be adhered to.

9.0 Conclusion

This DSI was carried out for the site in accordance with the scope of work and current applicable regulations. This report has been prepared in accordance with MfE's Guidelines for Contaminated Site Investigations and Auckland Council requirements. The investigation and reporting have been prepared, reviewed and authorised by SQEP, as required under the NES.

Sixteen soil samples (seven shallow soil samples and nine deeper soil samples) were collected from the site and analysed for CoC, including Heavy Metals, TPH, PAH, and/or Asbestos. Laboratory analytical results reported:

- All CoC concentrations complied with MfE NES and PHG Commercial/Industrial Human Health criteria;
- Heavy Metals (Lead) concentrations in three soil samples (SS1, SS4 and SS5), comprising shallow (less than 0.4m bgl) fill material, exceeded AUP Environmental Discharge criteria;
- Asbestos was detected in two soil samples (SS1 and SS4), but with FA/AF concentrations below Asbestos Human Health SGV; and
- Heavy Metals concentrations were above Background Levels and/or TPH and PAH concentrations were above laboratory MDL in most soil samples.

10.0 Recommendations

Based on these findings:

- A SMP/RAP has been prepared for the site, outlining remediation and control measures to be in place in order to ensure that site conditions are protective of Human Health and the Environment;
- Soil/fill material with Heavy Metals concentrations above applicable Environmental Discharge criteria shall be remediated (excavated and disposed of off-site or otherwise isolated);
- Any soil/fill material disposed of off-site as part of site redevelopment would not be considered 'Cleanfill' and must be disposed of at a facility licensed to accept such materials. Findings from this report should be presented to the receiving facility for reference; and
- Any visual/olfactory evidence of contamination discovered during site works should be segregated and analysed prior to disposal.

End of Report Text – Appendices Follow

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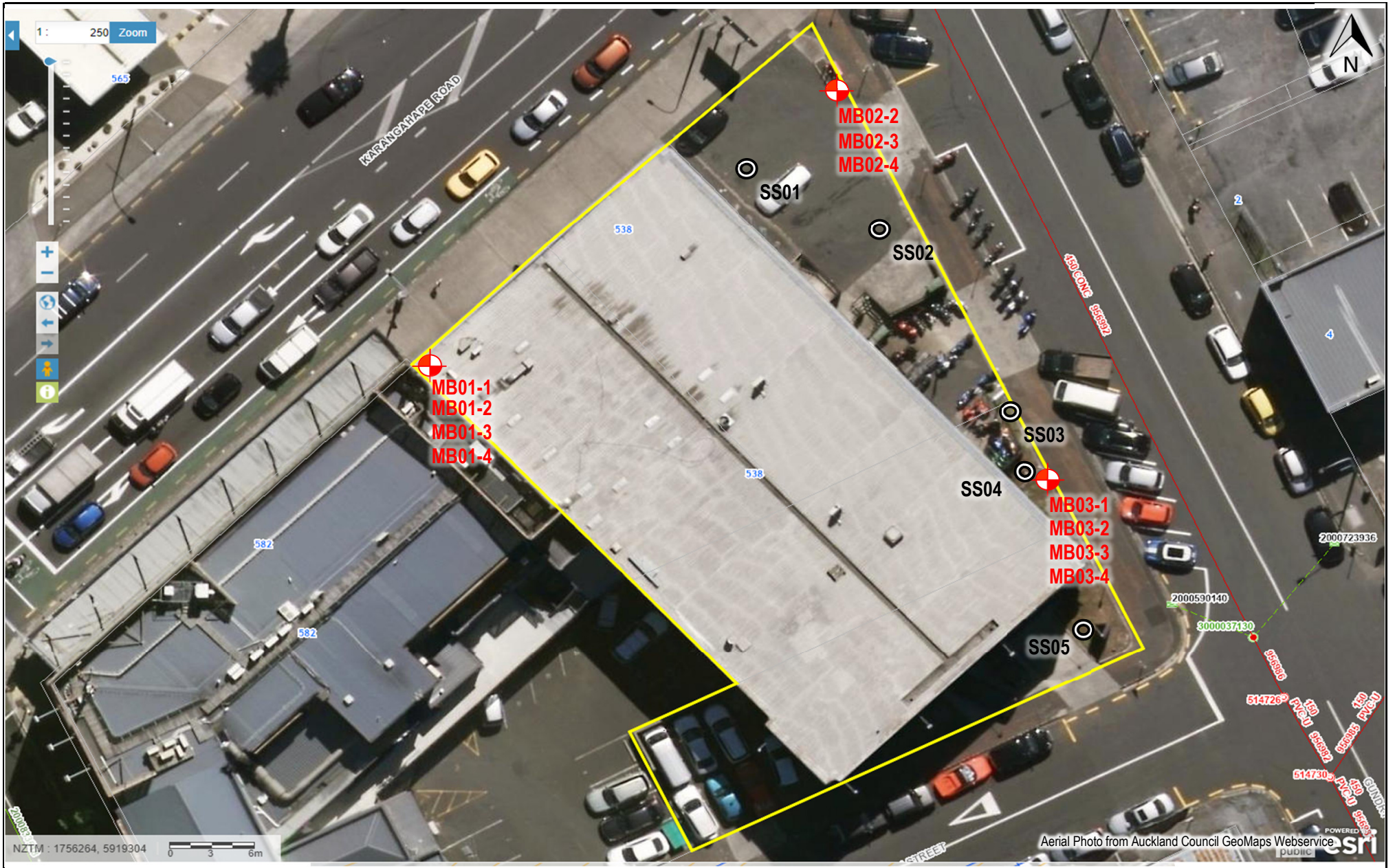
Appendix A

Investigation Plan



Soil&Rock Consultants *Your responsive & cost-effective engineers*	DRAWING NO: **220086 /1** DATE: August 2023 DRAWN: GC SCALE: NTS	**INVESTIGATION PLAN** **583 KARANGAHAPE ROAD, AUCKLAND CITY**	**Key:** SS01 S&RC Soil Sample Locations 18 Feb 2022 MB01 S&RC Soil Sample Locations 3-5 July 2023

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Appendix B

Machine Bore Logs (S&RC Geotechnical Investigation, 2023) – MB04, MB05 & MB06

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ04

Sheet 1 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	4/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	4/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
FILL		SILT, some fine to coarse gravel, some fine to coarse sand, grey, brown, stiff, wet, slightly plastic (FILL)		0.0			Flight Auger		Bentonite
WAITEMATA GROUP		SILT, some clay, minor fine sand, orange brown, orange, yellowish brown, stiff, moist, slightly plastic (WEATHERED WAITEMATA GROUP SOILS)		0.5					
		clayey SILT, trace fine sand, orange, yellowish orange, stiff, moist, moderately plastic		1.0					
		silty CLAY, trace fine sand, orange, yellowish grey, stiff, moist, highly plastic							
		clayey SILT, trace fine sand, orange, stiff, moist, moderately plastic		1.5		V,67 VR,30 1 1 2 2 2 2 N=8			
		silty CLAY, trace fine sand, orange, yellow, stiff, wet, highly plastic							
		light grey with orange mottles, very stiff		2.0					
		light grey, orange		2.5					
		orange with grey and pink mottles							
		pink, orange		3.0		V,140 VR,67 1 1 1 2 2 2 N=7	Open Barrel		
		clayey SILT, trace fine sand, light grey, pink, very stiff, wet, moderately plastic							
		SILT, some clay, minor fine sand, light grey with pink streaks, very stiff, wet, slightly plastic		3.5					
		clayey SILT, trace fine sand, light grey, pink, stiff, wet, moderately plastic							
		light grey with orange and pink streaks							
		orange, light orange		4.0					
		SILT, some clay, minor fine sand, grey, stiff, wet, slightly plastic		4.5		V,76 VR,32 1 0 1 1 1 1 N=4			
				5.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ04

Sheet 2 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	4/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	4/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		clayey SILT, minor fine sand, grey, stiff, wet, moderately plastic		5.0					
		trace fine sand		5.5					Filter Pack
				6.0		V,76 VR,48 0 0 1 1 2 2 N=6			Slotted Pipe
		SILT, minor fine sand, minor clay, grey with dark grey streaks, stiff, moist, slightly plastic		6.5					
		clayey SILT, trace fine sand, grey, stiff, moist, moderately plastic		7.0					
		very stiff		7.5		V,119 VR,49 1 1 1 1 2 1 N=5	Open Barrel		
		SILT, some fine sand, minor clay, grey, stiff, slightly plastic		8.0					
		fine to medium sandy SILT, minor clay, grey, stiff, wet, slightly plastic							
		trace clay, saturated, non-plastic		8.5					
		minor clay, slightly plastic							
		trace clay, non plastic		9.0		V,40 VR,8 0 0 0 2 1 2 N=5			
				9.5					
		silty fine to medium SAND, grey, loose, saturated		10.0					

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ04

Sheet 3 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	4/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	4/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		clayey SILT, trace fine sand, grey, stiff, saturated, moderately plastic		10.0					
		SILT, some fine to medium sand, some clay, grey, stiff, saturated, slightly plastic							
		clayey SILT, trace fine sand, grey, stiff, saturated, moderately plastic		10.5		V,80 VR,24 1 1 2 2 2 2 N=8			
		SILT, some fine to medium sand, some clay, grey, stiff, saturated, slightly plastic		11.0			Open Barrel		
		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic		11.5					
				12.0		V,200+ UTP 2 2 2 3 3 4 N=12			
		hard		12.5					
				13.0					
				13.5		V,200+ UTP 5 5 5 6 6 6 N=23	HQTT		
		SILT, some fine sand, minor clay, grey, hard, saturated, slightly plastic		14.0					
				14.5					
		clayey SILT, trace fine sand, grey, hard, saturated, moderately plastic							
		fine sandy SILT, trace clay, grey, hard, saturated non plastic		15.0					Backfill

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ04

Sheet 4 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	4/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	4/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		SILT, some fine sand, some clay, grey, hard, saturated, non plastic		15.0		4 4 4 5 5 6 N=20	HQTT		
		silty fine to medium sand, grey, medium dense, saturated dense / weakly cemented		15.5					
		slightly weathered, grey, SILTSTONE, weak to very weak (WAITEMATA GROUP SOIL AND ROCK)		16.0					
		moderately weathered, grey, fine to medium SANDSTONE, extremely weak, remoulds to fine to medium SAND		16.5		10 24 26 for 45mm N=50+			
		slightly weathered, grey, SILTSTONE, weak		17.0					
		moderately weathered, grey, fine to medium SANDSTONE, extremely weak, remoulds to fine to medium sand		17.5					
		slightly weathered, grey, SILTSTONE, weak							
		fine to medium SAND, some silt, grey, very dense / weakly cemented, saturated							
		slightly weathered, grey, SILTSTONE, weak (WAITEMATA GROUP ROCK) trace lignite fragments as brown streaks		18.0		15 32 13 for 20mm N=50+			
		slightly weathered, grey, fine SANDSTONE, weak		18.5					
				19.0					
		fracture dipping 45°, rough, aperture <1mm, no infill, no discoloration		19.5		58 for 95mm N=50+			
		END OF BORE. 19.67 METRES. (TARGET DEPTH)		20.0					

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ05

Sheet 1 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	3/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Asphalt
Date Finished:	3/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
FILL		ASPHALT SLAB for 35mm (FILL)		0.0					
		fine to coarse angular GRAVEL, grey, dense, moist (GRAVEL FILL)							
WAITEMATA GROUP		silty CLAY, trace fine sand, light grey with orange mottles, very stiff, moist, highly plastic (WEATHERED WAITEMATA GROUP SOILS)		0.5		V,119 VR,60			Bentonite
		clayey SILT, trace fine sand, light grey with some orange streaks, very stiff, moist, moderately plastic		1.0		V,99 VR,48			
		orange, light grey, pink							
		minor fine sand		1.5		V,95 VR,29			
		SILT, minor fine sand, some clay, light grey with orange and pink streaks, stiff, wet, slightly plastic				0 1 0 1 1 1 N=3			
		clayey SILT, trace fine sand, pink and light grey streaks, stiff, wet, moderately plastic		2.0					
		yellow, orange, light grey		2.5			OB		
		SILT, some fine sand, some clay, grey, orange, dark orange, stiff, wet, slightly plastic							
		clayey SILT, trace fine sand, orange, dark grey, stiff, wet, moderately plastic		3.0		V,51 VR,19			
		SILT, some fine sand, minor clay, grey, stiff, wet, slightly plastic				0 1 0 1 1 1 N=3			
		fine to medium sandy SILT, minor clay, grey, stiff, wet, slightly plastic							
		SILT, some fine to medium sand, some clay, grey, stiff, wet, slightly plastic		3.5					
		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic							
		fine to medium sandy SILT, minor clay, grey, stiff, wet, slightly plastic		4.0					
		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic							
		SILT, some clay, minor fine sand, trace lignite fragments, grey with black speckles, very stiff, wet, slightly plastic		4.5		V,118 VR,54			Filter Pack
		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic				1 1 1 2 2 3 N=8			Slotted Pipe
				5.0					

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ05

Sheet 2 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	3/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Asphalt
Date Finished:	3/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic		5.0			OB		
		hard		5.5					
		SILT, some fine sand, minor clay, grey, hard, moist, slightly plastic		6.0		V,200+ UTP 1 2 5 5 5 6 N=21			
		clayey SILT, trace fine sand, grey, hard, moist, moderately plastic							
		moderately weathered, grey, fine to medium SANDSTONE, very weak (WAITEMATA GROUP SOIL AND ROCK)		6.5					
		fine to medium SAND, grey, very dense/weakly cemented		7.0					
		SILT, some clay, trace fine sand, grey, hard, moist, slightly plastic							
		clayey SILT, trace fine sand, grey, hard, moist, moderately plastic		7.5		V,200+ UTP 3 7 9 11 10 10 N=40	HQTT		
		fine to medium SAND, minor silt, grey, dense / weakly cemented, saturated trace lignite as black speckles							
		SILT, some fine sand, some clay, grey, hard, moist, slightly plastic trace fine to medium sand		8.0					
		moderately weathered, grey, fine to medium SANDSTONE, very weak		8.5					
		moderately weathered, grey, SILTSTONE, extremely weak, remoulds to SILT some clay							
		SILT, some clay, minor fine to medium sand, grey, hard, moist, slightly plastic		9.0		2 2 2 4 5 6 N=17			
		clayey SILT, trace fine sand, grey, hard, moist, moderately plastic		9.5					
				10.0					

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ05

Sheet 3 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	3/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Asphalt
Date Finished:	3/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		SILT, some clay, some fine sand, grey, hard, moist, slightly plastic		10.0			HQTT		
		fine sandy SILT, minor clay, grey, hard, moist, slighty plastic							
		SILT, some clay, minor fine sand, grey, hard, moist, slightly plastic							
		clayey SILT, trace fine sand, grey, hard, moist, moderately plastic low recovery in drill run from 10.5m to 12.0m, high drilling resistance observed, inferred hard soils/very weak rock		10.5		4 7 5 7 12 34 for 50mm N=50+			
				11.0					
				11.5					
		slightly weathered, grey, fine to medium SANDSTONE, very weak		12.0		6 10 16 16 16 12 for 70mm N=50+			
		clayey SILT, trace fine sand, grey, hard, moist, moderately plastic							
		fine to medium SAND, grey, very dense / weakly cemented, saturated		12.5					
		moderately weathered, grey, SILTSTONE, very weak, fracture dipping 60°, smooth, aperture less <1mm, no infill, no discoloration							
		moderately weathered, grey, fine to medium SANDSTONE, very weak fracture dipping 30°, rough, aperture <1mm, no infill, no discoloration		13.0					Backfill
		SILT, some clay, trace fine sand, grey, hard, moist, slightly plastic							
		fine sandy SILT, minor clay, grey, hard, moist, sightly plastic		13.5		6 8 10 10 10 10 N=40			
		fine to medium SAND, some silt, grey, dense / weakly cemented, saturated							
		SILT, some clay, trace fine sand, grey, hard, moist, slightly plastic		14.0					
				14.5					
				15.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ05

Sheet 4 of 4

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	3/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Asphalt
Date Finished:	3/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT (blows/300mm) / c_u (kPa)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		slightly weathered, grey, fine to medium SANDSTONE, very weak (WAITEMATA GROUP ROCK)		15.0		16 25 25 for 70mm N=50+			
		fracture dipping 75°, rough, aperture <1mm, no infill, no discoloration		15.5					
		slightly weathered, grey, SILTSTONE, weak							
		fracture dipping 60°, smooth, aperture <1mm, no infill, no discoloration		16.0					
		slightly weathered, grey, fine to medium SANDSTONE, weak to very weak		16.5		10 20 30 for 5mm N=50+	HQTT		
				17.0					
				17.5					
				18.0		15 26 19 for 35mm N=50+			
		END OF BORE. 18.19 METRES. (TARGET DEPTH)		18.5					
				19.0					
				19.5					
				20.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

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CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ06

Sheet 1 of 3

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	5/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	5/7/23	Water Level:			

STRATIGRAPHY	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
FILL	fine to coarse angular GRAVEL, some fine to coarse sand, some silt, light grey, brown, grey, loose, wet (GRANULAR FILL)	0.0			Flight Auger		Bentonite
WAITEMATA GROUP	silty CLAY, trace fine sand, orange, stiff, moist, highly plastic (WEATHERED WAITEMATA GROUP SOILS)	0.5		V,95 VR,48			
	orange, orange grey						
	yellow, orange, light orange, light grey	1.0					
	clayey SILT, trace fine to medium sand, light grey, orange, yellow, stiff, moist, moderately plastic	1.5		V,83 VR,32 1 1 2 1 1 2 N=6			
		2.0					
		2.5					
	silty CLAY, trace fine sand, orange, yellow, yellow grey, stiff, wet, highly plastic	3.0		V,62 VR,43 1 1 1 1 1 1 N=4	OB		
	blue grey, grey						
	clayey SILT, trace fine sand, grey, stiff, moist, moderately plastic	3.5					
	SILT some fine sand, some clay, orange, dark orange, firm, wet, slightly plastic	4.0					
	clayey SILT, trace fine sand, grey, firm, wet, moderately plastic	4.5		V,64 VR,48 0 0 0 0 1 2 N=3			
	stiff						
	firm						
	fine to medium sandy SILT, trace clay, grey, firm, wet, non plastic						
	SILT some clay, trace fine sand, grey, stiff, wet, slightly plastic	5.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

Soil&Rock Consultants
Your responsive & cost-effective engineers

CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

Machine Borehole No: MB/PZ06

Sheet 2 of 3

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	5/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	5/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT / c_u (kPa) (blows/300mm)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
WAITEMATA GROUP		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic		5.0					
		SILT some fine sand, some clay, grey, stiff, wet, slightly plastic		5.5					Filter Pack
				6.0		V,83 VR,29 1 1 1 2 3 2 N=8			Slotted Pipe
		clayey SILT, trace fine sand, grey, very stiff, moist, moderately plastic		6.5					
		SILT some fine sand, some clay, grey, very stiff, wet, slightly plastic		7.0			OB		
				7.5		V,151 VR,64 2 1 1 2 2 2 N=7			
		silty, fine to medium SAND, grey, loose, saturated		8.0					
		clayey SILT, trace fine sand, grey, hard, wet, moderately plastic		8.5					
		minor fine sand		9.0		V,200+ UTP 2 3 3 4 5 7 N=19			
		SILT some clay, trace fine sand, grey, hard, moist, slightly plastic		9.5			HQTT		
		moderately weathered, grey, SILTSTONE, extremely weak, remoulds to SILT some clay (WAITEMATA		10.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23

Soil&Rock Consultants
Your responsive & cost-effective engineers

CLIENT: James Kirkpatrick Ltd

PROJECT: 538 Karangahape Road, Newton, Auckland

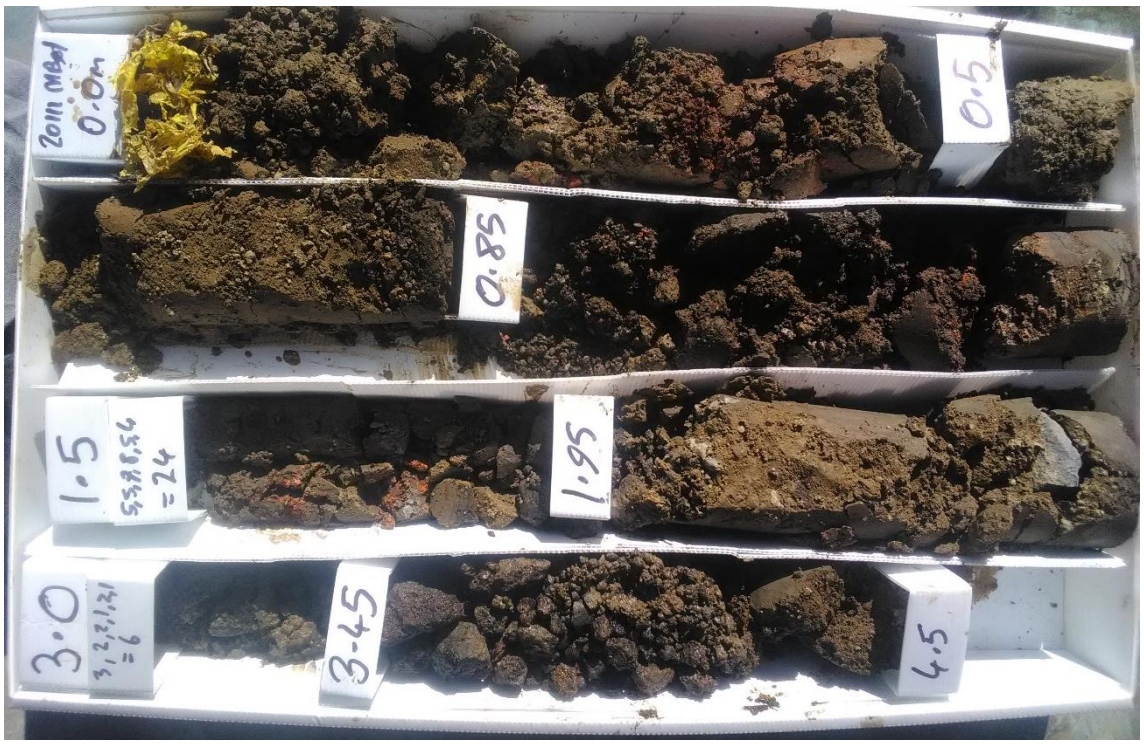
Machine Borehole No: MB/PZ06

Sheet 3 of 3

Drill Type:	Machine Bore	Project No:	20111	Logged By:	DEG
Drilled By:	PRO DRILL LTD	Coordinates:		Shear Vane No - Calibration Date:	GEO3564 - 2/05/2023
Date Started:	5/7/23	Ground Elevation:		Surface Conditions:	Slight Sloping, Gravel
Date Finished:	5/7/23	Water Level:			

STRATIGRAPHY	GRAPHIC LOG	Soil description in accordance with the NZ Geotechnical Society Inc 2005 "Guidelines for Field Description of Soil and Rock in Engineering Use"	WATER LEVEL (m)	DEPTH (m)	SAMPLE TYPE	SPT (blows/300mm) / c_u (kPa)	DRILLING METHOD	RECOVERY (%)	STANDPIPE PIEZOMETER Ø32mm
		GROUP SOIL AND ROCK)		10.0					
		SILT some fine sand, some clay, grey, hard, moist, slightly plastic							
		moderately weathered, grey, SILTSTONE, extremely weak, remoulds to SILT some clay							
		fine sandy SILT, grey, hard, moist, non plastic		10.5		6 7 10 12 14 11 for 74mm N=50+			
		moderately weathered, grey, SILTSTONE, extremely weak, remoulds to SILT some clay		11.0					
		silty, fine to medium SAND, grey, dense, saturated		11.5					
WAITEMATA GROUP		moderately weathered, grey, SILTSTONE, extremely weak, remoulds to SILT some clay		12.0		6 10 11 30 3 for 15mm N=50+	HQTT		Backfill
		SILT some fine sand, some clay, grey, hard, moist, slightly plastic							
		slightly weathered, grey, SILTSTONE, very weak (WAITEMATA GROUP ROCK)		12.5					
		moderately weathered, extremely weak, remoulds to clayey SILT		13.0					
		slightly weathered, grey, fine to medium SANDSTONE, weak to very weak fine SANDSTONE, very weak							
		slightly weathered, grey, SILTSTONE, very weak		13.5		20 30 10 for 20mm N=50+			
		END OF BORE. 13.67 METRES. (TARGET DEPTH)		14.0					
				14.5					
				15.0					

MACHINE BORES WITH PIEZO 20111 MB04 - MB06 - 04JUL2023.GPJ S+R_2013.GDT 28/7/23



MB03 from 0.0m to 4.5m, Box 1 of 5

MB03 from 4.5m to 8.1m, Box 2 of 5

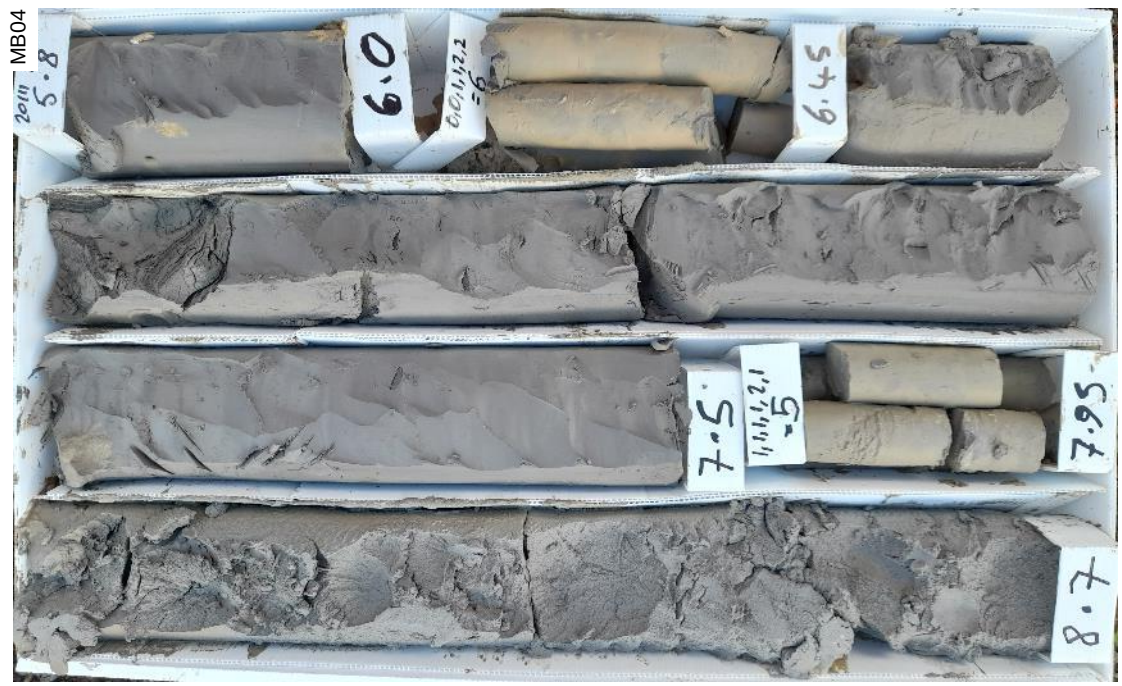
MB03 from 8.1m to 10.95m, Box 3 of 5

MB03 from 10.95m to 13m, Box 4 of 5

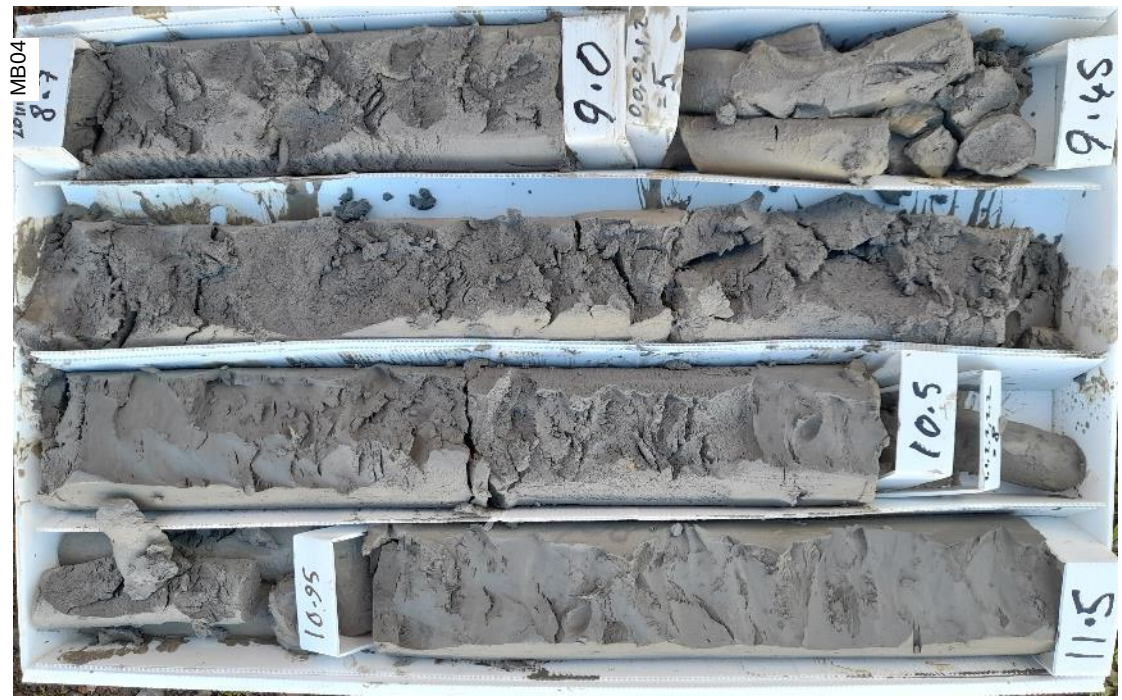
MB03 from 13m to 15.45m (EOH), Box 5 of 5

MB04 from 0.0m to 2.8m, Box 1 of 7

MB04 from 2.8m to 5.8m, Box 2 of 7



MB04 from 5.8m to 8.7m, Box 3 of 7



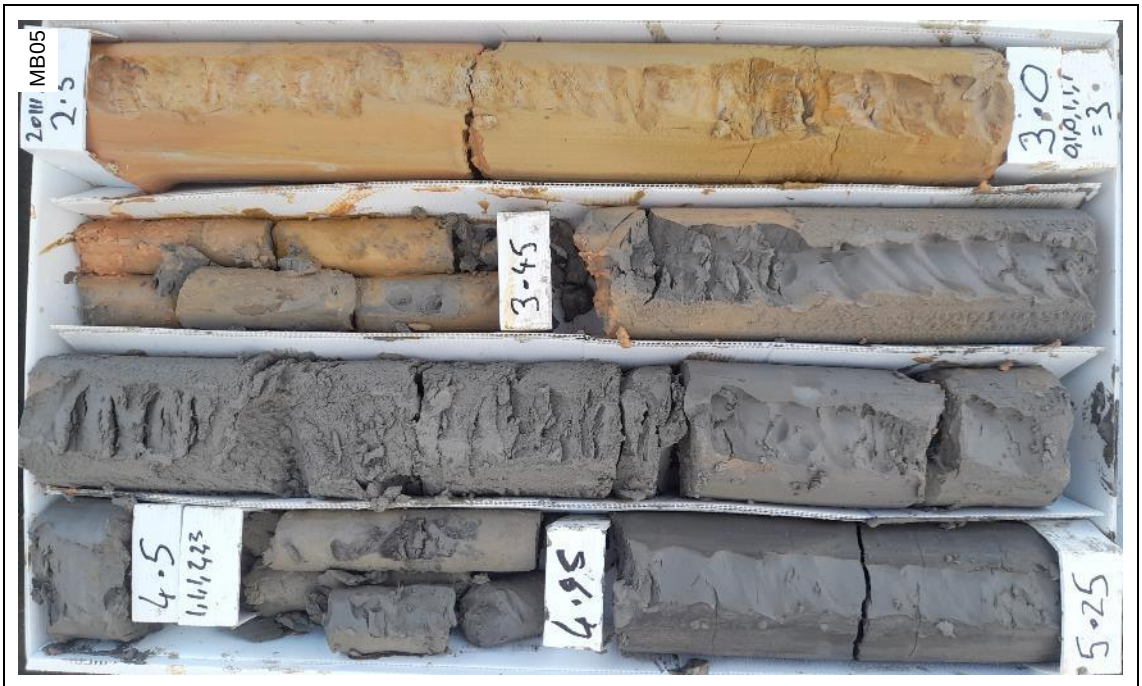
MB04 from 8.7m to 11.5m, Box 4 of 7

MB04 from 11.5m to 15.0m, Box 5 of 7

MB04 from 15.0m to 18.0m, Box 6 of 7

MB04 from 18.0m to 19.5m (EOH), Box 7 of 7

MB05 from 0.0m to 2.5m, Box 1 of 6



MB05 from 2.5m to 5.2m, Box 2 of 6

MB05 from 5.2m to 8.1m, Box 3 of 6

MB05 from 8.1m to 12.8m, Box 4 of 6

MB05 from 12.8m to 16.5m, Box 5 of 6

MB05 from 16.5m to 18.0m (EOH), Box 6 of 6

MB06 from 0.0m to 3.6m, Box 1 of 5

MB06 from 3.6m to 6.4m, Box 2 of 5

MB06 from 6.4m to 9.0m, Box 3 of 5

MB06 from 9.0m to 12.5m, Box 4 of 5

MB06 from 12.5m to 13.5m, Box 5 of 5

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Appendix C

Laboratory Analytical Results and Chain of Custody Documentation

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Soil & Rock Consultants
Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Attention: **Garry Cepe**

Report **864825-S**
Project name
Project ID 220086
Received Date Feb 18, 2022

Client Sample ID			SS1	SS1-1	SS3	SS4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K22-Fe39594	K22-Fe39595	K22-Fe39596	K22-Fe39597
Date Sampled			Feb 18, 2022	Feb 18, 2022	Feb 18, 2022	Feb 18, 2022
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	< 20	< 20	46	23
TPH-SG C7-C36 (Total)	35	mg/kg	< 35	< 35	50	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments					G01	
Acenaphthene	0.03	mg/kg	0.07	< 0.03	< 0.3	0.22
Acenaphthylene	0.03	mg/kg	0.42	< 0.03	< 0.3	1.1
Anthracene	0.03	mg/kg	0.73	< 0.03	0.61	1.4
Benz(a)anthracene	0.03	mg/kg	6.0	< 0.03	1.2	4.2
Benzo(a)pyrene	0.03	mg/kg	11	< 0.03	1.5	4.6
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	14	< 0.03	2.0	6.1
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	14	0.04	2.2	6.1
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	14	0.07	2.3	6.1
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	5.6	< 0.03	1.4	3.1
Benzo(g.h.i)perylene	0.03	mg/kg	2.1	< 0.03	0.44	0.58
Benzo(k)fluoranthene	0.03	mg/kg	5.9	< 0.03	1.5	2.6
Chrysene	0.03	mg/kg	6.2	0.04	2.1	3.2
Dibenz(a.h)anthracene	0.03	mg/kg	0.80	< 0.03	< 0.3	0.28
Fluoranthene	0.03	mg/kg	12	0.05	3.8	11
Fluorene	0.03	mg/kg	0.22	< 0.03	< 0.3	1.1
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	2.2	< 0.03	0.53	0.79
Naphthalene	0.1	mg/kg	0.2	< 0.1	< 0.3	0.2
Phenanthrene	0.03	mg/kg	5.3	< 0.03	1.0	9.0
Pyrene	0.03	mg/kg	14	0.05	3.9	9.9
p-Terphenyl-d14 (surr.)	1	%	109	118	107	104
2-Fluorobiphenyl (surr.)	1	%	123	98	93	116
Metals M8 (NZ MfE)						
Arsenic	0.1	mg/kg	4.8	3.3	12	8.8
Cadmium	0.01	mg/kg	0.17	< 0.01	0.34	0.39
Chromium	0.1	mg/kg	25	17	47	72
Copper	0.1	mg/kg	59	6.3	57	44
Lead	0.1	mg/kg	830	14	170	250
Mercury	0.01	mg/kg	0.32	0.16	0.15	0.29
Nickel	0.1	mg/kg	43	7.1	67	51
Zinc	5	mg/kg	110	9.8	200	190

Client Sample ID			SS1	SS1-1	SS3	SS4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K22-Fe39594	K22-Fe39595	K22-Fe39596	K22-Fe39597
Date Sampled			Feb 18, 2022	Feb 18, 2022	Feb 18, 2022	Feb 18, 2022
Test/Reference	LOR	Unit				
% Moisture	1	%	15	26	20	22

Client Sample ID			SS5
Sample Matrix			Soil
Eurofins Sample No.			K22-Fe39598
Date Sampled			Feb 18, 2022
Test/Reference	LOR	Unit	
Total Petroleum Hydrocarbons (NZ MfE 1999)			
TPH-SG C7-C9	5	mg/kg	< 5
TPH-SG C10-C14	10	mg/kg	< 10
TPH-SG C15-C36	20	mg/kg	62
TPH-SG C7-C36 (Total)	35	mg/kg	64
Polycyclic Aromatic Hydrocarbons (NZ MfE)			
Acenaphthene	0.03	mg/kg	< 0.03
Acenaphthylene	0.03	mg/kg	0.04
Anthracene	0.03	mg/kg	0.11
Benz(a)anthracene	0.03	mg/kg	0.53
Benzo(a)pyrene	0.03	mg/kg	0.64
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	0.88
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.88
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.88
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	0.64
Benzo(g.h.i)perylene	0.03	mg/kg	0.12
Benzo(k)fluoranthene	0.03	mg/kg	0.50
Chrysene	0.03	mg/kg	0.58
Dibenz(a.h)anthracene	0.03	mg/kg	0.04
Fluoranthene	0.03	mg/kg	1.2
Fluorene	0.03	mg/kg	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	0.14
Naphthalene	0.1	mg/kg	< 0.1
Phenanthrene	0.03	mg/kg	0.28
Pyrene	0.03	mg/kg	1.4
p-Terphenyl-d14 (surr.)	1	%	109
2-Fluorobiphenyl (surr.)	1	%	118
Metals M8 (NZ MfE)			
Arsenic	0.1	mg/kg	11
Cadmium	0.01	mg/kg	0.74
Chromium	0.1	mg/kg	50
Copper	0.1	mg/kg	150
Lead	0.1	mg/kg	260
Mercury	0.01	mg/kg	0.21
Nickel	0.1	mg/kg	51
Zinc	5	mg/kg	280
% Moisture	1	%	24

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Feb 22, 2022	14 Days
- Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Auckland	Feb 22, 2022	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
Metals M8 (NZ MfE)	Auckland	Feb 22, 2022	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Auckland	Feb 21, 2022	14 Days
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			

eurofins | Environment Testing

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NATA # 1261 Site # 18217

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Welshpool WA 6106
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NATA # 2377 Site # 2370

Company Name: Soil & Rock Consultants
Address: Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Project Name:
Project ID: 220086

Order No.:
Report #: 864825
Phone: 0011 64 9 835 1740
Fax: 0011 64 9 835 1847

Received: Feb 18, 2022 3:30 PM
Due: Feb 25, 2022
Priority: 5 Day
Contact Name: Garry Cepe

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Moisture Set	Metals M8 (NZ MfE)	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Eurofins Suite B21A-NZ: Asbestos, Metals (As,Cd,Cr,Cu,Ni,Pb,Zn,Hg) (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X	X
Christchurch Laboratory - IANZ# 1290									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	SS1	Feb 18, 2022		Soil	K22-Fe39594	X		X	X
2	SS1-1	Feb 18, 2022		Soil	K22-Fe39595	X	X	X	
3	SS3	Feb 18, 2022		Soil	K22-Fe39596	X		X	X
4	SS4	Feb 18, 2022		Soil	K22-Fe39597	X		X	X
5	SS5	Feb 18, 2022		Soil	K22-Fe39598	X		X	X
Test Counts						5	1	5	4

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram
mg/L: milligrams per litre
µg/L: micrograms per litre
ppm: parts per million
ppb: parts per billion
%: Percentage
org/100 mL: Organisms per 100 millilitres
NTU: Nephelometric Turbidity Units
MPN/100 mL: Most Probable Number of organisms per 100 millilitres

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR : RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.03			0.03	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
Method Blank							
Metals M8 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Mercury	mg/kg	< 0.01			0.01	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	107			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	112			70-130	Pass	
Acenaphthylene	%	113			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	85			70-130	Pass	
Benzo(a)pyrene	%	80			70-130	Pass	
Benzo(b&j)fluoranthene	%	76			70-130	Pass	
Benzo(g.h.i)perylene	%	86			70-130	Pass	
Benzo(k)fluoranthene	%	111			70-130	Pass	
Chrysene	%	130			70-130	Pass	
Dibenz(a.h)anthracene	%	88			70-130	Pass	
Fluoranthene	%	100			70-130	Pass	
Fluorene	%	100			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	85			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Naphthalene			%	110			70-130	Pass	
Phenanthrene			%	84			70-130	Pass	
Pyrene			%	101			70-130	Pass	
LCS - % Recovery									
Metals M8 (NZ MfE)									
Arsenic			%	93			80-120	Pass	
Cadmium			%	96			80-120	Pass	
Chromium			%	106			80-120	Pass	
Copper			%	109			80-120	Pass	
Lead			%	103			80-120	Pass	
Mercury			%	110			80-120	Pass	
Nickel			%	109			80-120	Pass	
Zinc			%	110			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K22-Fe39587	NCP	%	96			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Benzo(g.h.i)perylene	K22-Fe39587	NCP	%	125			70-130	Pass	
Dibenz(a.h)anthracene	K22-Fe39587	NCP	%	113			70-130	Pass	
Fluoranthene	K22-Fe39587	NCP	%	123			70-130	Pass	
Indeno(1.2.3-cd)pyrene	K22-Fe39587	NCP	%	103			70-130	Pass	
Pyrene	K22-Fe39587	NCP	%	120			70-130	Pass	
Spike - % Recovery									
Metals M8 (NZ MfE)				Result 1					
Arsenic	K22-Fe36184	NCP	%	89			75-125	Pass	
Cadmium	K22-Fe36184	NCP	%	93			75-125	Pass	
Chromium	K22-Fe36184	NCP	%	100			75-125	Pass	
Copper	K22-Fe36184	NCP	%	95			75-125	Pass	
Lead	K22-Fe36184	NCP	%	105			75-125	Pass	
Mercury	K22-Fe36184	NCP	%	108			75-125	Pass	
Nickel	K22-Fe36184	NCP	%	92			75-125	Pass	
Zinc	K22-Fe36184	NCP	%	99			75-125	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K22-Fe39595	CP	%	104			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Acenaphthene	K22-Fe39595	CP	%	125			70-130	Pass	
Acenaphthylene	K22-Fe39595	CP	%	124			70-130	Pass	
Anthracene	K22-Fe39595	CP	%	119			70-130	Pass	
Benz(a)anthracene	K22-Fe39595	CP	%	109			70-130	Pass	
Benzo(a)pyrene	K22-Fe39595	CP	%	98			70-130	Pass	
Benzo(b&j)fluoranthene	K22-Fe39595	CP	%	116			70-130	Pass	
Benzo(k)fluoranthene	K22-Fe39595	CP	%	122			70-130	Pass	
Chrysene	K22-Fe39595	CP	%	129			70-130	Pass	
Fluorene	K22-Fe39595	CP	%	104			70-130	Pass	
Naphthalene	K22-Fe39595	CP	%	126			70-130	Pass	
Phenanthrene	K22-Fe39595	CP	%	102			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K22-Fe39594	CP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K22-Fe39594	CP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K22-Fe39594	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TPH-SG C7-C36 (Total)	K22-Fe39594	CP	mg/kg	< 35	< 35	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K22-Fe39594	CP	mg/kg	0.07	0.06	8.0	30%	Pass	
Acenaphthylene	K22-Fe39594	CP	mg/kg	0.42	0.35	18	30%	Pass	
Anthracene	K22-Fe39594	CP	mg/kg	0.73	0.67	8.0	30%	Pass	
Benz(a)anthracene	K22-Fe39594	CP	mg/kg	6.0	5.4	11	30%	Pass	
Benzo(a)pyrene	K22-Fe39594	CP	mg/kg	11	9.0	19	30%	Pass	
Benzo(b&j)fluoranthene	K22-Fe39594	CP	mg/kg	5.6	5.6	<1	30%	Pass	
Benzo(g.h.i)perylene	K22-Fe39594	CP	mg/kg	2.1	1.7	20	30%	Pass	
Benzo(k)fluoranthene	K22-Fe39594	CP	mg/kg	5.9	4.8	20	30%	Pass	
Chrysene	K22-Fe39594	CP	mg/kg	6.2	5.3	16	30%	Pass	
Dibenz(a.h)anthracene	K22-Fe39594	CP	mg/kg	0.80	0.64	22	30%	Pass	
Fluoranthene	K22-Fe39594	CP	mg/kg	12	11	8.0	30%	Pass	
Fluorene	K22-Fe39594	CP	mg/kg	0.22	0.20	14	30%	Pass	
Indeno(1.2.3-cd)pyrene	K22-Fe39594	CP	mg/kg	2.2	1.8	17	30%	Pass	
Naphthalene	K22-Fe39594	CP	mg/kg	0.2	0.2	11	30%	Pass	
Phenanthrene	K22-Fe39594	CP	mg/kg	5.3	4.5	16	30%	Pass	
Pyrene	K22-Fe39594	CP	mg/kg	14	11	16	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K22-Fe39594	CP	%	15	12	24	30%	Pass	
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K22-Fe39596	CP	mg/kg	12	12	2.0	30%	Pass	
Cadmium	K22-Fe39596	CP	mg/kg	0.34	0.37	7.0	30%	Pass	
Chromium	K22-Fe39596	CP	mg/kg	47	47	<1	30%	Pass	
Copper	K22-Fe39596	CP	mg/kg	57	57	<1	30%	Pass	
Lead	K22-Fe39596	CP	mg/kg	170	180	1.0	30%	Pass	
Mercury	K22-Fe39596	CP	mg/kg	0.15	0.17	12	30%	Pass	
Nickel	K22-Fe39596	CP	mg/kg	67	67	<1	30%	Pass	
Zinc	K22-Fe39596	CP	mg/kg	200	200	1.0	30%	Pass	

Comments

Eurofins | Environment Testing accreditation number 1261, site 18217 is currently in progress of a controlled transition to a new custom built location at 179 Magowar Road, Girraween, NSW 2145. All results on this report denoted as being performed by Eurofins | Environment Testing Unit F3, Building F, 16 Mars road, Lane Cove West, NSW 2066, corporate site 18217, will have been performed on either Lane Cove or new Girraween site

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Karishma Patel	Analytical Services Manager
Michael Ritchie	Senior Analyst-Organic (NZN)
Shasti Ramachandran	Senior Analyst-Metal (NZN)

Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates IANZ accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

Environment Testing

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Soil & Rock Consultants
Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Attention:	Garry Cepe
Report	864825-AID
Project Name	
Project ID	220086
Received Date	Feb 18, 2022
Date Reported	Feb 25, 2022

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name
Project ID 220086
Date Sampled Feb 18, 2022
Report 864825-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
SS1	22-Fe39594	Feb 18, 2022	Approximate Sample 673g Sample consisted of: Fine grained soil and rocks	Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of asbestos containing material = 0.000040g* Total estimated asbestos content in the sample = 0.000040g* Total estimated asbestos concentration = 0.0000059% w/w* No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
SS3	22-Fe39596	Feb 18, 2022	Approximate Sample 532g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
SS4	22-Fe39597	Feb 18, 2022	Approximate Sample 581g Sample consisted of: Fine grained soil and rocks	Chrysotile asbestos detected in the form of loose fibre bundles. Approximate raw weight of asbestos containing material = 0.0041g* Total estimated asbestos content in the sample = 0.0037g* Total estimated asbestos concentration = 0.00064% w/w* No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
SS5	22-Fe39598	Feb 18, 2022	Approximate Sample 540g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Auckland	Feb 24, 2022	Indefinite

eurofins | Environment Testing

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Rolleston, Christchurch 7675
Phone : 0800 856 450
IANZ # 1290

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Melbourne
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Phone : +61 3 8564 5000
NATA # 1261 Site # 1254

Sydney
Unit F3, Building F
16 Mars Road
Lane Cove West NSW 2066
Phone : +61 2 9900 8400
NATA # 1261 Site # 18217

Brisbane
1/21 Smallwood Place
Murarrie QLD 4172
Phone : +61 7 3902 4600
NATA # 1261 Site # 20794

Newcastle
4/52 Industrial Drive
Mayfield East NSW 2304
PO Box 60 Wickham 2293
Phone : +61 2 4968 8448
NATA # 1261 Site # 25079

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 6253 4444
NATA # 2377 Site # 2370

Company Name: Soil & Rock Consultants
Address: Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Project Name:
Project ID: 220086

Order No.:
Report #: 864825
Phone: 0011 64 9 835 1740
Fax: 0011 64 9 835 1847

Received: Feb 18, 2022 3:30 PM
Due: Feb 25, 2022
Priority: 5 Day
Contact Name: Garry Cepe

Eurofins Analytical Services Manager : Karishma Patel

Sample Detail						Moisture Set	Metals M8 (NZ MfE)	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Eurofins Suite B21A-NZ: Asbestos, Metals (As,Cd,Cr,Cu,Ni,Pb,Zn,Hg) (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X	X
Christchurch Laboratory - IANZ# 1290									
External Laboratory									
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**				
1	SS1	Feb 18, 2022		Soil	K22-Fe39594	X		X	X
2	SS1-1	Feb 18, 2022		Soil	K22-Fe39595	X	X	X	
3	SS3	Feb 18, 2022		Soil	K22-Fe39596	X		X	X
4	SS4	Feb 18, 2022		Soil	K22-Fe39597	X		X	X
5	SS5	Feb 18, 2022		Soil	K22-Fe39598	X		X	X
Test Counts						5	1	5	4

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. Information identified on this report with the colour **orange** indicates sections of the report not covered by the laboratory's scope of NATA accreditation.
6. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to "non-bonded / friable".
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w**).
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Asbestos Counter/Identifier:

Laura Liu	Senior Analyst-Asbestos

Authorised by:

Katyana Gausel	Senior Analyst-Asbestos (Key Technical Personnel) (NSW)

Katyana Gausel
Senior Analyst-Asbestos (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates ISO/IEC 17025:2017 accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CHAIN OF CUSTODY RECORD

☑ Eurofins | mgt Auckland Office — 35 O'Rorke Road, Penrose, AUCKLAND 1061, New Zealand; P : 0800 856450 (free dial); E : ScottCarroll@eurofins.co.nz ; OnurMehmet@eurofins.com.au

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Company	Soil & Rock Consultants	Purchase Order		Project Manager	Project Name
Address		Eurofins | mgt Quote №		Project № 220086	Electronic Results Format
Contact Name	GC				Email for Results: garry.cepe@soilandrock.co.nz
Contact Phone №					Turn Around Requirements: ☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* (* Surcharges apply) ☑ 5 DAY (Std.) ☐ Other ( )
Special Direction	CoC 1 of 1				
Relinquished by (Signature)	GC				
(Time / Date)	: 18 / 02 / 2022				

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	B21A-NZ: Heavy Metals (M8) + Asbestos ID	B4B-NZ: TPH + PAH	Heavy Metals (M8)	Containers: 1L Plastic	500mL Plastic	125mL Plastic	200mL Amber Glass	40mL vial	125mL Amber Glass	Jar	Sample Comments / DG Hazard Warning
1	SS1	9/11/2021	soil	X	X			x					x	
2	SS1-1	9/11/2021	soil		X	X							x	
3	SS3	10/11/2021	soil	X	X			x					x	
4	SS4	10/11/2021	soil	X	X			x					x	
5	SS5	10/11/2021	soil	X	X			x					x	
6														
7														
8														
9														
10														
11														
12														

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal

Date/Time: 18/2/22 3:30pm

Chilled: (Yes) No

Temp: 13.5

Correction: +0.1

Final Temp: 13.6

Laboratory Use Only									
Received By	Kyla Alan	AUCK | WELL | MELB	Date ___/___/___	Time ___:___	Signature	Kala	Temperature	
Received By		AUCK | WELL | MELB	Date ___/___/___	Time ___:___	Signature		Report №	864825

CHAIN OF CUSTODY RECORD

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Company	**Soil & Rock Consultants**	Purchase Order		Project Manager	
Address		Eurofins | mgt Quote №		Project №	**220086**
Contact Name	**GC**				
Contact Phone №					
Special Direction	**CoC 1 of 1**				
Relinquished by (Signature)	**GC**				
(Time / Date)	___:___	18 / 02 / 2022			

Project Name	
Electronic Results Format	
Email for Results	garry.cepe@soilandrock.co.nz
Turn Around Requirements	☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* * Surcharges apply ☑ 5 DAY (Std.) ☐ Other ( )

Analysis (Note: Where metals are requested, please specify "Total" or "Filtered")

№	Client Sample ID	Date	Matrix	B21A-NZ: Heavy Metals (M8) + Asbestos ID	B4B-NZ:TPH + PAH	Heavy Metals (M8)														Containers: 1L Plastic	500mL Plastic	125mL Plastic	200mL Amber Glass	40mLvial	125mL Amber Glass	Jar		Method of Shipment	Sample Comments / DG Hazard Warning
1	SS1	18/02/2022	soil	X	X																x					x		☐ Courier (#)	
2	SS1-1	18/02/2022	soil		X	X																				x		☐ Hand Delivered	
3	SS3	18/02/2022	soil	X	X																x					x		☐ Postal	
4	SS4	18/02/2022	soil	X	X																x					x			
5	SS5	18/02/2022	soil	X	X																x					x			
6																													
7																													
8																													
9																													
10																													
11																													
12																													

Laboratory Use Only									
	Received By		AUCK | WELL | MELB	Date	___ / ___ / ___	Time	___:___	Signature		Temperature	
	Received By		AUCK | WELL | MELB	Date	___ / ___ / ___	Time	___:___	Signature		Report №	

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Soil & Rock Consultants
Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Attention: **Garry Cepe**

Report **1006260-S**
Project name
Project ID 220086
Received Date Jul 07, 2023

Client Sample ID			MB01-1	MB01-2	MB01-3	MB01-4
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**K23-JI0016754**	**K23-JI0016755**	**K23-JI0016756**	**K23-JI0016757**
Date Sampled			**Jul 04, 2023**	**Jul 04, 2023**	**Jul 04, 2023**	**Jul 04, 2023**
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	140	110	33	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	140	110	< 35	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments			G01			
Acenaphthene	0.03	mg/kg	< 1.5	0.84	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	< 1.5	0.72	< 0.03	< 0.03
Anthracene	0.03	mg/kg	< 1.5	0.44	0.04	< 0.03
Benz(a)anthracene	0.03	mg/kg	< 1.5	0.48	0.07	< 0.03
Benzo(a)pyrene	0.03	mg/kg	< 1.5	0.28	0.04	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 1.5	0.99	0.06	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	1.8	0.99	0.08	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	3.8	0.99	0.09	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 1.5	0.25	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	< 1.5	0.60	0.04	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	< 1.5	0.40	0.04	< 0.03
Chrysene	0.03	mg/kg	< 1.5	0.81	0.11	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	< 1.5	0.53	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	< 1.5	0.65	0.28	< 0.03
Fluorene	0.03	mg/kg	< 1.5	0.64	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 1.5	0.48	0.04	< 0.03
Naphthalene	0.1	mg/kg	< 1.5	0.8	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	< 1.5	0.68	0.33	< 0.03
Pyrene	0.03	mg/kg	< 1.5	0.77	0.28	< 0.03
Total PAH*	0.1	mg/kg	< 1.5	9.4	1.3	< 0.1
p-Terphenyl-d14 (surr.)	1	%	INT	59	56	55
2-Fluorobiphenyl (surr.)	1	%	50	63	56	65
Metals M8 (NZ MfE)						
Arsenic	0.1	mg/kg	3.3	3.3	1.7	1.0
Cadmium	0.01	mg/kg	0.11	< 0.01	0.11	< 0.01
Chromium	0.1	mg/kg	39	17	13	12
Copper	0.1	mg/kg	57	2.9	4.2	3.9
Lead	0.1	mg/kg	32	7.3	6.0	3.2
Mercury	0.01	mg/kg	0.08	0.11	0.15	0.07

Client Sample ID			MB01-1	MB01-2	MB01-3	MB01-4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K23-JI0016754	K23-JI0016755	K23-JI0016756	K23-JI0016757
Date Sampled			Jul 04, 2023	Jul 04, 2023	Jul 04, 2023	Jul 04, 2023
Test/Reference	LOR	Unit				
Metals M8 (NZ MfE)						
Nickel	0.1	mg/kg	110	5.5	5.4	1.1
Zinc	5	mg/kg	87	6.9	5.5	< 5
Sample Properties						
% Moisture	1	%	14	19	28	25

Client Sample ID			MB02-2	MB02-3	MB02-4	MB03-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K23-JI0016758	K23-JI0016759	K23-JI0016760	K23-JI0016761
Date Sampled			Jul 03, 2023	Jul 03, 2023	Jul 03, 2023	Jul 05, 2023
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	150	69	74	140
TPH-SG C7-C36 (Total)	35	mg/kg	150	76	79	140
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments			G01			G01
Acenaphthene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Acenaphthylene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Anthracene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Benz(a)anthracene	0.03	mg/kg	0.94	< 0.03	< 0.03	1.0
Benzo(a)pyrene	0.03	mg/kg	< 0.3	< 0.03	0.03	< 0.3
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 0.3	< 0.03	0.03	< 0.3
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.5	0.04	0.05	0.5
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.8	0.08	0.08	0.8
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Benzo(g.h.i)perylene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Benzo(k)fluoranthene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Chrysene	0.03	mg/kg	0.56	< 0.03	< 0.03	0.64
Dibenz(a.h)anthracene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Fluoranthene	0.03	mg/kg	0.57	< 0.03	< 0.03	0.69
Fluorene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	< 0.3
Naphthalene	0.1	mg/kg	< 0.3	< 0.1	< 0.1	< 0.3
Phenanthrene	0.03	mg/kg	< 0.3	< 0.03	< 0.03	0.36
Pyrene	0.03	mg/kg	0.71	< 0.03	< 0.03	0.95
Total PAH*	0.1	mg/kg	2.8	< 0.1	< 0.1	3.6
p-Terphenyl-d14 (surr.)	1	%	INT	69	INT	INT
2-Fluorobiphenyl (surr.)	1	%	62	74	70	70
Metals M8 (NZ MfE)						
Arsenic	0.1	mg/kg	12	1.2	8.8	6.6
Cadmium	0.01	mg/kg	0.01	0.02	0.06	0.19
Chromium	0.1	mg/kg	23	24	25	28
Copper	0.1	mg/kg	8.7	5.6	16	31
Lead	0.1	mg/kg	19	5.2	5.1	31
Mercury	0.01	mg/kg	0.18	0.06	0.08	0.07
Nickel	0.1	mg/kg	10	3.8	2.7	34
Zinc	5	mg/kg	15	16	17	110

Client Sample ID			MB02-2	MB02-3	MB02-4	MB03-1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K23-JI0016758	K23-JI0016759	K23-JI0016760	K23-JI0016761
Date Sampled			Jul 03, 2023	Jul 03, 2023	Jul 03, 2023	Jul 05, 2023
Test/Reference	LOR	Unit				
Sample Properties						
% Moisture	1	%	32	40	34	17

Client Sample ID			MB03-2	MB03-3	MB03-4
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			K23-JI0016762	K23-JI0016763	K23-JI0016764
Date Sampled			Jul 05, 2023	Jul 05, 2023	Jul 05, 2023
Test/Reference	LOR	Unit			
Total Petroleum Hydrocarbons (NZ MfE 1999)					
TPH-SG C7-C9	5	mg/kg	< 5	< 5	< 5
TPH-SG C10-C14	10	mg/kg	< 10	< 10	< 10
TPH-SG C15-C36	20	mg/kg	77	< 20	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	77	< 35	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)					
Acenaphthene	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	0.04	< 0.03	< 0.03
Anthracene	0.03	mg/kg	0.07	< 0.03	< 0.03
Benz(a)anthracene	0.03	mg/kg	0.14	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	0.12	< 0.03	0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	0.24	< 0.03	0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	0.24	0.04	0.05
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	0.24	0.08	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	0.06	< 0.03	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	0.13	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	0.07	< 0.03	< 0.03
Chrysene	0.03	mg/kg	0.25	< 0.03	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	0.07	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	0.62	< 0.03	< 0.03
Fluorene	0.03	mg/kg	< 0.03	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	0.14	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	0.49	< 0.03	< 0.03
Pyrene	0.03	mg/kg	0.62	< 0.03	< 0.03
Total PAH*	0.1	mg/kg	2.8	< 0.1	< 0.1
p-Terphenyl-d14 (surr.)	1	%	73	60	82
2-Fluorobiphenyl (surr.)	1	%	73	80	85
Metals M8 (NZ MfE)					
Arsenic	0.1	mg/kg	1.0	1.1	1.7
Cadmium	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chromium	0.1	mg/kg	21	28	24
Copper	0.1	mg/kg	4.1	5.8	7.5
Lead	0.1	mg/kg	6.2	5.1	5.2
Mercury	0.01	mg/kg	0.14	0.09	0.06
Nickel	0.1	mg/kg	6.3	3.2	3.3
Zinc	5	mg/kg	5.8	< 5	5.4
Sample Properties					
% Moisture	1	%	31	29	34

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Jul 12, 2023	14 Days
- Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS			
Polycyclic Aromatic Hydrocarbons (NZ MfE)	Auckland	Jul 12, 2023	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
Metals M8 (NZ MfE)	Auckland	Jul 12, 2023	28 Days
- Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS			
% Moisture	Auckland	Jul 10, 2023	14 Days
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			

eurofins

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Company Name: Soil & Rock Consultants
Address: Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Project Name:
Project ID: 220086

Order No.: 220086
Report #: 1006260
Phone: 0011 64 9 835 1740
Fax: 0011 64 9 835 1847

Received: Jul 7, 2023 4:12 PM
Due: Jul 17, 2023
Priority: 6 Day
Contact Name: Garry Cepe

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						Moisture Set	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Eurofins Suite B21A-NZ: Asbestos, Metals (As,Cd,Cr,Cu,Ni,Pb,Zn,Hg) (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X
Christchurch Laboratory - IANZ# 1290								X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MB01-1	Jul 04, 2023		Soil	K23-Jl0016754	X	X	X
2	MB01-2	Jul 04, 2023		Soil	K23-Jl0016755	X	X	X
3	MB01-3	Jul 04, 2023		Soil	K23-Jl0016756	X	X	X
4	MB01-4	Jul 04, 2023		Soil	K23-Jl0016757	X	X	X
5	MB02-2	Jul 03, 2023		Soil	K23-Jl0016758	X	X	X
6	MB02-3	Jul 03, 2023		Soil	K23-Jl0016759	X	X	X
7	MB02-4	Jul 03, 2023		Soil	K23-Jl0016760	X	X	X
8	MB03-1	Jul 05, 2023		Soil	K23-Jl0016761	X	X	X
9	MB03-2	Jul 05, 2023		Soil	K23-Jl0016762	X	X	X
10	MB03-3	Jul 05, 2023		Soil	K23-Jl0016763	X	X	X
11	MB03-4	Jul 05, 2023		Soil	K23-Jl0016764	X	X	X
Test Counts						11	11	11

Internal Quality Control Review and Glossary

General

1. Laboratory QC results for Method Blanks, Duplicates, Matrix Spikes, and Laboratory Control Samples follows guidelines delineated in the National Environment Protection (Assessment of Site Contamination) Measure 1999, as amended May 2013 and are included in this QC report where applicable. Additional QC data may be available on request.
2. All soil/sediment/solid results are reported on a dry basis, unless otherwise stated.
3. All biota/food results are reported on a wet weight basis on the edible portion, unless otherwise stated.
4. Actual LORs are matrix dependant. Quoted LORs may be raised where sample extracts are diluted due to interferences.
5. Results are uncorrected for matrix spikes or surrogate recoveries except for PFAS compounds.
6. SVOC analysis on waters are performed on homogenised, unfiltered samples, unless noted otherwise.
7. Samples were analysed on an 'as received' basis.
8. Information identified on this report with blue colour, indicates data provided by customer that may have an impact on the results.
9. This report replaces any interim results previously issued.

Holding Times

Please refer to 'Sample Preservation and Container Guide' for holding times (QS3001).

For samples received on the last day of holding time, notification of testing requirements should have been received at least 6 hours prior to sample receipt deadlines as stated on the SRA.

If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported.

Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

For VOCs containing vinyl chloride, styrene and 2-chloroethyl vinyl ether the holding time is 7 days however for all other VOCs such as BTEX or C6-10 TRH then the holding time is 14 days.

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**µg/L:** micrograms per litre
ppm: parts per million	**ppb:** parts per billion	**%:** Percentage
org/100 mL: Organisms per 100 millilitres	**NTU:** Nephelometric Turbidity Units	**MPN/100 mL:** Most Probable Number of organisms per 100 millilitres
CFU: Colony forming unit		

Terms

APHA	American Public Health Association
COC	Chain of Custody
CP	Client Parent - QC was performed on samples pertaining to this report
CRM	Certified Reference Material (ISO17034) - reported as percent recovery.
Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
LOR	Limit of Reporting.
LCS	Laboratory Control Sample - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
SRA	Sample Receipt Advice
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
TBTO	Tributyltin oxide (*bis*-tributyltin oxide) - individual tributyltin compounds cannot be identified separately in the environment however free tributyltin was measured and its values were converted stoichiometrically into tributyltin oxide for comparison with regulatory limits.
TCLP	Toxicity Characteristic Leaching Procedure
TEQ	Toxic Equivalency Quotient or Total Equivalence
QSM	US Department of Defense Quality Systems Manual Version 5.4
US EPA	United States Environmental Protection Agency
WA DWER	Sum of PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC - Acceptance Criteria

The acceptance criteria should be used as a guide only and may be different when site specific Sampling Analysis and Quality Plan (SAQP) have been implemented

RPD Duplicates: Global RPD Duplicates Acceptance Criteria is 30% however the following acceptance guidelines are equally applicable:

Results <10 times the LOR: No Limit

Results between 10-20 times the LOR: RPD must lie between 0-50%

Results >20 times the LOR: RPD must lie between 0-30%

NOTE: pH duplicates are reported as a range not as RPD

Surrogate Recoveries: Recoveries must lie between 20-130% for Speciated Phenols & 50-150% for PFAS. SVOCs recoveries 20 – 150%

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.4 where no positive PFAS results have been reported have been reviewed and no data was affected.

QC Data General Comments

1. Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
2. Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
3. pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore, laboratory analysis is unlikely to be completed within holding time.Analysis will begin as soon as possible after sample receipt.
4. Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of recovery the term "INT" appears against that analyte.
5. For Matrix Spikes and LCS results a dash "-" in the report means that the specific analyte was not added to the QC sample.
6. Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g.h.i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
Dibenz(a.h)anthracene	mg/kg	< 0.03			0.03	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
Method Blank							
Metals M8 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Mercury	mg/kg	< 0.01			0.01	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	108			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	80			70-130	Pass	
Acenaphthylene	%	126			70-130	Pass	
Anthracene	%	94			70-130	Pass	
Benz(a)anthracene	%	77			70-130	Pass	
Benzo(b&j)fluoranthene	%	116			70-130	Pass	
Benzo(g.h.i)perylene	%	96			70-130	Pass	
Benzo(k)fluoranthene	%	94			70-130	Pass	
Chrysene	%	78			70-130	Pass	
Dibenz(a.h)anthracene	%	92			70-130	Pass	
Fluoranthene	%	85			70-130	Pass	
Fluorene	%	86			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	74			70-130	Pass	
Naphthalene	%	77			70-130	Pass	
Phenanthrene	%	73			70-130	Pass	

Test			Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Pyrene			%	97			70-130	Pass	
LCS - % Recovery									
Metals M8 (NZ MfE)									
Arsenic			%	109			80-120	Pass	
Cadmium			%	105			80-120	Pass	
Chromium			%	103			80-120	Pass	
Copper			%	103			80-120	Pass	
Lead			%	115			80-120	Pass	
Mercury			%	115			80-120	Pass	
Nickel			%	111			80-120	Pass	
Zinc			%	115			80-120	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K23-JI0006060	NCP	%	78			70-130	Pass	
Spike - % Recovery									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Acenaphthene	K23-JI0009440	NCP	%	79			70-130	Pass	
Acenaphthylene	K23-JI0009440	NCP	%	71			70-130	Pass	
Anthracene	K23-JI0009440	NCP	%	71			70-130	Pass	
Benz(a)anthracene	K23-JI0018377	NCP	%	81			70-130	Pass	
Benzo(g.h.i)perylene	K23-JI0018377	NCP	%	85			70-130	Pass	
Benzo(k)fluoranthene	K23-JI0009440	NCP	%	80			70-130	Pass	
Chrysene	K23-JI0009440	NCP	%	78			70-130	Pass	
Dibenz(a.h)anthracene	K23-JI0009440	NCP	%	76			70-130	Pass	
Fluoranthene	K23-JI0018377	NCP	%	92			70-130	Pass	
Fluorene	K23-JI0009440	NCP	%	86			70-130	Pass	
Naphthalene	K23-JI0009440	NCP	%	76			70-130	Pass	
Phenanthrene	K23-JI0009440	NCP	%	74			70-130	Pass	
Pyrene	K23-JI0018377	NCP	%	104			70-130	Pass	
Spike - % Recovery									
Metals M8 (NZ MfE)				Result 1					
Arsenic	K23-JI0016755	CP	%	90			75-125	Pass	
Cadmium	K23-JI0016755	CP	%	96			75-125	Pass	
Chromium	K23-JI0016755	CP	%	111			75-125	Pass	
Copper	K23-JI0016755	CP	%	107			75-125	Pass	
Lead	K23-JI0016755	CP	%	102			75-125	Pass	
Mercury	K23-JI0016755	CP	%	107			75-125	Pass	
Nickel	K23-JI0016755	CP	%	101			75-125	Pass	
Zinc	K23-JI0016755	CP	%	106			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K23-JI0016754	CP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K23-JI0016754	CP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K23-JI0016754	CP	mg/kg	140	120	16	30%	Pass	
TPH-SG C7-C36 (Total)	K23-JI0016754	CP	mg/kg	140	120	16	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K23-JI0009438	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K23-JI0009438	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K23-JI0009438	NCP	mg/kg	0.15	0.16	7.6	30%	Pass	
Benzo(a)pyrene	K23-JI0009438	NCP	mg/kg	0.22	0.26	14	30%	Pass	

Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Benzo(b&j)fluoranthene	K23-Jl0009438	NCP	mg/kg	0.40	0.48	18	30%	Pass	
Benzo(g.h.i)perylene	K23-Jl0009438	NCP	mg/kg	0.19	0.23	24	30%	Pass	
Benzo(k)fluoranthene	K23-Jl0009438	NCP	mg/kg	0.21	0.17	19	30%	Pass	
Chrysene	K23-Jl0009438	NCP	mg/kg	0.36	0.38	4.3	30%	Pass	
Dibenz(a.h)anthracene	K23-Jl0009438	NCP	mg/kg	0.10	0.10	10	30%	Pass	
Fluoranthene	K23-Jl0009438	NCP	mg/kg	0.90	0.99	9.5	30%	Pass	
Fluorene	K23-Jl0009438	NCP	mg/kg	0.06	0.06	5.2	30%	Pass	
Indeno(1.2.3-cd)pyrene	K23-Jl0009438	NCP	mg/kg	0.16	0.21	27	30%	Pass	
Naphthalene	K23-Jl0009438	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K23-Jl0009438	NCP	mg/kg	1.1	1.2	8.1	30%	Pass	
Pyrene	K23-Jl0009438	NCP	mg/kg	0.90	0.98	9.3	30%	Pass	
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K23-Jl0016754	CP	mg/kg	3.3	3.4	3.1	30%	Pass	
Cadmium	K23-Jl0016754	CP	mg/kg	0.11	0.13	18	30%	Pass	Q15
Chromium	K23-Jl0016754	CP	mg/kg	39	43	11	30%	Pass	
Copper	K23-Jl0016754	CP	mg/kg	57	54	6.6	30%	Pass	
Lead	K23-Jl0016754	CP	mg/kg	32	59	59	30%	Fail	Q02
Mercury	K23-Jl0016754	CP	mg/kg	0.08	0.14	60	30%	Fail	Q02
Nickel	K23-Jl0016754	CP	mg/kg	110	100	4.2	30%	Pass	
Zinc	K23-Jl0016754	CP	mg/kg	87	100	14	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	K23-Jl0016754	CP	%	14	15	12	30%	Pass	
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K23-Jl0016764	CP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K23-Jl0016764	CP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K23-Jl0016764	CP	mg/kg	< 20	< 20	<1	30%	Pass	
TPH-SG C7-C36 (Total)	K23-Jl0016764	CP	mg/kg	< 35	< 35	<1	30%	Pass	
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K23-Jl0016764	CP	mg/kg	1.7	2.2	25	30%	Pass	
Cadmium	K23-Jl0016764	CP	mg/kg	< 0.01	0.08	180	30%	Fail	Q15
Chromium	K23-Jl0016764	CP	mg/kg	24	23	2.5	30%	Pass	
Copper	K23-Jl0016764	CP	mg/kg	7.5	7.9	4.4	30%	Pass	
Lead	K23-Jl0016764	CP	mg/kg	5.2	5.7	11	30%	Pass	
Mercury	K23-Jl0016764	CP	mg/kg	0.06	0.06	12	30%	Pass	
Nickel	K23-Jl0016764	CP	mg/kg	3.3	3.2	3.1	30%	Pass	
Zinc	K23-Jl0016764	CP	mg/kg	5.4	10.0	60	30%	Fail	Q02
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	K23-Jl0016764	CP	%	34	34	1.2	30%	Pass	

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Qualifier Codes/Comments

Code	Description
G01	The LORs have been raised due to matrix interference
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs
Q02	The duplicate %RPD is outside the recommended acceptance criteria. Further analysis indicates sample heterogeneity as the cause
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

Authorised by:

Swati Oberoi	Analytical Services Manager
Raymond Siu	Senior Analyst-Metal
Raymond Siu	Senior Analyst-Organic
Sophie Bush	Senior Analyst-Asbestos

Raymond Siu
Senior Instrument Chemist (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates IANZ accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

Certificate of Analysis

eurofins | Environment Testing

All tests reported herein have been performed in accordance with the laboratory's scope of accreditation

Soil & Rock Consultants
Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Attention:	Garry Cepe
Report	1006260-AID
Project Name	
Project ID	220086
Received Date	Jul 07, 2023
Date Reported	Jul 17, 2023

Methodology:

Asbestos Fibre Identification	Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques. *NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*
Unknown Mineral Fibres	Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity. *NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*
Subsampling Soil Samples	The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed. *NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*
Bonded asbestos-containing material (ACM)	The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination.The resultant material is then further examined in accordance with AS 4964 - 2004. *NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*
Limit of Reporting	The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w). The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk). *NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos".This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

Project Name
Project ID 220086
Date Sampled Jul 03, 2023 to Jul 05, 2023
Report 1006260-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
MB01-1	23-Jl0016754	Jul 04, 2023	Approximate Sample 804g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB01-2	23-Jl0016755	Jul 04, 2023	Approximate Sample 535g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB01-3	23-Jl0016756	Jul 04, 2023	Approximate Sample 465g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB01-4	23-Jl0016757	Jul 04, 2023	Approximate Sample 509g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB02-2	23-Jl0016758	Jul 03, 2023	Approximate Sample 402g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB02-3	23-Jl0016759	Jul 03, 2023	Approximate Sample 352g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB02-4	23-Jl0016760	Jul 03, 2023	Approximate Sample 425g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB03-1	23-Jl0016761	Jul 05, 2023	Approximate Sample 694g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
MB03-2	23-Jl0016762	Jul 05, 2023	Approximate Sample 494g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB03-3	23-Jl0016763	Jul 05, 2023	Approximate Sample 457g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.
MB03-4	23-Jl0016764	Jul 05, 2023	Approximate Sample 421g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w. Organic fibre detected. No trace asbestos detected.

Sample History

Where samples are submitted/analysed over several days, the last date of extraction is reported.

If the date and time of sampling are not provided, the Laboratory will not be responsible for compromised results should testing be performed outside the recommended holding time.

Description	Testing Site	Extracted	Holding Time
Asbestos - LTM-ASB-8020	Christchurch	Jul 10, 2023	Indefinite

eurofins

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NATA# 2377 Site# 2370

Company Name: Soil & Rock Consultants
Address: Level 1, 131 Lincoln Rd Henderson
Auckland
NEW ZEALAND

Project Name:
Project ID: 220086

Order No.: 220086
Report #: 1006260
Phone: 0011 64 9 835 1740
Fax: 0011 64 9 835 1847

Received: Jul 7, 2023 4:12 PM
Due: Jul 17, 2023
Priority: 6 Day
Contact Name: Garry Cepe

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						Moisture Set	Eurofins Suite B4B-NZ: TPH, PAH (NZ MfE)	Eurofins Suite B21A-NZ: Asbestos, Metals (As,Cd,Cr,Cu,Ni,Pb,Zn,Hg) (NZ MfE)
Auckland Laboratory - IANZ# 1327						X	X	X
Christchurch Laboratory - IANZ# 1290								X
External Laboratory								
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**			
1	MB01-1	Jul 04, 2023		Soil	K23-Jl0016754	X	X	X
2	MB01-2	Jul 04, 2023		Soil	K23-Jl0016755	X	X	X
3	MB01-3	Jul 04, 2023		Soil	K23-Jl0016756	X	X	X
4	MB01-4	Jul 04, 2023		Soil	K23-Jl0016757	X	X	X
5	MB02-2	Jul 03, 2023		Soil	K23-Jl0016758	X	X	X
6	MB02-3	Jul 03, 2023		Soil	K23-Jl0016759	X	X	X
7	MB02-4	Jul 03, 2023		Soil	K23-Jl0016760	X	X	X
8	MB03-1	Jul 05, 2023		Soil	K23-Jl0016761	X	X	X
9	MB03-2	Jul 05, 2023		Soil	K23-Jl0016762	X	X	X
10	MB03-3	Jul 05, 2023		Soil	K23-Jl0016763	X	X	X
11	MB03-4	Jul 05, 2023		Soil	K23-Jl0016764	X	X	X
Test Counts						11	11	11

Internal Quality Control Review and Glossary General

1. QC data may be available on request.
2. All soil results are reported on a dry basis, unless otherwise stated.
3. Samples were analysed on an 'as received' basis.
4. Information identified on this report with the colour **blue** indicates data provided by customer that may have an impact on the results.
5. This report replaces any interim results previously issued.

Holding Times

Please refer to the most recent version of the 'Sample Preservation and Container Guide' for holding times (QS3001).
If the Laboratory did not receive the information in the required timeframe, and regardless of any other integrity issues, suitably qualified results may still be reported. Holding times apply from the date of sampling, therefore compliance to these may be outside the laboratory's control.

Units

% w/w:	Percentage weight-for-weight basis, e.g. of asbestos in asbestos-containing finds in soil samples (**% w/w**)
F/fld	Airborne fibre filter loading as Fibres (**N**) per Fields counted (**n**)
F/mL	Airborne fibre reported concentration as Fibres per millilitre of air drawn over the sampler membrane (**C**)
g, kg	Mass, e.g. of whole sample (**M**) or asbestos-containing find within the sample (**m**)
g/kg	Concentration in grams per kilogram
L, mL	Volume, e.g. of air as measured in AFM (**V** = **r** x **t**)
L/min	Airborne fibre sampling Flowrate as litres per minute of air drawn over the sampler membrane (**r**)
min	Time (**t**), e.g. of air sample collection period

Calculations

Airborne Fibre Concentration: $C = \left(\frac{A}{a}\right) \times \left(\frac{N}{n}\right) \times \left(\frac{1}{r}\right) \times \left(\frac{1}{t}\right) = K \times \left(\frac{N}{n}\right) \times \left(\frac{1}{V}\right)$

Asbestos Content (as asbestos): $\%\, w/w = \frac{(m \times P_A)}{M}$

Weighted Average (of asbestos): $\%_{WA} = \sum \frac{(m \times P_A)_x}{x}$

Terms

%asbestos	Estimated percentage of asbestos in a given matrix. May be derived from knowledge or experience of the material, informed by HSG264 *Appendix 2*, else assumed to be 15% in accordance with WA DOH *Appendix 2* (**P_A**).
ACM	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded (non-friable) condition. For the purposes of the NEPM and WA DOH, ACM corresponds to material larger than 7 mm x 7 mm.
AF	Asbestos Fines. Asbestos contamination within a soil sample, as defined by WA DOH. Includes loose fibre bundles and small pieces of friable and non-friable material such as asbestos cement fragments mixed with soil. Considered under the NEPM as equivalent to “non-bonded / friable”.
AFM	Airborne Fibre Monitoring, e.g. by the MFM.
Amosite	Amosite Asbestos Detected. Amosite may also refer to Fibrous Grunerite or Brown Asbestos. Identified in accordance with AS 4964-2004.
AS	Australian Standard.
Asbestos Content (as asbestos)	Total % w/w asbestos content in asbestos-containing finds in a soil sample (**% w/w)**.
Chrysotile	Chrysotile Asbestos Detected. Chrysotile may also refer to Fibrous Serpentine or White Asbestos. Identified in accordance with AS 4964-2004.
COC	Chain of Custody.
Crocidolite	Crocidolite Asbestos Detected. Crocidolite may also refer to Fibrous Riebeckite or Blue Asbestos. Identified in accordance with AS 4964-2004.
Dry	Sample is dried by heating prior to analysis.
DS	Dispersion Staining. Technique required for Unequivocal Identification of asbestos fibres by PLM.
FA	Fibrous Asbestos. Asbestos containing material that is wholly or in part friable, including materials with higher asbestos content with a propensity to become friable with handling, and any material that was previously non-friable and in a severely degraded condition. For the purposes of the NEPM and WA DOH, FA generally corresponds to material larger than 7 mm x 7 mm, although FA may be more difficult to visibly distinguish and may be assessed as AF.
Fibre Count	Total of all fibres (whether asbestos or not) meeting the counting criteria set out in the NOHSC:3003
Fibre ID	Fibre Identification. Unequivocal identification of asbestos fibres according to AS 4964-2004. Includes Chrysotile, Amosite (Grunerite) or Crocidolite asbestos.
Friable	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory’s remit to assess degree of friability.
HSG248	UK HSE HSG248, *Asbestos: The Analysts Guide*, 2nd Edition (2021).
HSG264	UK HSE HSG264, *Asbestos: The Survey Guide* (2012).
ISO (also ISO/IEC)	International Organization for Standardization / International Electrotechnical Commission.
K Factor	Microscope constant (**K**) as derived from the effective filter area of the given AFM membrane used for collecting the sample (**A**) and the projected eyepiece graticule area of the specific microscope used for the analysis (**a**).
LOR	Limit of Reporting.
MFM (also NOHSC:3003)	Membrane Filter Method. As described by the Australian Government National Occupational Health and Safety Commission, *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibres*, 2nd Edition [NOHSC:3003(2005)].
NEPM (also ASC NEPM)	National Environment Protection (Assessment of Site Contamination) Measure, (2013, as amended).
Organic	Organic Fibres Detected. Organic may refer to Natural or Man-Made Polymeric Fibres. Identified in accordance with AS 4964-2004.
PCM	Phase Contrast Microscopy. As used for Fibre Counting according to the MFM.
PLM	Polarised Light Microscopy. As used for Fibre Identification and Trace Analysis according to AS 4964-2004.
Sampling	Unless otherwise stated Eurofins are not responsible for sampling equipment or the sampling process.
SMF	Synthetic Mineral Fibre Detected. SMF may also refer to Man Made Vitreous Fibres. Identified in accordance with AS 4964-2004.
SRA	Sample Receipt Advice.
Trace Analysis	Analytical procedure used to detect the presence of respirable fibres (particularly asbestos) in a given sample matrix.
UK HSE HSG	United Kingdom, Health and Safety Executive, Health and Safety Guidance, publication.
UMF	Unidentified Mineral Fibre Detected. Fibrous minerals that are detected but have not been unequivocally identified by PLM with DS according the AS 4964-2004. May include (but not limited to) Actinolite, Anthophyllite or Tremolite asbestos.
WA DOH	Reference document for the NEPM. Government of Western Australia, *Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia* (updated 2021), including Appendix Four: *Laboratory analysis*
Weighted Average	Combined average % w/w asbestos content of all asbestos-containing finds in the given aliquot or total soil sample (**$\%_{WA}$**).

Comments

Sample Integrity

Custody Seals Intact (if used)	N/A
Attempt to Chill was evident	Yes
Sample correctly preserved	Yes
Appropriate sample containers have been used	Yes
Sample containers for volatile analysis received with minimal headspace	Yes
Samples received within HoldingTime	Yes
Some samples have been subcontracted	No

Asbestos Counter/Identifier:

Kate Stuart	Senior Analyst-Asbestos

Authorised by:

Sophie Bush	Senior Analyst-Asbestos

Sophie Bush
Senior Analyst-Asbestos (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

* Indicates ISO/IEC 17025:2017 accreditation does not cover the performance of this service

Measurement uncertainty of test data is available on request or please click here.

CHAIN OF CUSTODY RECORD

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Company	**Soil & Rock Consultants**	Purchase Order		Project Manager	
Address		Eurofins | mgt Quote №		Project №	**220086**
Contact Name	**GC**				
Contact Phone №					
Special Direction	**CoC 1 of 1**				
Relinquished by (Signature)	**GC**				
(Time / Date)	___:___	5 / 07 / 2023			

Project Name	
Electronic Results Format	
Email for Results	garry.cepe@soilandrock.co.nz

Turn Around Requirements: ☐ 1 DAY* ☐ 2 DAY* ☐ 3 DAY* (* Surcharges apply) ☑ 5 DAY (Std.) ☐ Other ( )

Method of Shipment: ☐ Courier (#) ☐ Hand Delivered ☐ Postal

№	Client Sample ID	Date	Matrix	Analysis (Note: Where metals are requested, please specify "Total" or "Filtered") B21A-NZ: Heavy Metals (M8) + Asbestos ID	B4B-NZ:TPH + PAH								Containers: 1L Plastic	500mL Plastic	125mL Plastic	200mL Amber Glass	40mL vial	125mL Amber Glass	Jar		Sample Comments / DG Hazard Warning
1	MB01-1	4/07/2023	soil	X	X									x					x		
2	MB01-2	4/07/2023	soil	X	X									x					x		
3	MB01-3	4/07/2023	soil	X	X									x					x		
4	MB01-4	4/07/2023	soil	X	X									x					x		
5	MB02-2	3/07/2023	soil	X	X									x					x		
6	MB02-3	3/07/2023	soil	X	X									x					x		
7	MB02-4	3/07/2023	soil	X	X									x					x		
8	MB03-1	5/07/2023	soil	X	X									x					x		
9	MB03-2	5/07/2023	soil	X	X									x					x		
10	MB03-3	5/07/2023	soil	X	X									x					x		
11	MB03-4	5/07/2023	soil	X	X									x					x		
12																					

Laboratory Use Only								
	Received By		AUCK | WELL | MELB	Date	___/___/___	Time	___:___	Signature		Temperature	
	Received By		AUCK | WELL | MELB	Date	___/___/___	Time	___:___	Signature		Report №	