REPORT

Tonkin+Taylor

Preliminary Site Investigation/Detailed Site Investigation

6-10 Orr Street, Ashburton

Prepared for
Kāinga Ora Homes and Communities
Prepared by
Tonkin & Taylor Ltd
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Executive summary

Tonkin & Taylor Ltd (T+T) was engaged by Kāinga Ora Homes and Communities (Kāinga Ora) to undertake the investigation at, and prepare this preliminary site investigation/detailed site investigation (PSI/DSI) for 6 -10 Orr Street, Ashburton ('the site').

The findings of this investigation are summarised as follows:

Consideration	Findings
Proposed redevelopment	• Kāinga Ora plans to re-develop the site to a high-density residential land use. • For the purposes of this investigation and assessment of its data, both high-density residential and standard residential (10% home grown produce consumption) land use scenario criteria have been adopted (see Section 1.1). • A site scrape of approximately 0.4 m below ground level (bgl) will be undertaken for geotechnical/constructability reasons as part of the redevelopment's earthwork.
Site history	• The site has been in residential use for approximately 70 years. Prior to that, it was in pastoral use. • Site history review indicates that the site has *not* been subjected to an activity on the Hazardous Activities and Industry List (HAIL).
Soil investigation	• In accordance with the Kāinga Ora SAP[1] and CSM[2], soil samples were collected across the site for testing of metals, asbestos, and at selected locations on site, total petroleum hydrocarbons (TPHs), and polycyclic aromatic hydrocarbons (PAHs). • Except for the following locations, the soil contaminant concentrations recorded were below residential and commercial/industrial land use assessment criteria; the exceptions being: – 8 Orr Street, investigation location HA5, 0.0 to 0.3 m bgl (arsenic). – 8 Orr Street, at the dwelling's halo and footprint HALO, 0.0 to 0.3 m bgl (lead). *It should be noted, based on the soil investigation data that following the topsoil strip undertaken for constructability reasons (generally to 0.4 m bgl across the site), these soil impacts will be remediated removing pathways to future site users.* • Asbestos was not detected in the surficial soil samples analysed. • A fragment of cement sheet material found at location 6 Orr Street, HA2 was confirmed to be an asbestos containing material (see Photograph B9, Appendix B). • Low levels of the metals analysed were recorded in surface soil samples from across the site above their respective published background levels. • TPHs were recorded at two locations where oil staining was observed on the soil surface in concentrations below residential and commercial/industrial land use assessment criteria. PAHs were recorded below the laboratory limit of reporting in the samples analysed from these locations.
Soil disposal implications	• Soils displaced by the redevelopment earthwork across the site will require disposal as controlled fill, managed fill, or landfill, depending on location and depth across the site. A Work Instruction (see below) will provide more information about options for the offsite disposal of displaced and surplus soils from the site's redevelopment. • Analytical results show that two areas of the site (cell 10 HA7 and 10 HA3) recorded TPH and PAH (see Section 5.3.2) in surficial soils (0 to 0.3 m bgl). Surficial soil at these areas will require disposal to a facility licensed to receive these types of contaminants (e.g., Kate Valley Landfill).

[1] Kāinga Ora, July 2022. Residential Property – Soil Sampling and Analysis Plan (SAP). Version 7.
[2] Kāinga Ora, July 2022. Conceptual Site Model- Residential Properties. Version 4.

Consideration	Findings
	• A fragment of cement sheet asbestos containing material (ACM) was collected from topsoil at 6 Orr Street (HA2); soils from this location need disposal to landfill.
Regulatory implications	• Locally within the site arsenic and lead have been recorded above high-density residential land use criteria, these impacted soils shall be removed as part of the site's scrape as part of its redevelopment and shall not be present when it is used for high-density purposes; therefore, they shall *not* be of risk to future user human health or to have significant adverse effects on the environment. However, correspondence with ADC for other HDS redevelopment sites in Ashburton indicates council position is that consent for a restricted discretionary activity under the NESCS is required for the site redevelopment earthwork where any individual results record exceedances of applicable human health criteria. **Note, this NESCS[3] consent application should not be considered a precedence or standard Kāinga Ora operating procedure.** • As an activity or industry described in Schedule 3 of the Land and Water Regional Plan (LWRP) has not been undertaken on the site, the site is not considered to meet the definition of potentially contaminated land under the LWRP. **The project planner should confirm the full planning requirements and need for consent(s) under the LWRP.** • Soils remaining at this site *after* the redevelopment earthwork will comply with. Ashburton District Council's 'global consent' (see Section 7.2) for the discharge of stormwater to land. • For the disturbance of soils at one location on site where ACM in soil was encountered, the site's redevelopment earthwork shall be undertaken as *unlicensed asbestos work* pursuant to the Asbestos Regulations.[4]
Work Instruction	• A Work Instruction (WI) shall be prepared. The WI will set out health and safety and environmental controls and offsite disposal options. The WI will also provide mitigation controls to manage unexpected discovery of contamination, including ACM.

[3] Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations), 2011.
[4] Health and Safety at Work (Asbestos) Regulations, 2016.

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by Kāinga Ora Homes and Communities (Kāinga Ora) to prepare a preliminary site investigation/detailed site investigation (PSI/DSI) at 6, 8, and 10 Orr Street, Ashburton (herein referred to as 'the site') to support Kāinga Ora's site redevelopment.

The work for the PSI/DSI was undertaken in accordance with the T+T Housing Delivery System (HDS) Christchurch contract and Variation #1 authorised 21 November 2022. The scope of work follows a standard contaminated site assessment protocol developed by Kāinga Ora. The key aims of the PSI/DSI were to:

- Determine whether activities detailed on the HAIL[5], are or have more likely than not been undertaken on the site.
- Determine whether historical land use is likely to have resulted in ground contamination.
- Establish soil contamination conditions at the site.

The contaminated site assessment work performed follows the general reporting and investigation methodology presented in the Ministry for the Environment's (MfE's) CLMG No. 1[6] and No. 5[7]. In addition, the requirements outlined in the Asbestos in Soil Guidelines[8] has also been followed where appropriate.

The persons undertaking, managing, reviewing, and certifying this investigation are suitably qualified and experienced practitioners (SQEP), as required by the NESCS and defined in the NESCS Users' Guide[9].

1.1 Proposed redevelopment

Kāinga Ora plans to re-develop the site from standard residential use for a high-density residential land use.

At one part of the site's proposed redevelopment (i.e., House 6 at the western corner) will include a larger lawn area; and thus, at this portion of the site *only* the assessment of this investigation's data will be conservatively assessed using standard residential (i.e. 10% homegrown produce consumption) criteria (see Figure 1, and the proposed bulk and location plan for the site's redevelopment (Appendix A)).

For the majority and rest of the site, high-density residential land use criteria will be adopted for the assessment of the investigation data.

2 Site description

2.1 General

The site is accessed off Orr Street in Ashburton. At the time of PSI/DSI site work, the site contained three standalone dwellings with ancillary structures at the side and rear of each dwelling (e.g., shed, concrete driveway and footpaths).

[5] Hazardous Activities and Industries List (HAIL), MfE, revised 2021.
[6] MfE, Contaminated Land Management Guidelines No. 1. Reporting on Contaminated Sites in New Zealand (Revised 2021).
[7] MfE, Contaminated Land Management Guidelines No. 5. Site Investigation and Analysis of Soils (Revised 2021).
[8] New Zealand Guidelines for Assessing and Managing Asbestos in Soil - BRANZ, November 2017.
[9] MfE, 2012, Users Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.

The site identification details are presented in Table 2.1.

Table 2.1: Site identification

Address	Legal description	Area (m^2)
6 Orr Street, Ashburton	Lot 5 DP 18886	892
8 Orr Street, Ashburton	Lot 4 DP 18886	913
10 Orr Street, Ashburton	Lot 3 DP 18886	892
	Total site area	2,697

2.2 Client provided information

As part of HDS Christchurch, a project brief was issued to all consultants involved with the site's redevelopment[10]. The project brief, Architectural drawings[11], and previous PSI/SMR[12] provides a summary of the known Kāinga Ora information on the site, the following of which is considered relevant:

- The existing standalone dwellings at 6-10 Orr Street were built in 1954.
- The dwelling at 6 Orr Street is single storey with weatherboard and likely asbestos-cement cladding.
- The dwelling at 8 Orr Street is single storey with weatherboard cladding.
- The dwelling at 10 Orr Street is single storey with brick cladding and tile roof.
- The anticipated redevelopment is for a 3 to 9 uplift factor.
- The project brief indicates that the site is "not a HAIL site", meaning that the site is not recorded on Environment Canterbury's (ECan's) Listed Land Use Register (LLUR).

Kāinga Ora plans for a site scrape to remove existing topsoil materials (for geotechnical/constructability reasons) down to approximately 0.4 m below ground level (bgl) (or deeper in some parts of the site, depending on actual ground conditions) as part of the planned site redevelopment.

2.3 Site topography and geology

The site is generally flat[13]. Stormwater runoff generated at the site is expected to discharge to soakage through the gardens and landscaped areas. The existing stormwater drainage generated from the dwelling and ancillary structures will drain to the existing offsite local network until site clearance of these features.

The site is underlain by alluvial gravel, sand, and silt[14].

2.4 Site condition

A site walkover was undertaken on 28 and 29 February 2024 by T+T Environmental Scientists. Relevant observations on the site condition and surrounding land use made at this time are

[10] Project Brief (6-10 Orr St, Netherby, Ashburton) AR109526 (5 August 2022).
[11] Hierarchy Group Ltd – 12 March 2023 – Architectural Drawings (A10758969) 6-10 Orr Street.
[12] Kirk Roberts Consulting Engineers Ltd– 15 March 2023 – Preliminary Site Investigation and Soil Management Report, 6-10 Orr St, Netherby, Ashburton.
[13] Graham Surveying, 21.02.2023. Topographical Survey (6-10 ORR STREET, NETHERBY, ASHBURTON). Prepared for Kāinga Ora Homes and Communities.
[14] BECA Limited (25 March 2024). 06-10 Orr Street, Netherby, Ashburton - Geotechnical Design Report, prepared for Kāinga Ora.

summarised in Table 2.2 below, and in Section 5.1. Selected photographs are included in Appendix A.

Table 2.2: Site condition

Condition	Observation
Surface water	None.
Nearest surface water body	Wakanui Creek approximately 175 m to the northeast of the site.
Site description	**6 Orr Street:** The dwelling is constructed on a timber and concrete foundation and has duroc cement sheet clad walls and a sheet metal roof. Ancillary structures include two sheds (one with weatherboard cladding and sheet metal roof on concrete pad, and the other with timber framing and cladding, and a corrugated sheet metal roof.) and concrete footpaths. PACMs observed at the dwelling's exterior include the cement sheet duroc cladding, soffits, textured stucco coating on concrete sections of the foundation, and wall and ceiling panelling around the entryways. **8 Orr Street:** The dwelling is constructed on a timber and concrete foundation, with weatherboard cladding and concrete tile roof. Ancillary structures include a shed (weatherboard and sheet metal cladding and sheet metal roof on concrete pad), concrete footpaths and an asphalt driveway. PACMs observed at the dwelling's exterior include cement sheet soffits, textured stucco coating on concrete sections of the foundation, and wall and ceiling panelling around the entryways. **10 Orr Street:** The dwelling is constructed on a concrete ring foundation with a textured coating, painted concrete block cladding, and a concrete tile roof. Ancillary structures include concrete driveway, footpaths, concrete slab, shed (combination of weatherboard and cement sheet cladding, sheet metal roof, timber framing and concrete pad foundation). PACMs observed at the dwelling and ancillary structure's exteriors include the cement sheet cladding, soffits, textured stucco coating on concrete sections of the foundation, and wall and ceiling panelling around the entryways. The backyard comprises of lawn, household items, two unused cars and car parts.
Visible signs of plant stress	None observed other than the bare patches of oil-stained soils in 10 Orr Street backyard (see below).
Visible signs of potential contamination sources	A full oil drain pan (8 L capacity) and discarded car parts (brake rotors, suspension springs, and shock absorbers) were present on bare ground at the southwestern corner of the rear yard at 10 Orr Street (investigation location HA7 (see Figure 1)). Black staining was visible on the ground by this oil pan and car parts

Condition	Observation
	(approximately 1 m^2) and oily hydrocarbon odour were noted (*Appendix A; photograph A23*). Two unused cars and car parts, motor oil containers, tires, etc. were present next to the shed at 10 Orr Street. Dark staining and oily hydrocarbon odour were noted (*Appendix A; photographs A19 and A20*). Various PACMs noted around the site on the exterior of the dwellings and sheds.

Table 2.3: Surrounding land use

Direction	Observation
North	Residential properties.
South	
East	
West	

2.5 Previous investigation

In 2023, Kirk Roberts Consulting Ltd (Kirk Roberts) completed an investigation of the site[15]. The investigation rationale implemented did not align with the standard Kāinga Ora Sampling Analysis Plan (see Executive Summary, reference [1]) regarding number of investigation/sampling points across the site based on its size, presence of structures etc. Key findings of the previous investigation included:

- ACM was not observed, and asbestos fibres were detected in one surficial sample tested; however, semi-quantitative analysis of this sample did not detect anything further.
- Heavy metals were detected in most topsoil samples above the adopted cleanfill criteria but below the NESCS standards for high-density residential land use.
- Arsenic was not detected above background criteria in the samples tested.

To characterise the site in accordance with the Kāinga Ora's SAP, further investigation has been undertaken by T+T to characterise site conditions which will be disturbed as part of the site's redevelopment. The information from T+T's investigation of this site (see Sections 5 to 9) *supersedes the previous investigation's findings*.

3 Site history

Historical information relating to the site has been collected from a variety of sources including the ECan LLUR and historical aerial photographs. This history focuses on the aerial photograph review where comments are provided on readily observable surrounding land use. The information reviewed is summarised in the following sections.

[15] Kirk Roberts Consulting Ltd – preliminary Site Investigation and Soil Management Report (PSI/SMR), 6-10 Orr St, Netherby, Ashburton – ref. 2310011, 15 March 2023.

3.1 Aerial photograph review

T+T has reviewed historical aerial photographs dating back to the 1940s held on the Canterbury Maps online repository[16]. Relevant features of the site and surrounds are summarised from each aerial photograph below, with copies of aerials provided in Appendix C.

Table 3.1: Summary of historical aerial photograph review

Year	Onsite observations	Surrounding land use observations
1940-1944	The site is in pastoral use.	Some residential properties to the east and west of the site. Princess Street and Bridge Street visible as present day.
1955-1959	The site is developed with dwellings and ancillary structures (sheds and footpaths) as their present-day locations.	Further residential development. Orr Street is visible as present day.
1980-1984	No significant changes observed, except for the addition of a large structure in the backyard of 8 Orr Street.	
1995-1999	Poor quality aerial imagery.	
2004-2010	Large structure in the backyard of 8 Orr Street is gone.	No significant changes observed.
2010-2022	No significant changes observed.	

3.2 ECan LLUR

The site is *not* recorded on the ECan LLUR as contaminated or potentially contaminated land. A copy of the ECan LLUR statement for the site is provided in Appendix D.

4 Potential for ground contamination

Site history review indicates that the site has *not* been subjected to a HAIL activity.

However, the following potential sources of ground contamination have been identified from the site walkover, site history review, and Kāinga Ora's standard CSM (see Executive Summary, reference [2]) for residential sites:

- Based on the age of the dwellings and their ancillary structures on site, there is the potential for the use of asbestos and/or lead based paint on or in the structures providing a potential contamination source to surrounding soils. Depending on weathering and maintenance, site soils (including within the 'halos' of the dwellings) could be impacted by these potential contaminants. The ancillary structures (e.g., the sheds) may have their own localised impacts if they were constructed of similar materials such as ACM etc.
- There is potential of PAH and TPH ground contamination locally in the backyard of 10 Orr Street due to the vehicle parts and oil-stained ground. This activity may trigger HAIL category I[17] (i.e., spills of hazardous substances or dangerous goods) under the recently updated guidance[18] if PAHs and TPHs are found at concentrations at or above the applicable soil contaminant standard and environmental guideline value for the land.

[16] https://mapviewer.canterburymaps.govt.nz/

[17] I. Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

[18] MfE. 2023. Hazardous Activities and Industries List guidance: Identifying HAIL land.

The presence of asbestos, elevated concentrations of metals, PAHs and/or TPHs in site soils from the above activities could be considered a HAIL activity (specifically activity I) if found in sufficient concentrations that exceed the land use criteria for the proposed high-density residential land use.

5 Soil sampling and analysis plan

The sampling and analysis plan (SAP) was based on the findings of the desktop assessment, the potential for ground contamination at the site and the established Kāinga Ora site investigation methodology sampling protocols (see Executive Summary, reference [1]). The SAP for the site is provided in Table 5.1.

Soil sampling has been undertaken mainly to inform soil disposal requirements and earthwork controls as the proposed redevelopment earthwork (including foundations) will require the removal of surface soil from the site. Soil sampling and equipment decontamination was undertaken by a T+T Environmental Scientist in general accordance with the Kāinga Ora methodology as well as CLMG No. 5 and the Asbestos in Soil Guidelines.

Investigation locations prefaced HA in Table 5.1 below were undertaken by hand auger, with initially a shallow test pit hand dug to approximately 0.1 m bgl (lifting a sod of soil/lawn). The ground level to 0.1 m depth materials were examined for evidence of PACMs. On completion of the augering, surplus soils were returned to the hole and soil/lawn reinstated. Dwelling halo investigation was undertaken by hand excavation.

Table 5.1: Soil sampling and analysis plan

Sample number/ID	Sample type (per cell)	Sample design	Depths (m bgl)	Sample analysis*
6HA1 – 6HA5 8HA1 – 8HA4 & 8HA6 10HA1 – 10HA5	One sample within each investigation cell (general coverage of yard and garden areas).	Systematic	Surface to 0.1+, 0.3, 0.5, 0.7, and 1.0 m bgl unless refusal encountered.	Metals screen. Asbestos presence/ absence (in soil and in one fragment of building material found within topsoil at 6HA2).
10HA3 & 10HA7	One sample collected from oil stained, odorous soil.	Targeted	Surface to 0.1 m bgl.+	Metals screen. TPH and PAH.**
6HA6, 8HA5, and 10HA6	Sample of halo/ curtilage area from ancillary structures (sheds).	Targeted	Surface to 0.1+, 0.3, 0.5, 0.7, and 1.0 m bgl unless refusal encountered.	Metals screen. Asbestos presence/ absence.
6,8 and 10Halos A - D	Sample of halo/ curtilage[19] area from each side of the dwelling.	Targeted	Surface to 0.1 m bgl.	Metals screen (composite of samples). Asbestos presence/absence.

Notes:

+ Surface to 0.1 m bgl sample consists of one soil sample from a designated sample cell.

[19] The halo or curtilage of a dwelling is defined as the space between 1-2 m from the building edge, as defined in the Kāinga Ora SAP and CSM.

* Analysis was performed on deeper primary sample(s) (0.5, 0.7 and 1.0 m depths) where shallow sample results (surface to 0.3 m) reported concentrations above background levels.

** Total petroleum hydrocarbons and poly-cyclic aromatic hydrocarbons.

The soil investigation was undertaken by T+T on 28 and 29 February 2024. Soil analyses were carried out by an IANZ accredited laboratory using industry standard methods. The soil sampling locations are illustrated in Figure 1.

5.1 Ground conditions

The following observations were made during the field investigations. Soil logs are provided in Appendix E.

- Topsoil was observed from the surface and generally to 0.15 - 0.3 m bgl across the investigation locations and consisted of an organic brown silt and sand with traces of gravel.
- Underlying soils comprised of yellowish-brown sandy silt or silty sands to the maximum investigation depth of 1.0 m.
- Trace amounts of anthropogenic materials, including one fragment of ACM cement sheet, glass, plastic, fire ash, porcelain, concrete, fabric, nails, and mussel shells were observed in surficial soils at various locations on site.
- At 6 Orr Street's investigation location 6HA2 at 0.15 m depth, a fragment of cement sheet PACM was encountered (see Photograph B9, Appendix B). This was removed from site and sampled (labelled 6HA2 FRAG) for laboratory analysis and was the only instance of this material encountered at this investigation location.
- Two unused cars next to the shed, an oil drain pan (at location 10HA7), and discarded car parts were observed at the backyard of 10 Orr Street (see Section 2.4). Dark oil staining and odour were noted on the ground surface at locations 10 HA3 and 10 HA7. The staining and odour did not penetrate the soil profile (restricted to top 20 mm at 10HA7 and to top 3 mm at 10HA3).
- No other visual or olfactory indicators of contamination (e.g., staining or odours) were observed across sampling locations.

5.2 Data quality

A quality assurance and quality control (QA/QC) programme was implemented as part of field procedures to confirm data was fit for purpose and included:

- Decontamination of sampling equipment between sampling locations.
- Appropriate preservation of samples during transport from the field to the laboratory.
- Transportation of samples with accompanying chain of custody documentation.
- Compliance with sample holding times.

Eurofins Environmental Testing NZ Limited (Eurofins), the analytical laboratory used for this DSI also conducts its own internal quality control on selected samples (Appendix F). The laboratory QC results of method blanks, duplicates, matrix spikes, and laboratory control samples were all within the laboratories' accepted ranges. This included a relative percent difference (RPD) of duplicate samples within the range of <1 and 28 %.

5.3 Analytical results

The soil sample results are presented in Table 5.2 and 5.3 below. Laboratory reports are attached in Appendix F.

5.3.1 Assessment criteria

Soil sample results were compared against criteria for the assessment of regulatory requirements, the proposed redevelopment land use, and environmental criteria to meet the objectives of the investigation. The adopted assessment acceptance criteria included:

Land use (protection of human health) and workplace health and safety

- For the protection of human health: NESCS Soil Contaminants Standards (SCS) and national/international guideline values incorporated by reference for:
  - Standard residential (10% homegrown produce consumption) (applied only at the backyard lawn area for planned House 6 (see Section 1.1, and Figure 1).
  - High-density residential land use (applied to remainder of the site).
  - Commercial/industrial land use, used for the protection of outdoor workers (involved in soil disturbance at the site).
- Human health soil guideline values for asbestos for the above land uses, as presented in the Asbestos in Soil Guidelines.

Environmental

- Published background concentrations[20] to assess the suitability of site soils for cleanfill disposal.
- For regulatory assessment (see Section 7.2) criteria relating to the discharge of stormwater to land based on ANZG[21] high interim sediment quality guidelines (ISQ-high) criteria[22].

5.3.2 Analytical results summary

The findings are summarised in Table 5.2 (based on high-density residential land use), 5.3 (based on standard residential land use criteria and backyard lawn area for planned House 6) and 5.4 (based on ANZG high interim sediment quality guidelines (ISQ-high) criteria) as follows:

Land use (protection of human health) and workplace health and safety.

- [Investigation locations 10 Orr St, 10HA4, 10HA5 and 10HA7]
  - Soil samples used to characterise the soil at the backyard lawn area of planned House 6 recorded concentrations of the metals analysed, TPHs, and PAHs **below** NESCS standard residential (10% homegrown produce consumption) land use criteria.
- Except for the following, analysed soils recorded concentrations of the metals tested **below** NESCS high-density residential land use and commercial/industrial criteria. The recorded exceedances are at:
  - 8 Orr Street, cell 8HA5 at 0 to 0.3 m bgl, where arsenic was recorded above its NESCS SCS for a high-density residential land use.
  - 8 Orr Street HALO composite at 0 to 0.3 m bgl, where lead was recorded above its NESCS SCS for a high-density residential land use.
- Asbestos in soil (via presence/absence analysis) was **not** detected in the soil samples collected from across the site.

[20] Environment Canterbury GIS, Trace Elements Level 2.
[21] Australia and New Zealand Guidelines for Fresh and Marine Water Quality.
[22] Toxicant default guideline values for sediment quality (waterquality.gov.au)

- Laboratory analysis of the PACM fragment collected from 6 Orr Street, location 6HA2 confirmed it contains chrysotile (white) asbestos and organic fibres. Presence/absence testing for the soil sample collected from this location did not detect asbestos, however, as this fragment was encountered, *trace level* asbestos in soil (as AF/FA[23]) is conservatively assumed to be present at this location at a concentration of <0.001 % w/w.

Environmental

- Soils displaced by the site's redevelopment and requiring removal will, based on this investigation's data and assessment, need to be disposed to either cleanfill or managed fill, depending on their location and depth.
- Locally surficial soils on site have recorded concentrations of one or more of the metals analysed and/or TPH above ANZG ISQ-high criteria.

[23] Asbestos fibres/fibrous asbestos.

Table 5.2: Soil analytical results summary (High Density Residential): 6-10 Orr Street, Ashburton

				Asbestos[1]			Heavy Metals - Screen							PAH *			Total Petroleum Hydrocarbons (TPH)			
				Asbestos Containing Material (ACM)	Asbestos Containing Material (ACM)	Fibrous asbestos (FA) / Asbestos fines (AF)	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	BaP TEQ	Pyrene	Naphthalene	C7-C9	C10-C14	C15-C36	C7-C36 (Total)
			Units	Presence/absence	% w/w	% w/w	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Laboratory Limit of Reporting	0.01	0.01	0.001	0.1	0.01	0.1	0.1	0.1	0.1	5	0.03	0.03	0.1	5	10	20	35
Background (Canterbury)[2]				NAD	NAD	NAD	12.58	0.19	22.7	20.3	40.96	20.7	93.94	0.922[6]	1.362[6]	0.029[6]	<LoR	<LoR	<LoR	<LoR
NESCS - Commercial / Industrial[3]				-	0.05	0.001	70	1,300	6,300	>10,000	3,300	6,000[4]	400,000[4]	35	NA[5]	210[5]	500[m,7]	1,700[x,7]	NA[7]	NGV
NESCS - High Density Residential[3]				-	0.04	0.001	45	230	1,500	>10,000	500	1,200[4]	60,000[4]	24	1,600[5]	63[5]	500[m,7]	510[x,7]	NA[7]	NGV
Property Address	Sample ID	Sample depth (m bgl)	Material Type																	
6 Orr St	6HA1	0.1	Soil	NAD	-	-	6.1	0.10	23	16	47	16	90	-	-	-	-	-	-	-
		0.3		-	-	-	5.8	0.07	20	11	24	15	67	-	-	-	-	-	-	-
	6HA2	0.1	Soil	NAD	-	-	6	0.09	24	15	41	17	91	-	-	-	-	-	-	-
		0.3		-	-	-	6.7	0.05	25	15	19	18	73	-	-	-	-	-	-	-
	6HA2 FRAG	0.15	Building material	Chrysotile asbestos	NAD	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6HA3	0.1	Soil	NAD	-	-	10	0.13	30	27	47	23	140	-	-	-	-	-	-	-
		0.3		-	-	-	14	0.07	37	35	31	30	120	-	-	-	-	-	-	-
		0.5		-	-	-	8	0.05	25	24	19	20	75	-	-	-	-	-	-	-
		0.7		-	-	-	7.9	0.04	23	23	20	19	74	-	-	-	-	-	-	-
		0.95		-	-	-	6.5	0.04	21	16	17	16	67	-	-	-	-	-	-	-
	6HA4	0.1	Soil	NAD	-	-	11	0.18	29	27	67	21	140							
		0.3		-	-	-	14	0.07	37	35	34	29	120	-	-	-	-	-	-	-
		0.5		-	-	-	8	0.04	22	24	19	18	69	-	-	-	-	-	-	-
		0.7		-	-	-	7.4	0.05	21	21	19	17	70	-	-	-	-	-	-	-
		1.0		-	-	-	3.8	0.03	16	8.8	11	12	47	-	-	-	-	-	-	-
	6HA5	0.1	Soil	NAD	-	-	9.2	0.32	26	30	39	19	120	-	-	-	-	-	-	-
		0.3		-	-	-	11	0.12	31	28	28	24	100	-	-	-	-	-	-	-
		0.5		-	-	-	7.1	0.06	21	20	17	17	65	-	-	-	-	-	-	-
		0.7		-	-	-	7.7	0.05	21	21	18	17	67	-	-	-	-	-	-	-
		1.0		-	-	-	12	0.1	35	35	32	28	110	-	-	-	-	-	-	-
	6HA6	0.1	Soil	NAD	-	-	9.9	0.43	27	25	410	19	470	-	-	-	-	-	-	-
		0.3		-	-	-	8.1	0.16	26	20	47	20	290	-	-	-	-	-	-	-
	6 HALO COMPOSITE	0.1	Topsoil	-	-	-	8.1	0.16	25	29	350	16	200	-	-	-	-	-	-	-
	6HALO A	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6HALO B	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6HALO C	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6HALO D	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8 Orr St	8HA1	0.1	Soil	NAD	-	-	9.8	0.19	21	24	71	13	110	-	-	-	-	-	-	-
		0.3		-	-	-	4.8	0.08	17	11	20	13	60	-	-	-	-	-	-	-
	8HA2	0.1	Soil	NAD	-	-	4.7	0.18	21	14	35	14	81	-	-	-	-	-	-	-
		0.3		-	-	-	4.4	0.06	20	9.0	16	14	68	-	-	-	-	-	-	-
	8HA3	0.1	Soil	NAD	-	-	7.9	0.24	27	22	88	19	130	-	-	-	-	-	-	-
		0.3		-	-	-	6.6	0.04	24	16	23	17	80	-	-	-	-	-	-	-
	8HA4	0.1	Soil	NAD	-	-	9.3	0.27	26	31	62	18	190	-	-	-	-	-	-	-
		0.3		-	-	-	8.8	0.09	28	24	23	22	120	-	-	-	-	-	-	-
		0.5		-	-	-	12	0.07	37	36	32	30	120	-	-	-	-	-	-	-
		0.7		-	-	-	11	0.07	33	30	29	26	110	-	-	-	-	-	-	-
		0.8		-	-	-	7.6	0.07	28	18	34	19	130	-	-	-	-	-	-	-
	8HA5	0.1	Soil	NAD	-	-	61	0.42	41	59	390	24	340	-	-	-	-	-	-	-
		0.3		-	-	-	6.7	0.07	25	14	26	18	180	-	-	-	-	-	-	-
		0.45		-	-	-	5.7	0.05	25	15	18	19	71	-	-	-	-	-	-	-
	8HA6	0.1	Soil	NAD	-	-	8.1	0.20	25	22	120	18	140	-	-	-	-	-	-	-
		0.3		-	-	-	7.3	0.05	26	17	22	19	86	-	-	-	-	-	-	-
		0.5		-	-	-	5.7	0.06	26	16	19	19	72	-	-	-	-	-	-	-
		0.65		-	-	-	6.2	0.04	26	13	19	19	74	-	-	-	-	-	-	-
	8 HALO COMPOSITE	0.1	Topsoil	-	-	-	11	0.35	27	65	660	19	350	-	-	-	-	-	-	-
	8HALO A	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8HALO B	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8HALO C	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8HALO D	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10 Orr St	10HA1	0.1	Soil	NAD	-	-	8.4	0.21	21	25	79	12	140	-	-	-	-	-	-	-
		0.3		-	-	-	4.2	0.05	18	9	15	13	60	-	-	-	-	-	-	-
	10HA2	0.1	Soil	NAD	-	-	5.2	0.21	21	20	39	15	82	-	-	-	-	-	-	-
		0.3		-	-	-	4	0.07	19	9.8	15	13	55	-	-	-	-	-	-	-
	10HA3	0.1	Soil	NAD	-	-	6.8	0.18	24	23	69	17	140	<LoR	<LoR	<LoR	< 50	< 100	4,400	4,400
		0.3		-	-	-	7.4	0.06	26	19	24	20	85	<LoR	<LoR	<LoR	< 5	< 10	< 20	< 35
		0.5		-	-	-	6.5	0.03	26	14	19	20	73	-	-	-	-	-	-	-
		0.7		-	-	-	5.6	0.04	24	14	18	17	72	-	-	-	-	-	-	-
	10HA6	0.1	Soil	NAD	-	-	10	0.40	28	35	170	18	270	-	-	-	-	-	-	-
		0.3		-	-	-	6.8	0.07	27	17	24	20	94	-	-	-	-	-	-	-
		0.5		-	-	-	3.8	0.04	17	11	13	12	44	-	-	-	-	-	-	-
	10 HALO COMPOSITE	0.1	Topsoil	-	-	-	30	0.28	34	56	220	17	290	-	-	-	-	-	-	-
	10HALO A	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10HALO B	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10HALO C	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10HALO D	0.1	Topsoil	NAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Key:
NAD = No Asbestos Detected.
NGV = no guideline value.
<LoR = below laboratory Limit of Reporting.
'-' denotes not analysed or not applicable.
m bgl = metres below ground level.

BOLD	exceeds published background concentrations at the site (used as a proxy for suitability of soils for disposal to cleanfill)
Red text	exceeds NES:CS SCS commercial/industrial criteria
Blue text	exceeds NES:CS SCS high density residential

References:
* Full suite analysed, selected analytes shown. Refer Eurofins Environment Testing certificates of analysis for full results.
1. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, BRANZ 2017. Soil guideline values for ACM and AF/FA based on relevant land use.
2. Environment Canterbury GIS, Trace Elements Level 2. Background concentrations at the site, from "Background concentrations of selected trace elements in Canterbury soils" prepared for Environment Canterbury by Tonkin & Taylor Ltd, July 2006.
3. MfE, June 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Commercial/industrial land use criteria as a conservative proxy for construction worker health and safety, and high-density residential land use criteria.
4. In the absence of availbale NESCS criterion for nickel and zinc, the criterion has been adopted from Assessment of Site Contamination National Environment Protection Measures (ASC NEPM) Toolbox – http://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox.
5. MfE 2011, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 soil acceptance criteria for TPH, pyrene and naphthalene commercial/industrial and residential land use. All pathways, SANDY SILT soil type, <1 m depth of contamination.
6. ECan 2007, Background concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils.
7. MfE 2011, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 soil acceptance criteria for TPH. All pathways, SANDY SILT soil type conservatively adopted, <1 m depth of contamination. The following notes denote the limiting pathway for each criterion: m-maintenance/excavation, x- PAH surrogate. NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

Table 5.3: Soil analytical results summary (Residential 10% produce): 6-10 Orr Street, Ashburton

				Asbestos[1]			Heavy Metals - Screen							PAH *			Total Petroleum Hydrocarbons (TPH)			
				Asbestos Containing Material (ACM)	Asbestos Containing Material (ACM)	Fibrous asbestos (FA) / Asbestos fines (AF)	Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	BaP TEQ	Pyrene	Naphthalene	C7-C9	C10-C14	C15-C36	C7-C36 (Total)
			Units	Presence/absence	% w/w	% w/w	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Laboratory Limit of Reporting	0.01	0.01	0.001	0.1	0.01	0.1	0.1	0.1	0.1	5	0.03	0.03	0.1	5	10	20	35
Background (Canterbury)[2]				NAD	NAD	NAD	12.58	0.19	22.7	20.3	40.96	20.7	93.94	0.922[6]	1.362[6]	0.029[6]	<LoR	<LoR	<LoR	<LoR
NESCS - Commercial / Industrial[3]				-	0.05	0.001	70	1,300	6,300	>10,000	3,300	6,000[4]	400,000[4]	35	NA[5]	210[5]	500[m,7]	1,700[x,7]	NA[7]	NGV
NESCS - Residential 10% produce[3]				-	-	-	20	3	460	>10,000	210	400[4]	7,400[4]	10	1,600[5]	63[5]	500[m,7]	510[x,7]	NA[7]	NGV
Property Address	Sample ID	Sample depth (m bgl)	Material Type																	
10 Orr Street	10HA4	0.1	Soil	NAD	-	-	6	0.27	22	24	49	15	160	-	-	-	-	-	-	-
		0.3		-	-	-	6.5	0.08	25	17	24	18	91	-	-	-	-	-	-	-
		0.5		-	-	-	5.7	0.11	28	16	20	19	80	-	-	-	-	-	-	-
	10HA5	0.1	Soil	NAD	-	-	7.6	0.18	26	25	46	19	110	-	-	-	-	-	-	-
		0.3		-	-	-	5.7	0.05	24	14	18	18	70	-	-	-	-	-	-	-
		0.5		-	-	-	4.4	0.06	20	14	13	15	55	-	-	-	-	-	-	-
		0.6		-	-	-	4	0.06	18	13	15	13	55	-	-	-	-	-	-	-
	10HA7	0.0	Soil	NAD	-	-	10	0.11	18	20	20	11	340	<LoR	<LoR	<LoR	< 500	< 1,000	76,000	76,000

Key:

NA = Indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

NAD = No Asbestos Detected.

NGV = no guideline value.

<LoR = below laboratory Limit of Reporting.

'-' denotes not analysed or not applicable.

m bgl = metres below ground level.

BOLD	exceeds published background concentrations at the site (used as a proxy for suitability of soils for disposal to cleanfill)
Red text	exceeds NES:CS SCS commercial/industrial criteria
Green text	exceeds NES:CS SCS residential 10% produce

References:

* Full suite analysed, selected analytes shown. Refer Eurofins Environment Testing certificates of analysis for full results.

1. New Zealand Guidelines for Assessing and Managing Asbestos in Soil, BRANZ 2017. Soil guideline values for ACM and AF/FA based on relevant land use.

2. Environment Canterbury GIS, Trace Elements Level 2. Background concentrations at the site, from "Background concentrations of selected trace elements in Canterbury soils" prepared for Environment Canterbury by Tonkin & Taylor Ltd, July 2006.

3. MfE, June 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Commercial/industrial land use criteria as a conservative proxy for construction worker health and safety, and high-density residential land use criteria.

4. In the absence of availbale NESCS criterion for nickel and zinc, the criterion has been adopted from Assessment of Site Contamination National Environment Protection Measures (ASC NEPM) Toolbox – http://www.nepc.gov.au/nepms/assessment-site-contamination/toolbox.

5. MfE 2011, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 soil acceptance criteria for TPH, pyrene and naphthalene commercial/industrial and residential land use. All pathways, SANDY SILT soil type, <1 m depth of contamination.

6. ECan 2007, Background concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils.

7. MfE 2011, Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand. Tier 1 soil acceptance criteria for TPH. All pathways, SANDY SILT soil type conservatively adopted, <1 m depth of contamination. The following notes denote the limiting pathway for each criterion: m-maintenance/excavation, x- PAH surrogate. NA indicates contaminant not limiting as estimated health-based criterion is significantly higher than that likely to be encountered on site.

Table 5.4: Soil analytical results for discharge to stormwater: 6-10 Orr Street, Ashburton

				Heavy Metals - Screen							PAH *	TPH
				Arsenic	Cadmium	Chromium	Copper	Lead	Nickel	Zinc	Total PAH	C7-C36 (Total)
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
			Laboratory Limit of Reporting	0.1	0.01	0.1	0.1	0.1	0.1	5	0.03	35
Background (Canterbury)[1]				12.58	0.19	22.7	20.3	40.96	20.7	93.94	0.922 [3]	<LoR
ANZECC Guideline Values (High) [2]				70	10	370	270	220	52	410	50,000	550
Property Address	Sample ID	Sample depth (m bgl)	Material Type									
6 Orr St	6HA1	0.1	Soil	6.1	0.10	23	16	47	16	90	-	-
		0.3		5.8	0.07	20	11	24	15	67	-	-
	6HA2	0.1	Soil	6	0.09	24	15	41	17	91	-	-
		0.3		6.7	0.05	25	15	19	18	73	-	-
	6HA3	0.1	Soil	10	0.13	30	27	47	23	140	-	-
		0.3		14	0.07	37	35	31	30	120	-	-
		0.5		8	0.05	25	24	19	20	75	-	-
		0.7		7.9	0.04	23	23	20	19	74	-	-
		0.95		6.5	0.04	21	16	17	16	67	-	-
	6HA4	0.1	Soil	11	0.18	29	27	67	21	140		
		0.3		14	0.07	37	35	34	29	120	-	-
		0.5		8	0.04	22	24	19	18	69	-	-
		0.7		7.4	0.05	21	21	19	17	70	-	-
		1.0		3.8	0.03	16	8.8	11	12	47	-	-
	6HA5	0.1	Soil	9.2	0.32	26	30	39	19	120	-	-
		0.3		11	0.12	31	28	28	24	100	-	-
		0.5		7.1	0.06	21	20	17	17	65	-	-
		0.7		7.7	0.05	21	21	18	17	67	-	-
		1.0		12	0.1	35	35	32	28	110	-	-
	6HA6	0.1	Soil	9.9	0.43	27	25	410	19	470	-	-
		0.3		8.1	0.16	26	20	47	20	290	-	-
	6 HALO COMPOSITE	0.1	Topsoil	8.1	0.16	25	29	350	16	200	-	-
8 Orr St	8HA1	0.1	Soil	9.8	0.19	21	24	71	13	110	-	-
		0.3		4.8	0.08	17	11	20	13	60	-	-
	8HA2	0.1	Soil	4.7	0.18	21	14	35	14	81	-	-
		0.3		4.4	0.06	20	9.0	16	14	68	-	-
	8HA3	0.1	Soil	7.9	0.24	27	22	88	19	130	-	-
		0.3		6.6	0.04	24	16	23	17	80	-	-
	8HA4	0.1	Soil	9.3	0.27	26	31	62	18	190	-	-
		0.3		8.8	0.09	28	24	23	22	120	-	-
		0.5		12	0.07	37	36	32	30	120	-	-
		0.7		11	0.07	33	30	29	26	110	-	-
		0.8		7.6	0.07	28	18	34	19	130	-	-
	8HA5	0.1	Soil	61	0.42	41	59	390	24	340	-	-
		0.3		6.7	0.07	25	14	26	18	180	-	-
		0.45		5.7	0.05	25	15	18	19	71	-	-
	8HA6	0.1	Soil	8.1	0.20	25	22	120	18	140	-	-
		0.3		7.3	0.05	26	17	22	19	86	-	-
		0.5		5.7	0.06	26	16	19	19	72	-	-
		0.65		6.2	0.04	26	13	19	19	74	-	-
	8 HALO COMPOSITE	0.1	Topsoil	11	0.35	27	65	660	19	350	-	-
10 Orr St	10HA1	0.1	Soil	8.4	0.21	21	25	79	12	140	-	-
		0.3		4.2	0.05	18	9	15	13	60	-	-
	10HA2	0.1	Soil	5.2	0.21	21	20	39	15	82	-	-
		0.3		4	0.07	19	9.8	15	13	55	-	-
	10HA3	0.1	Soil	6.8	0.18	24	23	69	17	140	<LoR	4,400
		0.3		7.4	0.06	26	19	24	20	85	<LoR	< 35
		0.5		6.5	0.03	26	14	19	20	73	-	-
		0.7		5.6	0.04	24	14	18	17	72	-	-
	10HA4	0.1	Soil	6	0.27	22	24	49	15	160	-	-
		0.3		6.5	0.08	25	17	24	18	91	-	-
		0.5		5.7	0.11	28	16	20	19	80	-	-
	10HA5	0.1	Soil	7.6	0.18	26	25	46	19	110	-	-
		0.3		5.7	0.05	24	14	18	18	70	-	-
		0.5		4.4	0.06	20	14	13	15	55	-	-
		0.6		4	0.06	18	13	15	13	55	-	-
	10HA6	0.1	Soil	10	0.40	28	35	170	18	270	-	-
		0.3		6.8	0.07	27	17	24	20	94	-	-
		0.5		3.8	0.04	17	11	13	12	44	-	-
	10HA7	0.0	Soil	10	0.11	18	20	20	11	340	<LoR	76,000
	10 HALO COMPOSITE	0.1	Topsoil	30	0.28	34	56	220	17	290	-	-

Key:

NGV = no guideline value.

<LoR = below laboratory Limit of Reporting.

'-' Denotes not analysed or not applicable.

m bgl = metres below ground level.

BOLD exceeds published background concentrations at the site (used as a proxy for suitability of soils for disposal to cleanfill)

Red text exceeds ANZG high interim sediment quality guidelines (ISQG-High)

References:

* Full suite analysed, selected analytes shown. Refer Eurofins Environment Testing certificates of analysis for full results.

1. Environment Canterbury GIS, Trace Elements Level 2. Background concentrations at the site, from "Background concentrations of selected trace elements in Canterbury soils" prepared for Environment Canterbury by Tonkin & Taylor Ltd, July 2006.

2. Australia and New Zealand Guidelines for Fresh and Marine Water - Toxicant default guideline values for sediment quality (high).

3. ECan 2007, Background concentrations of polycyclic aromatic hydrocarbons in Christchurch urban soils.

6 Conceptual site model

A conceptual site model (CSM) as defined by the MfE's CLMG No. 5, sets out known and potential sources of ground contamination, potential exposure pathways, and potential receptors for a site. For there to be an effect to the proposed activity there must be a contamination source and a mechanism (pathway) for contamination to affect human health or the environment (receptor).

The CSM (used as a screening assessment) based on our review of available ECan ground contamination related information, review of aerial photographs, the proposed high-density residential land use, and assessment of the soil laboratory test results, is presented below in Table 6.1.

Table 6.1: Conceptual site model

Source	Exposure pathway	Potential receptor	Complete pathway?
Asbestos in soil from ACMs used in the construction of the structures on site (as ACM and/or AF/FA from construction, demolition, and renovation activities and/or weather/degradation).	Inhalation of asbestos fines/fibres. Offsite disposal.	Site re-development workers. Receiving environment (in surrounds and at disposal facility).	**YES.** ACM was encountered and collected from surficial soil (0.0 to 0.3 m bgl) at investigation location 6 Orr Street, 6HA2 (removed from site during sampling). As part of the site's redevelopment, soil at this area will be disturbed and removed under suitable soil management controls, removed from the site, and disposed to a facility licensed to accept asbestos containing materials (see Section 8).
		Future site users. Surrounding residents.	**NO.** Soil where ACM was encountered will be removed from the site during redevelopment, this contaminant 'source' will be removed from the site *prior* to the planned high-density residential land use.
Metal concentrations in soil from anthropogenic activity.	Direct contact. Ingestion of soil. Inhalation of airborne dust. Off-site discharge.	Site re-development workers. Receiving environment (in surrounds and at disposal facility).	**NO.** Arsenic and lead were recorded below commercial/ industrial (outdoor worker) criterion in surficial soils.
		Future site users. Surrounding residents.	**NO.** Although arsenic and lead were recorded above their respective high-density residential criterion in surficial soils, this contaminant 'source' will be removed from the site *prior* to the planed high-density residential land use.
TPH/PAH concentrations in soil from anthropogenic activity.	Direct contact. Ingestion of soil. Inhalation of vapour or airborne dust.	Site re-development workers. Receiving environment (in surrounds and at disposal facility).	**NO.** Concentrations of TPH and PAH were recorded below their respective standard residential land use criteria and do not pose a risk to site workers and/or future users. PAH and TPH concentrations above

Source	Exposure pathway	Potential receptor	Complete pathway?
	Off-site discharge.	Future site users. Surrounding residents.	background will be removed from site as part of the site scrape to 0.4 m bgl.

7 Regulatory requirements

The project planner should confirm the interpretation and applicability of all rules in the LWRP for the entire site redevelopment.

7.1 NESCS

The NESCS applies to a piece of land which an activity or industry on the HAIL has been, is being, or is 'more likely than not' to have been undertaken on it.

Review of historical aerial photographs and council records indicates that the site has *not* been subjected to an activity on the HAIL.

While some impact from anthropogenic activities has been identified on site by this investigation, this would only be considered a HAIL if contamination was present in sufficient quantity that it could be a risk to human health (i.e., HAIL category I). Concentrations of arsenic and lead in surface soil were recorded above high-density residential criterion in two locations at 8 Orr St, and a fragment of ACM was identified at one investigation location at 6 Orr St. If these isolated instances of arsenic and lead impacted soils were *not* removed from site it *could* meet the threshold for HAIL category I for future site users. However, this impacted soil, as well as the soil containing the ACM fragment will be removed from the site in accordance with Kāinga Ora's site redevelopment policy, and the earthwork undertaken following suitable management and controls. As this contaminant source is being removed prior to the site's high-density residential land use, HAIL category I would not apply following its redevelopment.

However, correspondence with ADC for other HDS redevelopment sites in Ashburton indicates their position is that consent as a *restricted discretionary activity* under the NESCS is required for this site's redevelopment earthwork due to the individual results recording exceedances of applicable human health criteria.

Note, this NESCS consent application should not be considered a precedence or standard Kāinga Ora operating procedure.

7.2 Canterbury Land and Water Regional Plan

The LWRP [24] defines a contaminated site as, "*land that has a hazardous substance in or on it that; a) has significant adverse effects on the environment; or b) is reasonably likely to have significant adverse effects on the environment".*

Potentially contaminated land is defined as, *"part of a site where an activity or industry described in the list in Schedule 3 of this Plan has been or is being undertaken on it or where it is more likely than not that an activity or industry described in the list in Schedule 3 of this Plan is being or has been undertaken on it, but excludes any site where a detailed site investigation has been completed and reported and which demonstrates that any contaminants in or on the site are at, or below, background concentrations".*

[24] Canterbury Land and Water Regional Plan, Volume 1, 2018.

Whilst locally within the site, concentrations of the parameters analysed have been recorded above their published background concentrations and at two locations, above high-density residential land use criteria, they have *not* been recorded in a sufficient quantity or magnitude to be of risk to human health or to have significant adverse effects on the environment.

Despite metal concentrations recorded at concentrations above background levels in surface soils across the site, these are unlikely to result in significant adverse effects as:

a There is no evidence of leaching of contaminants to deeper soils (as soils below 0.3 m bgl are generally below published background concentrations); and

b The intended site redevelopment earthworks will see the removal of the top 0.4 m of the soil profile across the site over a short time, meaning that any increased potential for leaching (over and above that currently occurring in unsealed areas) is minimal.

As such, and as an activity or industry described in Schedule 3 (i.e., a HAIL activity) has not been undertaken at the site, the site is not considered to meet the definition of potentially contaminated land. On this basis, resource consent(s) relating to contaminated land are not considered to be required for redevelopment earthworks for this site.

Rules 5.185 to 5.188 deal with contaminated land in the LWRP. In summary, rules 5.185 and 5.186 indicate that a site investigation is a permitted activity if it is carried out in accordance with MfE guidelines and the report is provided to Environment Canterbury within 2 months. Otherwise, the investigation requires a consent as a restricted discretionary.

ADC holds a 'global' consent for the discharge of stormwater to land[25] from ECan (the 'global consent'). The global consent's condition 3 relates to discharge of stormwater to land being precluded if land is or was subject to one or more of the activities listed on the HAIL. Under Condition 3a of the global consent, discharge stormwater to land is permitted when investigation soil (laboratory) data is assessed and is below ANZG ISQ-high criteria (or subsequent updates to these guidelines).

This investigation has recorded certain metal and TPH concentrations in surficial soils on site above the ANZG ISQ-high guidelines, after the planned removal of surficial soil on site (for constructability reasons etc.) including these impacted soils and subsequently the site conditions will comply with the global consent's conditions.

7.3 Asbestos Regulations

Asbestos was not detected in the soil samples analysed by T+T; however, a fragment of confirmed ACM was found at location 6HA2 and on this basis the Asbestos Regulations do apply to soil disturbance at the site and at this location (see Section 8.2).

A pre-deconstruction asbestos survey will be required for the dwelling/other structures on site prior to their demolition given their age, in accordance with Asbestos Regulations.

8 Remedial work, material handling requirement

8.1 Work Instruction

A WI report shall be prepared for the site's redevelopment earthwork which will include requirements to document soil disposal, health and safety and environmental controls to be implemented during soil disturbance to protect human health and/or the environment.

[25] ECan reference CRC186263 – "to discharge stormwater to land and water from existing and future urban areas", consent holder – Ashburton District Council.

8.2 Contamination remediation, management, and onsite reuse

Based on the results of this investigation, widespread ground contamination related remediation (beyond the planned removal of topsoil for geotechnical/constructability reasons) of the site is not required. The site soils are not considered to pose an unacceptable risk to current or future land use. The planned excavation and site clearance work (including the site scrape to 0.4 m bgl) will address the isolated presence of arsenic and lead in soil above high-density residential land use criteria (and the presence of asbestos fragment in surface soils identified at 6HA2 by removing these materials from site). Soils across the wider site below 0.3 m bgl are suitable for onsite reuse from a ground contamination perspective under the proposed high-density residential land use.

As a fragment of asbestos was found at investigation location 6HA2, soil disturbance work in this area of the site will need to be undertaken in accordance with the Asbestos Regulations and Asbestos in Soil Guidelines. Based on the laboratory data and Asbestos in Soil Guidelines, soil disturbance work in 6HA2 can be undertaken as '***unlicensed asbestos work'***.

Contaminant results across the rest of the site were below commercial/industrial land use criteria. As such, standard earthworks health and safety controls are considered suitable for construction workers involved in soil disturbance across the rest of the site.

Vigilance for any indicators of contamination (including the presence of ACM) will be required during site clearance and redevelopment earthworks, particularly under the dwelling and ancillary building footprint. Discovery of further ACM on site may require additional health and safety controls to be implemented.

8.3 Soil disposal options

Soils displaced by the site's redevelopment and soils requiring removal will, based on this investigation's data and assessment, need to be disposed to either cleanfill or managed fill, depending on their location and depth.

Soil disposal options will be detailed in the WI.

8.4 Soil excavation volume estimates

Information relating to soil excavation volume estimates for materials displaced by the site's redevelopment based on the sample results of this investigation shall be provided in the WI.

9 Recommendations

Based on the PSI/DSI findings, T+T recommends the following:

- Widespread remediation of the site is not required for the proposed use of the site as high-density residential housing. The planned site scrape and offsite disposal of soils from ground level to 0.4 m bgl will remove soils where a fragment of asbestos was found and where arsenic and lead have been recorded above high-density residential land use criteria.
- Soil disturbance of surficial soils (0 to 0.3 m bgl) at investigation location 6HA2 shall be undertaken as '***unlicensed asbestos work***' pursuant to the Asbestos Regulations.
- Across the rest of the site, and after the site clearance works to remove asbestos impacted soils at investigation location 6HA2, standard earthwork health and safety controls are suitable for workers involved in soil disturbance across the remainder of the site.
- Although no HAIL activity has been identified in this assessment, resource consent (as a restricted discretionary activity) under the NESCS for the site's redevelopment earthwork and change in land use to high-density residential is required, as informed by correspondence with ADC for other HDS redevelopment sites in Ashburton regarding their interpretation of individual soil concentration results exceeding applicable human health criteria.
- Consents are not required under the LWRP. However, this report needs to be submitted to ECan in accordance with rule 5.185.
- Post the site's redevelopment earthwork, including the scrape and removal of surficial soils, the site conditions and recorded investigation information comply with ADC's 'global consent' conditions for the discharge of stormwater to land.
- A WI is required to outline health, environmental and safety controls, mitigation controls to manage unexpected discovery of contaminants, including ACM, and summarise offsite disposal options for excavated soil.
- A pre-deconstruction asbestos survey is required to be undertaken on the dwelling/other structures prior to demolition in accordance with the requirements of the Asbestos Regulations.

10 Applicability

This report has been prepared for the exclusive use of our client Kāinga Ora Homes and Communities, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Recommendations and opinions in this report are based on discrete sampling data. The nature and continuity of subsoil away from the sampling points are inferred and it must be appreciated that actual conditions could vary from the assumed model.

In accordance with your instructions, in carrying out our services we have relied upon, and presumed accurate, the information in:

- The reports produced by EHS Support New Zealand Limited titled "Kainga Ora Conceptual Site Model Residential Properties" (Version 4) & "Residential Property Soil Sampling and Analysis Plan" (Version 7) both dated July 2022.
- The architectural drawings produced by Hierarchy Group Ltd dated 12 March 2024.
- The project brief produced by Kāinga Ora dated 5 August 2022.
- The report produced by BECA Ltd titled "06 - 10 Orr Street, Netherby, Ashburton - Geotechnical Design Report" 25 March 2024.
- The report produced by Kirk Roberts Consulting Engineers Ltd titled "Preliminary Site Investigation and Soil Management Report, 6-10 Orr Street, Netherby, Ashburton" dated 15 March 2023.
- The survey produced by Graham Surveying Ltd dated 21 February 2023.

Which you have provided to us ("Existing Information"). We have not attempted to verify the accuracy or completeness of the Existing Information. If any of the information in the Existing Information is subsequently determined to be false, inaccurate, or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

We understand and agree that our client will submit this report as part of an application for resource consent and that Ashburton District Council and/or Environment Canterbury as the consenting authorities will use this report for the purpose of assessing that application.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

Report prepared by:

.....

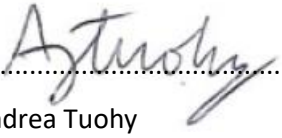
Katie Stephenson
Environmental Consultant

Authorised for Tonkin & Taylor Ltd by:

.....

Michael Mechaelis
Project Director

Report technically reviewed by a SQEP as prescribed in the NESCS Users' Guide:



.....

Andrea Tuohy
Environmental Scientist

Figures

- **Figure 1: Gound Contamination Investigation Plan.**

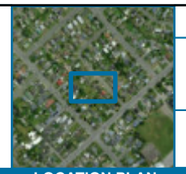
Date: 4/03/2024 11:37 AM

Tonkin+Taylor

Exceptional thinking together www.tonkintaylor.co.nz

NOTES:

CRS: WGS 1984 Web Mercator Auxiliary Sphere Credits: Canterbury RC, Environment Canterbury, LINZ, Environment Canterbury Regional Council; Hurunui District Council; Waimakariri District Council; Timaru District Council; Waimate District Council; Mackenzie District Council; Otago Regional Council; LINZ; NIWA, Canterbury RC, Environment Canterbury, Maxar



LOCATION PLAN

PROJECT No.	1018898.2000		
DESIGNED	MATK	MAR.24	APPROVED
DRAWN	-WEB-	MAR.24	DATE
CHECKED	KPS	APR.24	

CLIENT KĀINGA ORA HOMES AND COMMUNITIES

PROJECT HOUSING DELIVERY SYSTEM CHCH

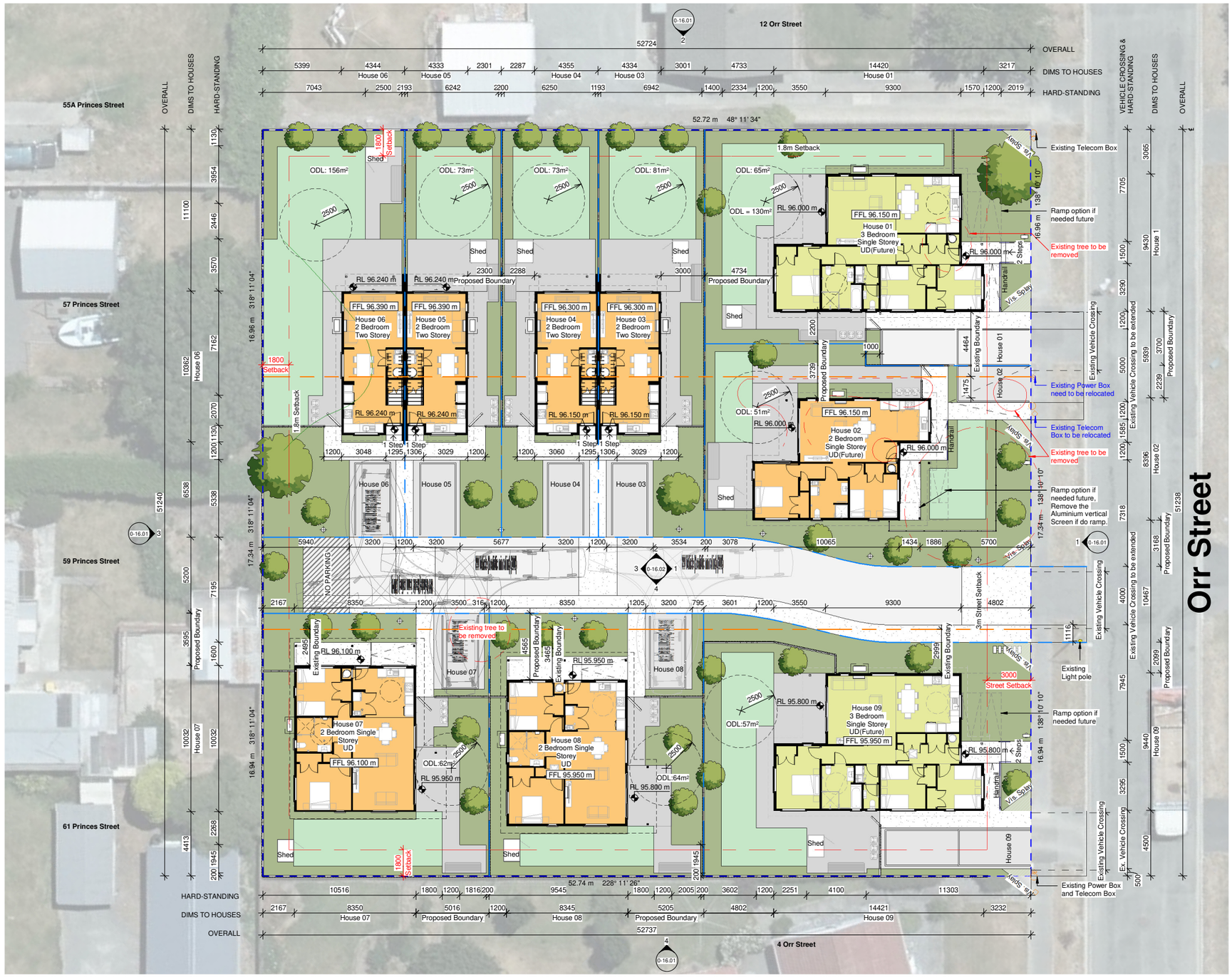
TITLE 6-10 ORR STREET, ASHBURTON
GROUND CONTAMINATION INVESTION PLAN

SCALE (A3) 1:450 FIG No. FIGURE 1. REV 0

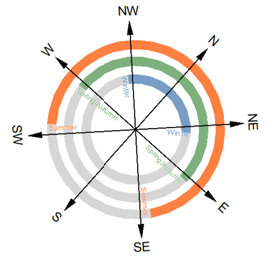
Appendix A Bulk and Location Plan

SCALE SUMMARY

1000 @ A1	= 2000 @ A3	100 @ A1	= 200 @ A3
500 @ A1	= 1000 @ A3	50 @ A1	= 100 @ A3
250 @ A1	= 500 @ A3	25 @ A1	= 50 @ A3
200 @ A1	= 100 @ A3	10 @ A1	= 20 @ A3
150 @ A1	= 300 @ A3	5 @ A1	= 10 @ A3



1 Ground Floor
scale1 : 150 @ A1



LEGAL DESCRIPTION

Address:	6-10 Orr Street, Netherby, Ashburton
Lot / DP / CB	3/4/5 / 18886

ZONING INFO:

Wind Region:	A
Earthquake Zone:	1
Exposure:	B
Wind Zone:	Medium
Planning Zone:	RC
Flood Management Zone:	NA

GENERAL NOTES:

All dimensions are nominal and are to be checked on site before commencing work.

Dimensions are showing to cladding face.

All work to comply with the relevant section of the New Zealand Building Code.

Location of water supply, power & phone to be confirmed.

LINE TYPES LEGEND

	Site Boundary
	Existing Boundary
	New internal Boundary
	Setbacks
	Handrail

NOTE:

Exposed aggregate Finishes to be crushed aggregate and compliant with Slip Resistance requirements of D1

Timber Entry Decks
To be coated with Dulux Intergrain UltraDeck, Slip Resistant, Achieving a P4 Slip resistance rating in compliance with D1 2.1.5

Deck exempt from Building Consent
proprietary balustrade system as per specification

Site levels for reference only.
Refer to Civil Engineers documentation for grading and site levels.

Refer to Landscape Architects drawing set
For all hard and soft landscaping setout and plant species.

HANDRAILS AND RAMPS NOTES

All external steps for FUD to have a maximum riser of 180mm and a minimum tread of 310mm with a clear width of 1200mm, and have the ability to install handrails in the future if required. All steps will require handrails where the change in level is more than 500mm high.

Accessible ramps are to be set at a maximum slope of 1:12 with a clear width of 1200mm.
Where the surface of an accessible route is more than 25mm above the adjacent ground, protection is to be provided by a 75 mm high ramp edge.

Handrails to be 1.1m high Juraloc Viking balustrade system as per specification.

MASTERPLANNING LEGEND

1 Bedroom House:	
2 Bedroom House:	
3 Bedroom House:	
4 Bedroom House:	
5 Bedroom House:	
Driveway:	
Footpath:	
Lawn Area:	
Landscaping:	
Waste & Recycle Areas:	
Refuse Bins:	
Timber Decking:	
Washlines 1 & 2 Bed: 1,2m above FFL (940mm x 2490mm)	
Washlines >3 Bed: 1,2m above FFL (940mm x 3390mm)	
Letter Boxes:	
New Water Meters:	WM
Lighting Bollard	

Small Shed 1 Bed = (1530W x 785D x 1830H mm)
* For no lawn unit only

Medium Shed 1 - 4 Bed = (1530W x 1080D x 1830H mm)

Large Shed 5 - 6 Bed = (1530W x 1830D x 1930H mm)

BULK & LOCATION

Address:	6-10 Orr Street, Netherby, Ashburton
Total Site Area:	2702 m²

	Net Lot Area	Net Lot Site Coverage
House 1:	345.6m²	33%
House 2:	310.6m²	27.5%
House 3:	205.4m²	21%
House 4:	186m²	23%
House 5:	186m²	23%
House 6:	274.5m²	16%
House 7:	280.2m²	34.6%
House 8:	266m²	36.4%
House 9:	317.9m²	35.9%
Building Coverage:		
House 1&9:	114.1m² each	
House 2:	85.4m²	
House 3-6:	43.17m² each	
House 7&8:	97m² each	
Total:	680.28m²	25%
Parking:	11 bays	
Bicycle Parks:	9 (In Shed)	
Building Setback:	>1.8m	
Road Setback:	3m	
Building Height:	<8m	

Kainga Ora Typology Legend

Unit Number	Typology
House 1	RH.04.08.01 UD
House 2	RC.04.08.01 UD
House 3&4	B.05.01.01
House 5&6	B.05.01.01
House 7	RF.04.06.02 UD
House 8	RF.04.06.02 UD
House 9	RH.04.08.01 UD

Hierarchy Group.

Client: Kāinga Ora Homes and Communities

NORTH

Project: 6-10 Orr Street - AR109526
Address: 6-10 Orr Street Netherby Ashburton, 7700

No: H1259-117

Revision Schedule

Rev.	Description	Date
A	Resource Consent	12/03/2024

Status: **Resource Consent**
Issue Date: **12/03/2024**
Drawn By: **KTC** Checked By: **MG**
Scale: **As indicated @ A1**

Sheet Name: **Bulk and Location Plan - Ground Floor**
Sheet No: 0-11.03 Rev No: A

C:\Users\Katie\Documents\H1259-117 - 6-10 Orr Street_REV01_Katie_Hierarchy.rvt

Appendix B Site photographs

- **All photographs taken 28 February 2024.**

6 Orr Street

Photograph B1: Front (northern) elevation of dwelling (facing southwest).

Photograph B2: front and side (south-eastern) elevations of dwelling (facing west).

Photograph B3: Rear and side elevations of dwelling and sheds (facing north-east).

Photograph B4: Backyard and sheds (facing south-west).

Photograph B5: Cladding and foundation detail including textured (stucco) render, painted timber and duroc cement sheet cladding.

Photograph B6: Soffit and cladding detail.

Photograph B7 (left) and B8 (right): Dwelling's front and rear entryways, respectively; PACM walls and ceiling at both.

Photograph B9: ACM fragment identified in surficial soil (approximately 0.15 m bgl) at 6HA2. Fragment removed from site.

8 Orr Street

Photograph B10: Front (north-eastern) elevation of dwelling (facing south-west).

Photograph B11: Southeastern elevation of dwelling and driveway (facing east).

Photograph B12: Rear and north-western elevation of dwelling (facing north-east).

Photograph B13: Rear Garden of property and shed (facing south-west).

Photograph B14: Shed and southern elevation of dwelling (facing north-east).

Photograph B15: Shed (facing east).

Photograph B16: Cladding and foundation detail including textured (stucco) render, painted timber, and weatherboard cladding.


Photograph B17 (left) and B18 (right): Dwelling's front and side entryways, respectively; PACM ceiling and weatherboard walls at front entrance. PACM ceiling and walls at side entrance.

10 Orr Street:

Photograph B19: Front (north-eastern) elevation of dwelling and driveway (facing south-west).

Photograph B20: Rear elevation of dwelling (facing north-east). Note the car and car parts next to shed.

Photograph B21: Shed detail (facing east). Weatherboard and PACM cement sheet cladding. Stockpiled tires and car parts next to shed.

Photograph B22: Soffit detail (PACM cement sheet).

Photograph B23: Dwelling foundation detail (textured PACM (stucco) render).

Photograph B24: Investigation 10HA7 location, visible oil staining on soil and car parts present.

Photograph B25 (left) and B26 (right): Dwelling's front and rear entryways, respectively; PACM ceiling and walls at front entrance. PACM ceiling and painted concrete block walls at rear entrance.

Appendix C Historical Aerial Photographs

- **Aerial images sourced from Canterbury Maps Viewer and Google Earth Pro.**
- **Approximate site boundaries are shown in red.**
- **Top of image is north facing.**

1940-1944

1955-1959

1980-1984

1995-1999

2004-2010

2010-2014

2015-2019

2022

Appendix D ECan LLUR Statement

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Customer Services
P. 03 353 9007 or 0800 324 636

PO Box 345
Christchurch 8140

P. 03 365 3828
F. 03 365 3194
E. ecinfo@ecan.govt.nz

www.ecan.govt.nz

Dear Sir/Madam

Thank you for submitting your property enquiry from our Listed Land Use Register (LLUR). The LLUR holds information about sites that have been used or are currently used for activities which have the potential to cause contamination.

The LLUR statement shows the land parcel(s) you enquired about and provides information regarding any potential LLUR sites within a specified radius.

Please note that if a property is not currently registered on the LLUR, it does not mean that an activity with the potential to cause contamination has never occurred, or is not currently occurring there. The LLUR database is not complete, and new sites are regularly being added as we receive information and conduct our own investigations into current and historic land uses.

The LLUR only contains information held by Environment Canterbury in relation to contaminated or potentially contaminated land; additional relevant information may be held in other files (for example consent and enforcement files).

Please contact Environment Canterbury if you wish to discuss the contents of this property statement.

Yours sincerely

Contaminated Sites Team

Property Statement
from the Listed Land Use Register

Visit ecan.govt.nz/HAIL for more information or
contact Customer Services at ecan.govt.nz/contact/ and quote ENQ369528

Date generated: 19 February 2024
Land parcels: Lot 5 DP 18886
Lot 3 DP 18886
Lot 4 DP 18886

The information presented in this map is specific to the property you have selected. Information on nearby properties may not be shown on this map, even if the property is visible.

Sites at a glance

Sites within enquiry area

There are no sites associated with the area of enquiry.

More detail about the sites

There are no sites associated with the area of enquiry.

Disclaimer

The enclosed information is derived from Environment Canterbury's Listed Land Use Register and is made available to you under the Local Government Official Information and Meetings Act 1987.

The information contained in this report reflects the current records held by Environment Canterbury regarding the activities undertaken on the site, its possible contamination and based on that information, the categorisation of the site. Environment Canterbury has not verified the accuracy or completeness of this information. It is released only as a copy of Environment Canterbury's records and is not intended to provide a full, complete or totally accurate assessment of the site. It is provided on the basis that Environment Canterbury makes no warranty or representation regarding the reliability, accuracy or completeness of the information provided or the level of contamination (if any) at the relevant site or that the site is suitable or otherwise for any particular purpose. Environment Canterbury accepts no responsibility for any loss, cost, damage or expense any person may incur as a result of the use, reference to or reliance on the information contained in this report.

Any person receiving and using this information is bound by the provisions of the Privacy Act 1993.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Listed Land Use Register

What you need to know

Everything is connected

What is the Listed Land Use Register (LLUR)?

The LLUR is a database that Environment Canterbury uses to manage information about land that is, or has been, associated with the use, storage or disposal of hazardous substances.

Why do we need the LLUR?

Some activities and industries are hazardous and can potentially contaminate land or water. We need the LLUR to help us manage information about land which could pose a risk to your health and the environment because of its current or former land use.

Section 30 of the Resource Management Act (RMA, 1991) requires Environment Canterbury to investigate, identify and monitor contaminated land. To do this we follow national guidelines and use the LLUR to help us manage the information.

The information we collect also helps your local district or city council to fulfil its functions under the RMA. One of these is implementing the National Environmental Standard (NES) for Assessing and Managing Contaminants in Soil, which came into effect on 1 January 2012.

For information on the NES, contact your city or district council.

How does Environment Canterbury identify sites to be included on the LLUR?

We identify sites to be included on the LLUR based on a list of land uses produced by the Ministry for the Environment (MfE). This is called the Hazardous Activities and Industries List (HAIL)[1]. The HAIL has 53 different activities, and includes land uses such as fuel storage sites, orchards, timber treatment yards, landfills, sheep dips and any other activities where hazardous substances could cause land and water contamination.

We have two main ways of identifying HAIL sites:

- We are actively identifying sites in each district using historic records and aerial photographs. This project started in 2008 and is ongoing.
- We also receive information from other sources, such as environmental site investigation reports submitted to us as a requirement of the Regional Plan, and in resource consent applications.

[1] The Hazardous Activities and Industries List (HAIL) can be downloaded from MfE's website www.mfe.govt.nz, keyword search HAIL

How does Environment Canterbury classify sites on the LLUR?

Where we have identified a HAIL land use, we review all the available information, which may include investigation reports if we have them. We then assign the site a category on the LLUR. The category is intended to best describe what we know about the land use and potential contamination at the site and is signed off by a senior staff member.

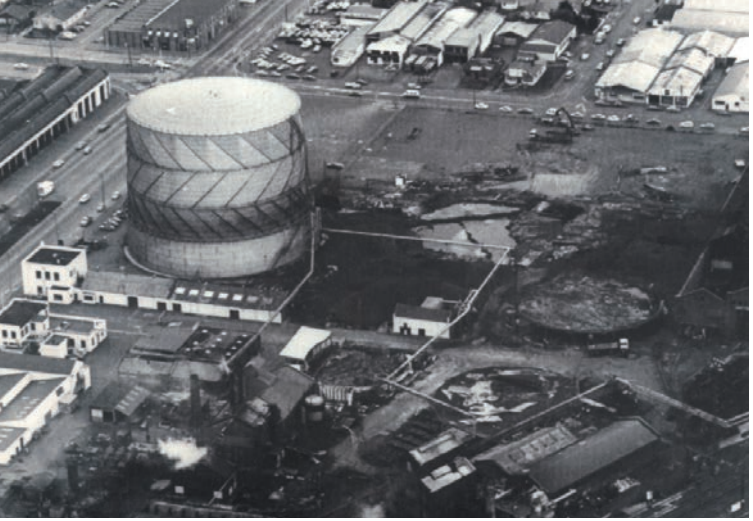
Please refer to the Site Categories and Definitions factsheet for further information.

What does Environment Canterbury do with the information on the LLUR?

The LLUR is available online at www.llur.ecan.govt.nz. We mainly receive enquiries from potential property buyers and environmental consultants or engineers working on sites. An inquirer would typically receive a summary of any information we hold, including the category assigned to the site and a list of any investigation reports.

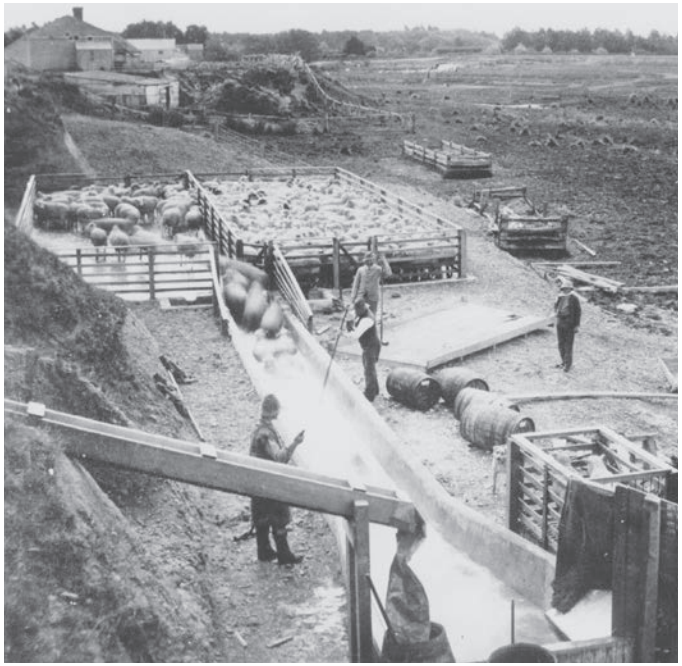
We may also use the information to prioritise sites for further investigation, remediation and management, to aid with planning, and to help assess resource consent applications. These are some of our other responsibilities under the RMA.

If you are conducting an environmental investigation or removing an underground storage tank at your property, you will need to comply with the rules in the Regional Plan and send us a copy of the report. This means we can keep our records accurate and up-to-date, and we can assign your property an appropriate category on the LLUR. To find out more, visit www.ecan.govt.nz/HAIL.



IMPORTANT!

The LLUR is an online database which we are continually updating. A property may not currently be registered on the LLUR, but this does not necessarily mean that it hasn't had a HAIL use in the past.



Sheep dipping (ABOVE) and gas works (TOP) are among the former land uses that have been identified as potentially hazardous. (Photo above by Wheeler & Son in 1987, courtesy of Canterbury Museum.)

My land is on the LLUR – what should I do now?

IMPORTANT! Just because your property has a land use that is deemed hazardous or is on the LLUR, it doesn't necessarily mean it's contaminated. The only way to know if land is contaminated is by carrying out a detailed site investigation, which involves collecting and testing soil samples.

You do not need to do anything if your land is on the LLUR and you have no plans to alter it in any way. It is important that you let a tenant or buyer know your land is on the Listed Land Use Register if you intend to rent or sell your property. If you are not sure what you need to tell the other party, you should seek legal advice.

You may choose to have your property further investigated for your own peace of mind, or because you want to do one of the activities covered by the National Environmental Standard for Assessing and Managing Contaminants in Soil. Your district or city council will provide further information.

If you wish to engage a suitably qualified experienced practitioner to undertake a detailed site investigation, there are criteria for choosing a practitioner on www.ecan.govt.nz/HAIL.

I think my site category is incorrect – how can I change it?

If you have an environmental investigation undertaken at your site, you must send us the report and we will review the LLUR category based on the information you provide. Similarly, if you have information that clearly shows your site has not been associated with HAIL activities (eg. a preliminary site investigation), or if other HAIL activities have occurred which we have not listed, we need to know about it so that our records are accurate.

If we have incorrectly identified that a HAIL activity has occurred at a site, it will be not be removed from the LLUR but categorised as Verified Non-HAIL. This helps us to ensure that the same site is not re-identified in the future.

Contact us

Property owners have the right to look at all the information Environment Canterbury holds about their properties.

It is free to check the information on the LLUR, online at www.llur.ecan.govt.nz.

If you don't have access to the internet, you can enquire about a specific site by phoning us on (03) 353 9007 or toll free on 0800 EC INFO (32 4636) during business hours.

Contact Environment Canterbury:

Email: ecinfo@ecan.govt.nz

Phone:
Calling from Christchurch: (03) 353 9007
Calling from any other area: 0800 EC INFO (32 4636)

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Everything is connected

Promoting quality of life through balanced resource management.

www.ecan.govt.nz E13/101

Listed Land Use Register

Site categories and definitions

When Environment Canterbury identifies a Hazardous Activities and Industries List (HAIL) land use, we review the available information and assign the site a category on the Listed Land Use Register. The category is intended to best describe what we know about the land use.

If a site is categorised as **Unverified** it means it has been reported or identified as one that appears on the HAIL, but the land use has not been confirmed with the property owner.

If the land use has been confirmed but analytical information from the collection of samples is not available, and the presence or absence of contamination has therefore not been determined, the site is registered as:

Not investigated:

- A site whose past or present use has been reported and verified as one that appears on the HAIL.
- The site has not been investigated, which might typically include sampling and analysis of site soil, water and/or ambient air, and assessment of the associated analytical data.
- There is insufficient information to characterise any risks to human health or the environment from those activities undertaken on the site. Contamination may have occurred, but should not be assumed to have occurred.

If analytical information from the collection of samples is available, the site can be registered in one of six ways:

At or below background concentrations:

The site has been investigated or remediated. The investigation or post remediation validation results confirm there are no hazardous substances above local background concentrations other than those that occur naturally in the area. The investigation or validation sampling has been sufficiently detailed to characterise the site.

Below guideline values for:

The site has been investigated. Results show that there are hazardous substances present at the site but indicate that any adverse effects or risks to people and/or the environment are considered to be so low as to be acceptable. The site may have been remediated to reduce contamination to this level, and samples taken after remediation confirm this.

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Managed for:

The site has been investigated. Results show that there are hazardous substances present at the site in concentrations that have the potential to cause adverse effects or risks to people and/or the environment. However, those risks are considered managed because:

- the nature of the use of the site prevents human and/or ecological exposure to the risks; and/or
- the land has been altered in some way and/or restrictions have been placed on the way it is used which prevent human and/or ecological exposure to the risks.

Partially investigated:

The site has been partially investigated. Results:

- demonstrate there are hazardous substances present at the site; however, there is insufficient information to quantify any adverse effects or risks to people or the environment; or
- do not adequately verify the presence or absence of contamination associated with all HAIL activities that are and/or have been undertaken on the site.

Significant adverse environmental effects:

The site has been investigated. Results show that sediment, groundwater or surface water contains hazardous substances that:

- have significant adverse effects on the environment; or
- are reasonably likely to have significant adverse effects on the environment.

Contaminated:

The site has been investigated. Results show that the land has a hazardous substance in or on it that:

- has significant adverse effects on human health and/or the environment; and/or
- is reasonably likely to have significant adverse effects on human health and/or the environment.

If a site has been included incorrectly on the Listed Land Use Register as having a HAIL, it will not be removed but will be registered as:

Verified non-HAIL:

Information shows that this site has never been associated with any of the specific activities or industries on the HAIL.

Please contact Environment Canterbury for further information:

(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Environment Canterbury Regional Council
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E13/102

Appendix E Soil Logs

Appendix D Table 1: Soil log table

6 Orr Street

Sampling point	Soil depth (m bgl)	Soil description[1]
6HA1	0.0 – 0.25	Topsoil: Sandy SILT, minor gravel, trace rootlets; brown. Sand f-m, gravel f-m, SR-SA.
	0.25 - 0.3	Subsoil: Sandy GRAVEL, minor cobbles, trace rootlets; yellowish brown.
	0.3	End of hole. Refusal due to gravel.
6HA2	0.0 – 0.15	Topsoil: Silty SAND, trace gravel, trace rootlets; brown. Sand f-m, gravel f-m, SA.
	At 0.15	*One piece of ACM (30x32x5mm), textured cement sheet.*
	0.15 - 0.3	Subsoil: Sandy SILT; yellowish brown. Sand f.
	0.3	End of hole. Refusal due to compacted clay/silt.
6HA3	0.0 – 0.3	Topsoil: Sandy SILT, trace rootlets and plastic; brown. Sand f-m, gravel f-m, SR-SA.
	0.3 – 0.97	Subsoil: Sandy SILT, trace rootlets; light brown. Sand f.
	At 0.9	*Trace ash, light orange mottling.*
	0.97	End of hole. Refusal due to gravel (f-m, SA-SR).
6HA4	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets/ roots and bone; brown. Sand f.
	0.3 – 0.8	Subsoil: Yellowish brown.
	0.8 – 1.0	Trace gravel, f, R-SR.
	1.0	End of Hole (target depth).
6HA5	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets; brown. Sand f.
	0.3 – 1.0	Subsoil: Yellowish brown.
	1.0	End of Hole (target depth), all samples collected.
6HA6	0.0 – 0.3	Topsoil: Silty SAND, minor gravel, trace-minor anthropogenic materials, trace rootlets; brown. Sand f, gravel f-m. Anthropogenic: fire ash, fabric (sock), plastic, paint chips.
	At 0.1	*Anthropogenic materials absent.*
	0.3 – 0.35	Mottled boundary to subsoil. Subsoil: Yellowish brown.
	0.35	End of hole. Refusal due to gravel.
6 Halo A	0.0 – 0.1	Topsoil: Sandy SILT, minor gravel, trace anthropogenic materials; brown. Sand f-m, gravel f-c, SA-SR. Anthropogenic: metal, plastic, and paint chips.
6 Halo B		Topsoil: Sandy SILT, minor gravel, trace rootlets, trace concrete; brown. Sand f-c, gravel f, SA.
6 Halo C		Topsoil: Sandy SILT, trace gravel, trace rootlets, trace wood, trace concrete, trace plastic; brown-dark brown. Sand f-m, gravel f-m, SA-SR.
6 Halo D		Topsoil: Sandy SILT, trace gravel, trace rootlets, trace glass, trace plastic; brown. Sand f-m.

8 Orr Street

Sampling point	Soil depth (m bgl)	Soil description[1]
8HA1	0.0 – 0.2	Topsoil: Silty SAND, trace rootlets, trace gravel and plastic; brown. Sand f. Gravel f-m, SA-SR.
	At 0.05	Gravelly f-c, SA. Plastic absent.
	At 0.15	Trace to minor cobbles.
	0.2 – 0.5	Subsoil: Sandy cobbly GRAVEL, trace silt; brown. Gravel f-c.
	0.5	End of hole. Refusal due to gravel.
8HA2	0.0 – 0.2	Topsoil: Silty SAND, trace rootlets; brown. Sand f-m.
	At 0.15	Trace to minor gravel, f-c, SA-SR.
	0.2 – 0.35	Subsoil: Yellowish brown.
	At 0.32	*Gravelly with cobbles.*
	0.35	End of hole. Refusal due to gravel.
8HA3	0.0 – 0.15	Topsoil: Silty SAND, trace rootlets, gravel and anthropogenic materials; brown. Sand f-m. Gravel f-m, SA-SR. Anthropogenic: metal, concrete, glass, porcelain, and terracotta.
	0.15 – 0.35	Subsoil: Silty SAND; yellowish brown. Sand f-m.
	At 0.28	*Gravelly.*
	0.35	End of hole. Refusal due to gravel.
8HA4	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets, plastic and gravel; brown. Sand f. Gravel f-m, SA.
	At 0.1	*Plastic absent.*
	0.3 – 0.85	Subsoil: Yellowish brown.
	At 0.8	Gravel f, SA.
	0.85	End of hole. Refusal due to gravel.
8HA5	0.0 – 0.25	Topsoil: Silty SAND, trace rootlets/roots and gravel, trace to minor anthropogenic; brown. Sand f-m. Gravel f-m, SA. Anthropogenic: Mussel shell, glass, tile, plastic, and fire ash.
	0.25 – 0.45	Subsoil: Silty SAND, trace rootlets; yellowish brown. Sand f.
	0.45	End of hole. Refusal due to gravel.
8HA6	0.0 – 0.15	Topsoil: Sandy SILT, trace rootlets; brown. Sand f-m.
	0.15 – 0.65	Subsoil: Silty SAND; light yellowish brown. Sand f-m.
	0.65	End of hole. Refusal due to gravel.
8 Halo A	0.0 – 0.1	Topsoil: Sandy SILT, trace rootlets, gravel and plastic; brown. Sand f-m. Gravel f-c, SA-SR.
8 Halo B		Topsoil: Gravelly sandy SILT, trace plastic, rootlets and cobbles; brown. Sand f-m. Gravel f-c, SA-SR.
8 Halo C		Topsoil: Sandy SILT, trace rootlets, minor anthropogenic; brown. Sand f-c. Anthropogenic: plastic, glass, and fabric (shoelace).
8 Halo D		Topsoil: Sandy SILT, minor gravel, trace rootlets and anthropogenic materials; brown. Sand f-m. Gravel f-c, SA. Anthropogenic: plastic, glass, and fabric (ribbon).

10 Orr Street

Sampling point	Soil depth (m bgl)	Soil description[1]
10HA1	0.0 – 0.15	Topsoil: Sandy SILT, minor gravel, trace rootlets; brown-dark brown. Sand f-c, gravel f-c, SR-SA.
	At 0.1	*Brown. gravelly.*
	0.15 - 0.3	Subsoil: Sandy cobbly GRAVEL, minor silt; yellowish-greyish brown.
	0.3	End of hole. Refusal due to gravel.
10HA2	0.0 – 0.26	Topsoil: Sandy SILT, minor gravel, trace rootlets; brown. Sand f, gravel f-m, SA.
	0.26 - 0.3	Subsoil: Gravelly with minor cobbles (up to 170mm on longest axis).
	0.3	End of hole. Refusal due to gravel.
10HA3	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets and gravel; brown-dark brown. sand f, gravel f-m, SA. Oil staining on surface that penetrates 3mm.
	0.3 – 0.72	Subsoil: SAND, some silt, trace rootlets; yellowish brown. Sand f-m.
	At 0.4 - 0.45	*Trace ash.*
	0.72	End of hole. Refusal due to gravel.
10HA4	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets/roots and gravel, trace plastic and metal on surface; dark brown. Sand f-m, gravel f-m, SA.
	At 0.1	*Brown. Trace concrete.*
	0.3 – 0.5	Subsoil: SAND, some silt; light yellowish brown. Sand f-m.
	0.5	End of hole. Refusal due to gravel.
10HA5	0.0 – 0.3	Topsoil: Silty SAND, trace rootlets; brown-dark brown. Sand f-m.
	At 0.1	*Brown.*
	0.3 – 0.6	Subsoil: SAND, some silt; light yellowish brown. Sand f-m. Rootlets absent.
	0.6	End of hole. Refusal due to gravel.
10HA6	0.0 – 0.3	Topsoil: Silty SAND/ sandy SILT, trace rootlets, coal and gravel; dark brown. Sand f-m, gravel f-c, SA-SR.
	0.3 – 0.56	Subsoil: SAND, some silt; light yellowish brown. Sand f-m.
	0.56	End of hole. Refusal due to gravel.
10HA7	0.0-0.1	Targeted sample taken. Black oily soil. Staining penetrates 20mm.
10 Halo A	0.0 – 0.1	Topsoil: Sandy SILT, trace gravel and rootlets; brown. Sand f-m, gravel f-c, SA-SR. Plastic, and glass on surface nearby.
10 Halo B		Topsoil: Sandy SILT, trace gravel, plastic and tinfoil; dark brown. Sand f-c, gravel A.
10 Halo C		
10 Halo D		Topsoil: Sandy SILT, trace gravel, rootlets and metal (nail); brown. Sand f-m, gravel f-c, SA-SR.

[1]Abbreviations:

Gravel and sand descriptions: f – fine, m – medium, c – coarse, SA – sub–angular, SR – sub-rounded, A – angular, R - rounded.

Appendix F Laboratory Certificates

Certificate of Analysis

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

Kainga Ora – Homes and Communities
107 Carlton Gore Road
Newmarket, Auckland
NZ 1023

Attention:	Katie Stephenson
Report	1073892-AID
Project Name	ORR6-10
Project ID	1018898.2000
Received Date	Feb 29, 2024
Date Reported	Mar 26, 2024

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 ORR6-10
Project ID 1018898.2000
Date Sampled Feb 28, 2024
Report 1073892-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
6 HA1 0.1	24-Ma0000228	Feb 28, 2024	Approximate Sample 107g 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.
6 HA2 0.1	24-Ma0000230	Feb 28, 2024	Approximate Sample 122g 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.
6 HA3 0.1	24-Ma0000232	Feb 28, 2024	Approximate Sample 104g 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.
6 HA4 0.1	24-Ma0000234	Feb 28, 2024	Approximate Sample 94g 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.
6 HA5 0.1	24-Ma0000236	Feb 28, 2024	Approximate Sample 65g 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.
6 HA6 0.1	24-Ma0000238	Feb 28, 2024	Approximate Sample 68g 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.
6 HALO A	24-Ma0000240	Feb 28, 2024	Approximate Sample 99g 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.
6 HALO B	24-Ma0000241	Feb 28, 2024	Approximate Sample 85g 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
6 HALO C	24-Ma0000242	Feb 28, 2024	Approximate Sample 75g 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.
6 HALO D	24-Ma0000243	Feb 28, 2024	Approximate Sample 88g 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.
8 HA1 0.1	24-Ma0000245	Feb 28, 2024	Approximate Sample 81g 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.
8 HA2 0.1	24-Ma0000247	Feb 28, 2024	Approximate Sample 74g 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.
8 HA3 0.1	24-Ma0000249	Feb 28, 2024	Approximate Sample 92g 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.
8 HA4 0.1	24-Ma0000251	Feb 28, 2024	Approximate Sample 93g 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.
8 HA5 0.1	24-Ma0000253	Feb 28, 2024	Approximate Sample 96g 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.
8 HA6 0.1	24-Ma0000255	Feb 28, 2024	Approximate Sample 56g 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.
8 HALO A	24-Ma0000257	Feb 28, 2024	Approximate Sample 120g 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.
8 HALO B	24-Ma0000258	Feb 28, 2024	Approximate Sample 99g 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.
8 HALO C	24-Ma0000259	Feb 28, 2024	Approximate Sample 46g 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.
8 HALO D	24-Ma0000260	Feb 28, 2024	Approximate Sample 82g 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.
10 HA1 0.1	24-Ma0000262	Feb 28, 2024	Approximate Sample 88g 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
10 HA2 0.1	24-Ma0000264	Feb 28, 2024	Approximate Sample 91g 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.
10 HA3 0.1	24-Ma0000266	Feb 28, 2024	Approximate Sample 71g 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.
10 HA4 0.1	24-Ma0000268	Feb 28, 2024	Approximate Sample 63g 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.
10 HA5 0.1	24-Ma0000270	Feb 28, 2024	Approximate Sample 82g 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.
10 HA6 0.1	24-Ma0000272	Feb 28, 2024	Approximate Sample 66g 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.
10 HALO A	24-Ma0000274	Feb 28, 2024	Approximate Sample 106g 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.
10 HALO B	24-Ma0000275	Feb 28, 2024	Approximate Sample 84g 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.
10 HALO C	24-Ma0000276	Feb 28, 2024	Approximate Sample 62g 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.
10 HALO D	24-Ma0000277	Feb 28, 2024	Approximate Sample 133g 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.
6 HA2 FRAG	24-Ma0000301	Feb 28, 2024	Approximate Sample 1g / 40 x 30 x 10mm Sample consisted of: Fibre cement	Chrysotile asbestos detected. Organic fibre detected.
6 HA2 0.15	24-Ma0000339	Feb 28, 2024	Approximate Sample 97g 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	Mar 13, 2024	Indefinite
Asbestos - LTM-ASB-8020	Christchurch	Mar 13, 2024	Indefinite

eurofins

web: www.eurofins.com.au
email: EnviroSales@eurofins.com

Eurofins Environment Testing NZ Ltd
NZBN: 9429046024954

Auckland	Auckland (Asb)	Christchurch	Tauranga
35 O'Rorke Road	Unit C1/4 Pacific Rise,	43 Detroit Drive	1277 Cameron Road,
Penrose,	Mount Wellington,	Rolleston,	Gate Pa,
Auckland 1061	Auckland 1061	Christchurch 7675	Tauranga 3112
+64 9 526 4551	+64 9 525 0568	+64 3 343 5201	+64 9 525 0568
IANZ# 1327	IANZ# 1308	IANZ# 1290	IANZ# 1402

Eurofins Environment Testing Australia Pty Ltd
ABN: 50 005 085 521

Melbourne	Geelong	Sydney	Canberra	Brisbane	Newcastle
6 Monterey Road	19/8 Lewalan Street	179 Magowar Road	Unit 1,2 Dacre Street	1/21 Smallwood Place	1/2 Frost Drive
Dandenong South	Grovedale	Girraween	Mitchell	Murarrie	Mayfield West
VIC 3175	VIC 3216	NSW 2145	ACT 2911	QLD 4172	NSW 2304
+61 3 8564 5000	+61 3 8564 5000	+61 2 9900 8400	+61 2 6113 8091	T: +61 7 3902 4600	+61 2 4968 8448
NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261	NATA# 1261
Site# 1254	Site# 25403	Site# 18217	Site# 25466	Site# 20794	Site# 25079 & 25289

Eurofins ARL Pty Ltd
ABN: 91 05 0159 898

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

Company Name: Kainga Ora – Homes and Communities - SI
Address: 107 Carlton Gore Road
Newmarket, Auckland
NZ 1023

Project Name: ORR6-10
Project ID: 1018898.2000

Order No.: PO 6181830
Report #: 1073892
Phone: (021) 537 696
Fax:

Received: Feb 29, 2024 5:30 PM
Due: Mar 22, 2024
Priority: 15 Day
Contact Name: Katie Stephenson

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Metals M7 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
Tauranga Laboratory - IANZ# 1402												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	6 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000228	X			X		X	
2	6 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000229				X		X	
3	6 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000230	X			X		X	
4	6 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000231				X		X	
5	6 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000232	X			X		X	
6	6 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000233				X		X	
7	6 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000234	X			X		X	
8	6 HA4 0.3	Feb 28, 2024		Soil	Z24-Ma0000235				X		X	
9	6 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000236	X			X		X	
10	6 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000237				X		X	

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Company Name: Kainga Ora – Homes and Communities - SI
Address: 107 Carlton Gore Road
Newmarket, Auckland
NZ 1023

Project Name: ORR6-10
Project ID: 1018898.2000

Order No.: PO 6181830
Report #: 1073892
Phone: (021) 537 696
Fax:

Received: Feb 29, 2024 5:30 PM
Due: Mar 22, 2024
Priority: 15 Day
Contact Name: Katie Stephenson

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Metals M7 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
11	6 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000238	X			X		X	
12	6 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000239				X		X	
13	6 HALO A	Feb 28, 2024		Soil	Z24-Ma0000240	X						
14	6 HALO B	Feb 28, 2024		Soil	Z24-Ma0000241	X						
15	6 HALO C	Feb 28, 2024		Soil	Z24-Ma0000242	X						
16	6 HALO D	Feb 28, 2024		Soil	Z24-Ma0000243	X						
17	6 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000244				X		X	
18	8 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000245	X			X		X	
19	8 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000246				X		X	
20	8 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000247	X			X		X	
21	8 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000248				X		X	
22	8 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000249	X			X		X	
23	8 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000250				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
24	8 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000251	X			X		X	
25	8 HA4 0.3	Feb 28, 2024		Soil	Z24-Ma0000252				X		X	
26	8 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000253	X			X		X	
27	8 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000254				X		X	
28	8 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000255	X			X		X	
29	8 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000256				X		X	
30	8 HALO A	Feb 28, 2024		Soil	Z24-Ma0000257	X						
31	8 HALO B	Feb 28, 2024		Soil	Z24-Ma0000258	X						
32	8 HALO C	Feb 28, 2024		Soil	Z24-Ma0000259	X						
33	8 HALO D	Feb 28, 2024		Soil	Z24-Ma0000260	X						
34	8 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000261				X		X	
35	10 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000262	X			X		X	
36	10 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000263				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
37	10 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000264	X			X		X	
38	10 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000265				X		X	
39	10 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000266	X			X	X	X	X
40	10 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000267				X	X	X	X
41	10 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000268	X			X		X	
42	10 HA4 0.25	Feb 28, 2024		Soil	Z24-Ma0000269				X		X	
43	10 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000270	X			X		X	
44	10 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000271				X		X	
45	10 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000272	X			X		X	
46	10 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000273				X		X	
47	10 HALO A	Feb 28, 2024		Soil	Z24-Ma0000274	X						
48	10 HALO B	Feb 28, 2024		Soil	Z24-Ma0000275	X						
49	10 HALO C	Feb 28, 2024		Soil	Z24-Ma0000276	X						
50	10 HALO D	Feb 28, 2024		Soil	Z24-Ma0000277	X						

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
51	10 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000278				X		X	
52	6 HA3 0.5	Feb 28, 2024		Soil	Z24-Ma0000279				X		X	
53	6 HA3 0.7	Feb 28, 2024		Soil	Z24-Ma0000280				X		X	
54	6 HA3 0.95	Feb 28, 2024		Soil	Z24-Ma0000281				X		X	
55	6 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000282				X		X	
56	6 HA4 0.7	Feb 28, 2024		Soil	Z24-Ma0000283				X		X	
57	6 HA4 1.0	Feb 28, 2024		Soil	Z24-Ma0000284				X		X	
58	6 HA5 0.5	Feb 28, 2024		Soil	Z24-Ma0000285				X		X	
59	6 HA5 0.7	Feb 28, 2024		Soil	Z24-Ma0000286				X		X	
60	6 HA5 1.0	Feb 28, 2024		Soil	Z24-Ma0000287				X		X	
61	8 HA1 0.5	Feb 28, 2024		Soil	Z24-Ma0000288			X				
62	8 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000289				X		X	
63	8 HA4 0.7	Feb 28, 2024		Soil	Z24-Ma0000290				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
64	8 HA4 0.8	Feb 28, 2024		Soil	Z24-Ma0000291				X		X	
65	8 HA5 0.45	Feb 28, 2024		Soil	Z24-Ma0000292				X		X	
66	8 HA6 0.5	Feb 28, 2024		Soil	Z24-Ma0000293				X		X	
67	8 HA6 0.65	Feb 28, 2024		Soil	Z24-Ma0000294				X		X	
68	10 HA3 0.5	Feb 28, 2024		Soil	Z24-Ma0000295				X		X	
69	10 HA3 0.7	Feb 28, 2024		Soil	Z24-Ma0000296				X		X	
70	10 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000297				X		X	
71	10 HA5 0.5	Feb 28, 2024		Soil	Z24-Ma0000298				X		X	
72	10 HA5 0.6	Feb 28, 2024		Soil	Z24-Ma0000299				X		X	
73	10 HA6 0.5	Feb 28, 2024		Soil	Z24-Ma0000300				X		X	
74	6 HA2 FRAG	Feb 28, 2024		Building Materials	Z24-Ma0000301		X					
75	10 HA7 0.0	Feb 28, 2024		Soil	Z24-Ma0000326				X	X	X	X
76	6 HA2 0.15	Feb 28, 2024		Soil	Z24-Ma0000339	X						

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Auckland Laboratory - IANZ# 1327			X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308							
Christchurch Laboratory - IANZ# 1290	X	X					
Test Counts	31	1	1	61	3	61	3

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**). This estimate is not NATA-accredited.
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:

Adelle Black	Senior Analyst-Asbestos

Authorised by:

Sophie Bush	Senior Analyst-Asbestos

Adelle Black
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.

Kainga Ora – Homes and Communities
107 Carlton Gore Road
Newmarket, Auckland
NZ 1023

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

Attention: **Katie Stephenson**

Report **1073892-S-V2**
Project name ORR6-10
Project ID 1018898.2000
Received Date Feb 29, 2024

Client Sample ID			**6 HA1 0.1**	**6 HA1 0.3**	**6 HA2 0.1**	**6 HA2 0.3**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**Z24-Ma0000228**	**Z24-Ma0000229**	**Z24-Ma0000230**	**Z24-Ma0000231**
Date Sampled			**Feb 28, 2024**	**Feb 28, 2024**	**Feb 28, 2024**	**Feb 28, 2024**
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	6.1	5.8	6.0	6.7
Cadmium	0.01	mg/kg	0.10	0.07	0.09	0.05
Chromium	0.1	mg/kg	23	20	24	25
Copper	0.1	mg/kg	16	11	15	15
Lead	0.1	mg/kg	47	24	41	19
Nickel	0.1	mg/kg	16	15	17	18
Zinc	5	mg/kg	90	67	91	73
Sample Properties						
% Moisture	1	%	7.3	3.0	13	4.2

Client Sample ID			**6 HA3 0.1**	**6 HA3 0.3**	**6 HA4 0.1**	**6 HA4 0.3**
Sample Matrix			**Soil**	**Soil**	**Soil**	**Soil**
Eurofins Sample No.			**Z24-Ma0000232**	**Z24-Ma0000233**	**Z24-Ma0000234**	**Z24-Ma0000235**
Date Sampled			**Feb 28, 2024**	**Feb 28, 2024**	**Feb 28, 2024**	**Feb 28, 2024**
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	10	14	11	14
Cadmium	0.01	mg/kg	0.13	0.07	0.18	0.07
Chromium	0.1	mg/kg	30	37	29	37
Copper	0.1	mg/kg	27	35	27	35
Lead	0.1	mg/kg	47	31	67	34
Nickel	0.1	mg/kg	23	30	21	29
Zinc	5	mg/kg	140	120	140	120
Sample Properties						
% Moisture	1	%	21	12	17	13

Client Sample ID			6 HA5 0.1	6 HA5 0.3	6 HA6 0.1	6 HA6 0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000236	Z24-Ma0000237	Z24-Ma0000238	Z24-Ma0000239
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	9.2	11	9.9	8.1
Cadmium	0.01	mg/kg	0.32	0.12	0.43	0.16
Chromium	0.1	mg/kg	26	31	27	26
Copper	0.1	mg/kg	30	28	25	20
Lead	0.1	mg/kg	39	28	410	47
Nickel	0.1	mg/kg	19	24	19	20
Zinc	5	mg/kg	120	100	470	290
Sample Properties						
% Moisture	1	%	19	10	18	13

Client Sample ID			6 HALO COMPOSITE	8 HA1 0.1	8 HA1 0.3	8 HA2 0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000244	Z24-Ma0000245	Z24-Ma0000246	Z24-Ma0000247
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	8.1	9.8	4.8	4.7
Cadmium	0.01	mg/kg	0.16	0.19	0.08	0.18
Chromium	0.1	mg/kg	25	21	17	21
Copper	0.1	mg/kg	29	24	11	14
Lead	0.1	mg/kg	350	71	20	35
Nickel	0.1	mg/kg	16	13	13	14
Zinc	5	mg/kg	200	110	60	81
Sample Properties						
% Moisture	1	%	12	12	3.3	15

Client Sample ID			8 HA2 0.3	8 HA3 0.1	8 HA3 0.3	8 HA4 0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000248	Z24-Ma0000249	Z24-Ma0000250	Z24-Ma0000251
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	4.4	7.9	6.6	9.3
Cadmium	0.01	mg/kg	0.06	0.24	0.04	0.27
Chromium	0.1	mg/kg	20	27	24	26
Copper	0.1	mg/kg	9.0	22	16	31
Lead	0.1	mg/kg	16	88	23	62
Nickel	0.1	mg/kg	14	19	17	18
Zinc	5	mg/kg	68	130	80	190
Sample Properties						
% Moisture	1	%	< 1	9.3	7.2	20

Client Sample ID			8 HA4 0.3	8 HA5 0.1	8 HA5 0.3	8 HA6 0.1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000252	Z24-Ma0000253	Z24-Ma0000254	Z24-Ma0000255
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	8.8	61	6.7	8.1
Cadmium	0.01	mg/kg	0.09	0.42	0.07	0.20
Chromium	0.1	mg/kg	28	41	25	25
Copper	0.1	mg/kg	24	59	14	22
Lead	0.1	mg/kg	23	390	26	120
Nickel	0.1	mg/kg	22	24	18	18
Zinc	5	mg/kg	120	340	180	140
Sample Properties						
% Moisture	1	%	12	16	9.2	14

Client Sample ID			8 HA6 0.3	8 HALO COMPOSITE	10 HA1 0.1	10 HA1 0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000256	Z24-Ma0000261	Z24-Ma0000262	Z24-Ma0000263
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	7.3	11	8.4	4.2
Cadmium	0.01	mg/kg	0.05	0.35	0.21	0.05
Chromium	0.1	mg/kg	26	27	21	18
Copper	0.1	mg/kg	17	65	25	9.0
Lead	0.1	mg/kg	22	660	79	15
Nickel	0.1	mg/kg	19	19	12	13
Zinc	5	mg/kg	86	350	140	60
Sample Properties						
% Moisture	1	%	7.1	18	20	2.8

Client Sample ID			10 HA2 0.1	10 HA2 0.3	10 HA3 0.1	10 HA3 0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000264	Z24-Ma0000265	Z24-Ma0000266	Z24-Ma0000267
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	5.2	4.0	5.1	5.3
Cadmium	0.01	mg/kg	0.21	0.07	0.12	0.05
Chromium	0.1	mg/kg	21	19	18	18
Copper	0.1	mg/kg	20	9.8	17	14
Lead	0.1	mg/kg	39	15	47	17
Nickel	0.1	mg/kg	15	13	13	14
Zinc	5	mg/kg	82	55	110	61
Sample Properties						
% Moisture	1	%	11	4.5	24	16

Client Sample ID			10 HA2 0.1	10 HA2 0.3	10 HA3 0.1	10 HA3 0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000264	Z24-Ma0000265	Z24-Ma0000266	Z24-Ma0000267
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Total Petroleum Hydrocarbons (NZ MfE 1999)						
Comments					G01	
TPH-SG C7-C9	5	mg/kg	-	-	< 50	< 5
TPH-SG C10-C14	10	mg/kg	-	-	< 100	< 10
TPH-SG C15-C36	20	mg/kg	-	-	4400	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	4400	< 35
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Comments					G01	
Acenaphthene	0.03	mg/kg	-	-	< 3	< 0.03
Acenaphthylene	0.03	mg/kg	-	-	< 3	< 0.03
Anthracene	0.03	mg/kg	-	-	< 3	< 0.03
Benz(a)anthracene	0.03	mg/kg	-	-	< 3	< 0.03
Benzo(a)pyrene	0.03	mg/kg	-	-	< 3	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	< 3	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	3.6	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	7.5	0.08
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	-	-	< 3	< 0.03
Benzo(g.h.i)perylene	0.03	mg/kg	-	-	< 3	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	-	-	< 3	< 0.03
Chrysene	0.03	mg/kg	-	-	< 3	< 0.03
Dibenz(a.h)anthracene	0.03	mg/kg	-	-	< 3	< 0.03
Fluoranthene	0.03	mg/kg	-	-	< 3	< 0.03
Fluorene	0.03	mg/kg	-	-	< 3	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	-	< 3	< 0.03
Naphthalene	0.1	mg/kg	-	-	< 3	< 0.1
Phenanthrene	0.03	mg/kg	-	-	< 3	< 0.03
Pyrene	0.03	mg/kg	-	-	< 3	< 0.03
Total PAH*	0.1	mg/kg	-	-	< 3	< 0.1
p-Terphenyl-d14 (surr.)	1	%	-	-	126	113
2-Fluorobiphenyl (surr.)	1	%	-	-	105	98

Client Sample ID			10 HA4 0.1	10 HA4 0.25	10 HA5 0.1	10 HA5 0.3
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000268	Z24-Ma0000269	Z24-Ma0000270	Z24-Ma0000271
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	6.0	6.5	7.6	5.7
Cadmium	0.01	mg/kg	0.27	0.08	0.18	0.05
Chromium	0.1	mg/kg	22	25	26	24
Copper	0.1	mg/kg	24	17	25	14
Lead	0.1	mg/kg	49	24	46	18
Nickel	0.1	mg/kg	15	18	19	18
Zinc	5	mg/kg	160	91	110	70
Sample Properties						
% Moisture	1	%	19	10	10	9.5

Client Sample ID			10 HA6 0.1	10 HA6 0.3	10 HALO COMPOSITE	6 HA3 0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000272	Z24-Ma0000273	Z24-Ma0000278	Z24-Ma0000279
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	10	6.8	30	8.0
Cadmium	0.01	mg/kg	0.40	0.07	0.28	0.05
Chromium	0.1	mg/kg	28	27	34	25
Copper	0.1	mg/kg	35	17	56	24
Lead	0.1	mg/kg	170	24	220	19
Nickel	0.1	mg/kg	18	20	17	20
Zinc	5	mg/kg	270	94	290	75
Sample Properties						
% Moisture	1	%	23	15	19	12

Client Sample ID			6 HA3 0.7	6 HA3 0.95	6 HA4 0.5	6 HA4 0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000280	Z24-Ma0000281	Z24-Ma0000282	Z24-Ma0000283
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	7.9	6.5	8.0	7.4
Cadmium	0.01	mg/kg	0.04	0.04	0.04	0.05
Chromium	0.1	mg/kg	23	21	22	21
Copper	0.1	mg/kg	23	16	24	21
Lead	0.1	mg/kg	20	17	19	19
Nickel	0.1	mg/kg	19	16	18	17
Zinc	5	mg/kg	74	67	69	70
Sample Properties						
% Moisture	1	%	15	15	12	12

Client Sample ID			6 HA4 1.0	6 HA5 0.5	6 HA5 0.7	6 HA5 1.0
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000284	Z24-Ma0000285	Z24-Ma0000286	Z24-Ma0000287
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	3.8	7.1	7.7	13
Cadmium	0.01	mg/kg	0.03	0.06	0.05	0.10
Chromium	0.1	mg/kg	16	21	21	36
Copper	0.1	mg/kg	8.8	20	21	36
Lead	0.1	mg/kg	11	17	18	33
Nickel	0.1	mg/kg	12	17	17	28
Zinc	5	mg/kg	47	65	67	120
Sample Properties						
% Moisture	1	%	11	10	10	15

Client Sample ID			8 HA4 0.5	8 HA4 0.7	8 HA4 0.8	8 HA5 0.45
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000289	Z24-Ma0000290	Z24-Ma0000291	Z24-Ma0000292
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	14	10	9.2	4.9
Cadmium	0.01	mg/kg	0.07	0.07	0.07	0.05
Chromium	0.1	mg/kg	40	30	28	18
Copper	0.1	mg/kg	39	30	25	12
Lead	0.1	mg/kg	34	27	25	22
Nickel	0.1	mg/kg	32	25	22	13
Zinc	5	mg/kg	130	99	93	84
Sample Properties						
% Moisture	1	%	14	15	14	7.2

Client Sample ID			8 HA6 0.5	8 HA6 0.65	10 HA3 0.5	10 HA3 0.7
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000293	Z24-Ma0000294	Z24-Ma0000295	Z24-Ma0000296
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	4.0	4.3	4.6	5.6
Cadmium	0.01	mg/kg	0.06	0.04	0.03	0.04
Chromium	0.1	mg/kg	17	19	19	24
Copper	0.1	mg/kg	10	12	10	14
Lead	0.1	mg/kg	12	14	14	18
Nickel	0.1	mg/kg	13	14	15	17
Zinc	5	mg/kg	49	55	57	72
Sample Properties						
% Moisture	1	%	5.9	5.2	12	12

Client Sample ID			10 HA4 0.5	10 HA5 0.5	10 HA5 0.6	10 HA6 0.5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			Z24-Ma0000297	Z24-Ma0000298	Z24-Ma0000299	Z24-Ma0000300
Date Sampled			Feb 28, 2024	Feb 28, 2024	Feb 28, 2024	Feb 28, 2024
Test/Reference	LOR	Unit				
Metals M7 (NZ MfE)						
Arsenic	0.1	mg/kg	5.7	4.4	4.0	3.8
Cadmium	0.01	mg/kg	0.11	0.06	0.06	0.04
Chromium	0.1	mg/kg	28	20	18	17
Copper	0.1	mg/kg	16	14	13	11
Lead	0.1	mg/kg	20	13	15	13
Nickel	0.1	mg/kg	19	15	13	12
Zinc	5	mg/kg	80	55	55	44
Sample Properties						
% Moisture	1	%	8.1	6.9	5.3	12

Client Sample ID			10 HA7 0.0
Sample Matrix			Soil
Eurofins Sample No.			Z24-Ma0000326
Date Sampled			Feb 28, 2024
Test/Reference	LOR	Unit	
Metals M7 (NZ MfE)			
Arsenic	0.1	mg/kg	10
Cadmium	0.01	mg/kg	0.11
Chromium	0.1	mg/kg	18
Copper	0.1	mg/kg	20
Lead	0.1	mg/kg	20
Nickel	0.1	mg/kg	11
Zinc	5	mg/kg	340
Sample Properties			
% Moisture	1	%	12
Total Petroleum Hydrocarbons (NZ MfE 1999)			
Comments			G01
TPH-SG C7-C9	5	mg/kg	< 500
TPH-SG C10-C14	10	mg/kg	< 1000
TPH-SG C15-C36	20	mg/kg	76000
TPH-SG C7-C36 (Total)	35	mg/kg	76000
Polycyclic Aromatic Hydrocarbons (NZ MfE)			
Comments			G01
Acenaphthene	0.03	mg/kg	< 3
Acenaphthylene	0.03	mg/kg	< 3
Anthracene	0.03	mg/kg	< 3
Benz(a)anthracene	0.03	mg/kg	< 3
Benzo(a)pyrene	0.03	mg/kg	< 3
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	< 3
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	3.6
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	7.5
Benzo(b&j)fluoranthene[N07]	0.03	mg/kg	< 3
Benzo(g.h.i)perylene	0.03	mg/kg	< 3
Benzo(k)fluoranthene	0.03	mg/kg	< 3
Chrysene	0.03	mg/kg	< 3
Dibenz(a.h)anthracene	0.03	mg/kg	< 3
Fluoranthene	0.03	mg/kg	< 3
Fluorene	0.03	mg/kg	< 3
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	< 3
Naphthalene	0.1	mg/kg	< 3
Phenanthrene	0.03	mg/kg	< 3
Pyrene	0.03	mg/kg	< 3
Total PAH*	0.1	mg/kg	< 3
p-Terphenyl-d14 (surr.)	1	%	INT
2-Fluorobiphenyl (surr.)	1	%	101

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
Metals M7 (NZ MfE)	Auckland	Apr 03, 2024	6 Months
- Method: LTM-MET-3040 Metals in Waters Soils Sediments by ICP-MS			
Total Petroleum Hydrocarbons (NZ MfE 1999)	Auckland	Mar 15, 2024	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	Mar 15, 2024	14 Days
- Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS			
% Moisture	Auckland	Mar 15, 2024	14 Days
- Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry			

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Company Name: Kainga Ora – Homes and Communities - SI
Address: 107 Carlton Gore Road
Newmarket, Auckland
NZ 1023

Project Name: ORR6-10
Project ID: 1018898.2000

Order No.: PO 6181830
Report #: 1073892
Phone: (021) 537 696
Fax:

Received: Feb 29, 2024 5:30 PM
Due: Mar 22, 2024
Priority: 15 Day
Contact Name: Katie Stephenson

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail						Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Metals M7 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
Tauranga Laboratory - IANZ# 1402												
External Laboratory												
No	**Sample ID**	**Sample Date**	**Sampling Time**	**Matrix**	**LAB ID**							
1	6 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000228	X			X		X	
2	6 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000229				X		X	
3	6 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000230	X			X		X	
4	6 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000231				X		X	
5	6 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000232	X			X		X	
6	6 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000233				X		X	
7	6 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000234	X			X		X	
8	6 HA4 0.3	Feb 28, 2024		Soil	Z24-Ma0000235				X		X	
9	6 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000236	X			X		X	
10	6 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000237				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
11	6 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000238	X			X		X	
12	6 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000239				X		X	
13	6 HALO A	Feb 28, 2024		Soil	Z24-Ma0000240	X						
14	6 HALO B	Feb 28, 2024		Soil	Z24-Ma0000241	X						
15	6 HALO C	Feb 28, 2024		Soil	Z24-Ma0000242	X						
16	6 HALO D	Feb 28, 2024		Soil	Z24-Ma0000243	X						
17	6 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000244				X		X	
18	8 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000245	X			X		X	
19	8 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000246				X		X	
20	8 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000247	X			X		X	
21	8 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000248				X		X	
22	8 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000249	X			X		X	
23	8 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000250				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
24	8 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000251	X			X		X	
25	8 HA4 0.3	Feb 28, 2024		Soil	Z24-Ma0000252				X		X	
26	8 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000253	X			X		X	
27	8 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000254				X		X	
28	8 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000255	X			X		X	
29	8 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000256				X		X	
30	8 HALO A	Feb 28, 2024		Soil	Z24-Ma0000257	X						
31	8 HALO B	Feb 28, 2024		Soil	Z24-Ma0000258	X						
32	8 HALO C	Feb 28, 2024		Soil	Z24-Ma0000259	X						
33	8 HALO D	Feb 28, 2024		Soil	Z24-Ma0000260	X						
34	8 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000261				X		X	
35	10 HA1 0.1	Feb 28, 2024		Soil	Z24-Ma0000262	X			X		X	
36	10 HA1 0.3	Feb 28, 2024		Soil	Z24-Ma0000263				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
37	10 HA2 0.1	Feb 28, 2024		Soil	Z24-Ma0000264	X			X		X	
38	10 HA2 0.3	Feb 28, 2024		Soil	Z24-Ma0000265				X		X	
39	10 HA3 0.1	Feb 28, 2024		Soil	Z24-Ma0000266	X			X	X	X	X
40	10 HA3 0.3	Feb 28, 2024		Soil	Z24-Ma0000267				X	X	X	X
41	10 HA4 0.1	Feb 28, 2024		Soil	Z24-Ma0000268	X			X		X	
42	10 HA4 0.25	Feb 28, 2024		Soil	Z24-Ma0000269				X		X	
43	10 HA5 0.1	Feb 28, 2024		Soil	Z24-Ma0000270	X			X		X	
44	10 HA5 0.3	Feb 28, 2024		Soil	Z24-Ma0000271				X		X	
45	10 HA6 0.1	Feb 28, 2024		Soil	Z24-Ma0000272	X			X		X	
46	10 HA6 0.3	Feb 28, 2024		Soil	Z24-Ma0000273				X		X	
47	10 HALO A	Feb 28, 2024		Soil	Z24-Ma0000274	X						
48	10 HALO B	Feb 28, 2024		Soil	Z24-Ma0000275	X						
49	10 HALO C	Feb 28, 2024		Soil	Z24-Ma0000276	X						
50	10 HALO D	Feb 28, 2024		Soil	Z24-Ma0000277	X						

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
51	10 HALO COMPOSITE	Feb 28, 2024		Soil	Z24-Ma0000278				X		X	
52	6 HA3 0.5	Feb 28, 2024		Soil	Z24-Ma0000279				X		X	
53	6 HA3 0.7	Feb 28, 2024		Soil	Z24-Ma0000280				X		X	
54	6 HA3 0.95	Feb 28, 2024		Soil	Z24-Ma0000281				X		X	
55	6 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000282				X		X	
56	6 HA4 0.7	Feb 28, 2024		Soil	Z24-Ma0000283				X		X	
57	6 HA4 1.0	Feb 28, 2024		Soil	Z24-Ma0000284				X		X	
58	6 HA5 0.5	Feb 28, 2024		Soil	Z24-Ma0000285				X		X	
59	6 HA5 0.7	Feb 28, 2024		Soil	Z24-Ma0000286				X		X	
60	6 HA5 1.0	Feb 28, 2024		Soil	Z24-Ma0000287				X		X	
61	8 HA1 0.5	Feb 28, 2024		Soil	Z24-Ma0000288			X				
62	8 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000289				X		X	
63	8 HA4 0.7	Feb 28, 2024		Soil	Z24-Ma0000290				X		X	

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Auckland Laboratory - IANZ# 1327								X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308												
Christchurch Laboratory - IANZ# 1290						X	X					
64	8 HA4 0.8	Feb 28, 2024		Soil	Z24-Ma0000291				X		X	
65	8 HA5 0.45	Feb 28, 2024		Soil	Z24-Ma0000292				X		X	
66	8 HA6 0.5	Feb 28, 2024		Soil	Z24-Ma0000293				X		X	
67	8 HA6 0.65	Feb 28, 2024		Soil	Z24-Ma0000294				X		X	
68	10 HA3 0.5	Feb 28, 2024		Soil	Z24-Ma0000295				X		X	
69	10 HA3 0.7	Feb 28, 2024		Soil	Z24-Ma0000296				X		X	
70	10 HA4 0.5	Feb 28, 2024		Soil	Z24-Ma0000297				X		X	
71	10 HA5 0.5	Feb 28, 2024		Soil	Z24-Ma0000298				X		X	
72	10 HA5 0.6	Feb 28, 2024		Soil	Z24-Ma0000299				X		X	
73	10 HA6 0.5	Feb 28, 2024		Soil	Z24-Ma0000300				X		X	
74	6 HA2 FRAG	Feb 28, 2024		Building Materials	Z24-Ma0000301		X					
75	10 HA7 0.0	Feb 28, 2024		Soil	Z24-Ma0000326				X	X	X	X
76	6 HA2 0.15	Feb 28, 2024		Soil	Z24-Ma0000339	X						

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Contact Name: Katie Stephenson

Eurofins Analytical Services Manager : Katyana Gausel

Sample Detail	Asbestos - AS4964	Asbestos Absence /Presence	HOLD	Moisture Set	Total Petroleum Hydrocarbons (NZ MfE 1999)	Metals M7 (NZ MfE)	Polycyclic Aromatic Hydrocarbons (NZ MfE)
Auckland Laboratory - IANZ# 1327			X	X	X	X	X
Auckland (asbestos) Laboratory - IANZ# 1308							
Christchurch Laboratory - IANZ# 1290	X	X					
Test Counts	31	1	1	61	3	61	3

Internal Quality Control Review and Glossary

General

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

Holding Times

Please refer to the '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 before sample receipt deadlines as stated on the SRA.

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

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

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

Units

mg/kg: milligrams per kilogram	**mg/L:** milligrams per litre	**ppm:** parts per million
µg/L: micrograms per litre	**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	**Colour:** Pt-Co Units (CU)	

Terms

APHA	American Public Health Association
CEC	Cation Exchange Capacity
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 moisture has been determined on a solid sample, the result is expressed on a dry weight 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 represents 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 similar compound to the analyte target is reported as percentage recovery. See below for acceptance criteria.
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 6.0
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 only be used as a guide 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%, VOC recoveries 50 – 150%

PFAS field samples containing surrogate recoveries above the QC limit designated in QSM 6.0, where no positive PFAS results have been reported or reviewed, and no data was affected.

QC Data General Comments

1. Where a result is reported as 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 are 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							
Metals M7 (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	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
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 M7 (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	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Metals M7 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	0.02			0.01	Fail	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Metals M7 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	0.03			0.01	Fail	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
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	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	108			80-120	Pass	
Cadmium	%	103			80-120	Pass	
Chromium	%	102			80-120	Pass	
Copper	%	99			80-120	Pass	
Lead	%	101			80-120	Pass	
Nickel	%	99			80-120	Pass	
Zinc	%	106			80-120	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	78			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Benzo(b&j)fluoranthene	%	111			70-130	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	116			80-120	Pass	
Cadmium	%	119			80-120	Pass	
Chromium	%	117			80-120	Pass	
Copper	%	116			80-120	Pass	
Lead	%	113			80-120	Pass	
Nickel	%	116			80-120	Pass	
Zinc	%	119			80-120	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	110			80-120	Pass	
Cadmium	%	111			80-120	Pass	
Chromium	%	109			80-120	Pass	
Copper	%	110			80-120	Pass	
Lead	%	106			80-120	Pass	
Nickel	%	109			80-120	Pass	
Zinc	%	107			80-120	Pass	
LCS - % Recovery							
Metals M7 (NZ MfE)							
Arsenic	%	108			80-120	Pass	
Cadmium	%	107			80-120	Pass	
Chromium	%	109			80-120	Pass	
Copper	%	109			80-120	Pass	
Lead	%	104			80-120	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Nickel	%	108			80-120	Pass	
Zinc	%	111			80-120	Pass	
LCS - % Recovery							
Total Petroleum Hydrocarbons (NZ MfE 1999)							
TPH-SG C7-C36 (Total)	%	76			70-130	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	84			70-130	Pass	
Acenaphthylene	%	108			70-130	Pass	
Anthracene	%	93			70-130	Pass	
Benz(a)anthracene	%	95			70-130	Pass	
Benzo(a)pyrene	%	97			70-130	Pass	
Benzo(g.h.i)perylene	%	85			70-130	Pass	
Benzo(k)fluoranthene	%	88			70-130	Pass	
Chrysene	%	105			70-130	Pass	
Dibenz(a.h)anthracene	%	82			70-130	Pass	
Fluoranthene	%	93			70-130	Pass	
Fluorene	%	87			70-130	Pass	
Indeno(1.2.3-cd)pyrene	%	83			70-130	Pass	
Naphthalene	%	88			70-130	Pass	
Phenanthrene	%	83			70-130	Pass	
Pyrene	%	91			70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	Z24-Ma0000237	CP	%	102			75-125	Pass	
Cadmium	Z24-Ma0000237	CP	%	102			75-125	Pass	
Chromium	Z24-Ma0000237	CP	%	104			75-125	Pass	
Copper	Z24-Ma0000237	CP	%	100			75-125	Pass	
Lead	Z24-Ma0000237	CP	%	100			75-125	Pass	
Nickel	Z24-Ma0000237	CP	%	99			75-125	Pass	
Zinc	Z24-Ma0000237	CP	%	108			75-125	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	Z24-Ma0000251	CP	%	97			75-125	Pass	
Cadmium	Z24-Ma0000251	CP	%	96			75-125	Pass	
Chromium	Z24-Ma0000251	CP	%	94			75-125	Pass	
Copper	Z24-Ma0000251	CP	%	91			75-125	Pass	
Lead	Z24-Ma0000251	CP	%	94			75-125	Pass	
Nickel	Z24-Ma0000251	CP	%	91			75-125	Pass	
Zinc	Z24-Ma0000251	CP	%	96			75-125	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	Z24-Ma0000265	CP	%	95			75-125	Pass	
Cadmium	Z24-Ma0000265	CP	%	95			75-125	Pass	
Chromium	Z24-Ma0000265	CP	%	96			75-125	Pass	
Copper	Z24-Ma0000265	CP	%	95			75-125	Pass	
Lead	Z24-Ma0000265	CP	%	97			75-125	Pass	
Nickel	Z24-Ma0000265	CP	%	95			75-125	Pass	
Zinc	Z24-Ma0000265	CP	%	106			75-125	Pass	
Spike - % Recovery									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1					
TPH-SG C7-C36 (Total)	K24-Ma0001969	NCP	%	113			70-130	Pass	
Spike - % Recovery									

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1					
Acenaphthene	K24-Ma0036009	NCP	%	80			70-130	Pass	
Acenaphthylene	K24-Ma0032689	NCP	%	83			70-130	Pass	
Anthracene	K24-Ma0032689	NCP	%	76			70-130	Pass	
Benz(a)anthracene	K24-Ma0032689	NCP	%	78			70-130	Pass	
Benzo(a)pyrene	K24-Ma0015106	NCP	%	93			70-130	Pass	
Benzo(b&j)fluoranthene	K24-Ma0015106	NCP	%	97			70-130	Pass	
Benzo(g.h.i)perylene	K24-Ma0032689	NCP	%	72			70-130	Pass	
Benzo(k)fluoranthene	K24-Ma0032689	NCP	%	82			70-130	Pass	
Chrysene	K24-Ma0032689	NCP	%	96			70-130	Pass	
Dibenz(a.h)anthracene	K24-Ma0032689	NCP	%	72			70-130	Pass	
Fluoranthene	K24-Ma0015106	NCP	%	91			70-130	Pass	
Fluorene	K24-Ma0036009	NCP	%	85			70-130	Pass	
Indeno(1.2.3-cd)pyrene	K24-Ma0032689	NCP	%	70			70-130	Pass	
Naphthalene	K24-Ma0032689	NCP	%	89			70-130	Pass	
Phenanthrene	K24-Ma0036009	NCP	%	90			70-130	Pass	
Pyrene	K24-Ma0025625	NCP	%	76			70-130	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	Z24-Ma0000288	CP	%	108			75-125	Pass	
Cadmium	Z24-Ma0000288	CP	%	111			75-125	Pass	
Chromium	Z24-Ma0000288	CP	%	105			75-125	Pass	
Copper	Z24-Ma0000288	CP	%	106			75-125	Pass	
Lead	Z24-Ma0000288	CP	%	104			75-125	Pass	
Nickel	Z24-Ma0000288	CP	%	105			75-125	Pass	
Zinc	Z24-Ma0000288	CP	%	95			75-125	Pass	
Spike - % Recovery									
Metals M7 (NZ MfE)				Result 1					
Arsenic	Z24-Ma0000289	CP	%	119			75-125	Pass	
Chromium	Z24-Ma0000289	CP	%	119			75-125	Pass	
Copper	Z24-Ma0000289	CP	%	119			75-125	Pass	
Lead	Z24-Ma0000289	CP	%	115			75-125	Pass	
Nickel	Z24-Ma0000289	CP	%	119			75-125	Pass	
Zinc	Z24-Ma0000289	CP	%	120			75-125	Pass	
Test	**Lab Sample ID**	**QA Source**	**Units**	**Result 1**			**Acceptance Limits**	**Pass Limits**	**Qualifying Code**
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000236	CP	mg/kg	9.2	10.0	8.0	30%	Pass	
Cadmium	Z24-Ma0000236	CP	mg/kg	0.32	0.33	3.6	30%	Pass	
Chromium	Z24-Ma0000236	CP	mg/kg	26	29	10.0	30%	Pass	
Copper	Z24-Ma0000236	CP	mg/kg	30	33	8.3	30%	Pass	
Lead	Z24-Ma0000236	CP	mg/kg	39	43	8.6	30%	Pass	
Nickel	Z24-Ma0000236	CP	mg/kg	19	21	9.5	30%	Pass	
Zinc	Z24-Ma0000236	CP	mg/kg	120	130	10	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	Z24-Ma0000236	CP	%	19	19	<1	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000250	CP	mg/kg	6.6	6.5	1.3	30%	Pass	
Cadmium	Z24-Ma0000250	CP	mg/kg	0.04	0.04	12	30%	Pass	
Chromium	Z24-Ma0000250	CP	mg/kg	24	24	1.4	30%	Pass	
Copper	Z24-Ma0000250	CP	mg/kg	16	16	<1	30%	Pass	
Lead	Z24-Ma0000250	CP	mg/kg	23	22	2.4	30%	Pass	

Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Nickel	Z24-Ma0000250	CP	mg/kg	17	17	1.6	30%	Pass	
Zinc	Z24-Ma0000250	CP	mg/kg	80	80	1.0	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	Z24-Ma0000250	CP	%	7.2	7.2	<1	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000264	CP	mg/kg	5.2	4.5	14	30%	Pass	
Cadmium	Z24-Ma0000264	CP	mg/kg	0.21	0.19	7.4	30%	Pass	
Chromium	Z24-Ma0000264	CP	mg/kg	21	20	9.2	30%	Pass	
Copper	Z24-Ma0000264	CP	mg/kg	20	18	11	30%	Pass	
Lead	Z24-Ma0000264	CP	mg/kg	39	34	13	30%	Pass	
Nickel	Z24-Ma0000264	CP	mg/kg	15	13	10	30%	Pass	
Zinc	Z24-Ma0000264	CP	mg/kg	82	75	9.9	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	Z24-Ma0000264	CP	%	11	11	4.6	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000266	CP	mg/kg	5.1	4.2	20	30%	Pass	
Cadmium	Z24-Ma0000266	CP	mg/kg	0.12	0.11	7.3	30%	Pass	
Chromium	Z24-Ma0000266	CP	mg/kg	18	15	20	30%	Pass	
Copper	Z24-Ma0000266	CP	mg/kg	17	14	18	30%	Pass	
Lead	Z24-Ma0000266	CP	mg/kg	47	40	15	30%	Pass	
Nickel	Z24-Ma0000266	CP	mg/kg	13	11	15	30%	Pass	
Zinc	Z24-Ma0000266	CP	mg/kg	110	94	13	30%	Pass	
Duplicate									
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD			
TPH-SG C7-C9	K24-Ma0014971	NCP	mg/kg	< 5	< 5	<1	30%	Pass	
TPH-SG C10-C14	K24-Ma0014971	NCP	mg/kg	< 10	< 10	<1	30%	Pass	
TPH-SG C15-C36	K24-Fe0074096	NCP	mg/kg	900	1200	28	30%	Pass	
TPH-SG C7-C36 (Total)	K24-Fe0074096	NCP	mg/kg	900	1200	28	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Anthracene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benz(a)anthracene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(a)pyrene	K24-Ma0032541	NCP	mg/kg	0.04	< 0.03	2.8	30%	Pass	
Benzo(b&j)fluoranthene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(g.h.i)perylene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Benzo(k)fluoranthene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Chrysene	K24-Ma0032541	NCP	mg/kg	0.05	0.04	6.7	30%	Pass	
Dibenz(a.h)anthracene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Fluoranthene	K24-Ma0032541	NCP	mg/kg	0.06	< 0.03	4.1	30%	Pass	
Fluorene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Indeno(1.2.3-cd)pyrene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Naphthalene	K24-Ma0032541	NCP	mg/kg	< 0.1	< 0.1	<1	30%	Pass	
Phenanthrene	K24-Ma0032541	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Pyrene	K24-Ma0032541	NCP	mg/kg	0.08	< 0.03	5.0	30%	Pass	

Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000278	CP	mg/kg	30	30	1.7	30%	Pass	
Cadmium	Z24-Ma0000278	CP	mg/kg	0.28	0.27	3.5	30%	Pass	
Chromium	Z24-Ma0000278	CP	mg/kg	34	32	4.7	30%	Pass	
Copper	Z24-Ma0000278	CP	mg/kg	56	52	6.4	30%	Pass	
Lead	Z24-Ma0000278	CP	mg/kg	220	260	18	30%	Pass	
Nickel	Z24-Ma0000278	CP	mg/kg	17	16	3.6	30%	Pass	
Zinc	Z24-Ma0000278	CP	mg/kg	290	300	<1	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	Z24-Ma0000278	CP	%	19	18	5.7	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000287	CP	mg/kg	13	13	1.4	30%	Pass	
Cadmium	Z24-Ma0000287	CP	mg/kg	0.10	0.08	20	30%	Pass	
Chromium	Z24-Ma0000287	CP	mg/kg	36	37	2.7	30%	Pass	
Copper	Z24-Ma0000287	CP	mg/kg	36	37	2.1	30%	Pass	
Lead	Z24-Ma0000287	CP	mg/kg	33	33	1.0	30%	Pass	
Nickel	Z24-Ma0000287	CP	mg/kg	28	29	2.9	30%	Pass	
Zinc	Z24-Ma0000287	CP	mg/kg	120	120	2.7	30%	Pass	
Duplicate									
Sample Properties				Result 1	Result 2	RPD			
% Moisture	Z24-Ma0000287	CP	%	15	14	2.4	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000297	CP	mg/kg	5.7	5.8	<1	30%	Pass	
Cadmium	Z24-Ma0000297	CP	mg/kg	0.11	0.10	11	30%	Pass	
Chromium	Z24-Ma0000297	CP	mg/kg	28	26	7.9	30%	Pass	
Copper	Z24-Ma0000297	CP	mg/kg	16	15	5.0	30%	Pass	
Lead	Z24-Ma0000297	CP	mg/kg	20	20	<1	30%	Pass	
Nickel	Z24-Ma0000297	CP	mg/kg	19	18	3.8	30%	Pass	
Zinc	Z24-Ma0000297	CP	mg/kg	80	77	3.4	30%	Pass	
Duplicate									
Metals M7 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	Z24-Ma0000298	CP	mg/kg	4.4	3.8	14	30%	Pass	
Cadmium	Z24-Ma0000298	CP	mg/kg	0.06	0.05	16	30%	Pass	
Chromium	Z24-Ma0000298	CP	mg/kg	20	17	14	30%	Pass	
Copper	Z24-Ma0000298	CP	mg/kg	14	11	18	30%	Pass	
Lead	Z24-Ma0000298	CP	mg/kg	13	12	11	30%	Pass	
Nickel	Z24-Ma0000298	CP	mg/kg	15	13	15	30%	Pass	
Zinc	Z24-Ma0000298	CP	mg/kg	55	47	15	30%	Pass	

Comments

This report has been revised (V2) following repeat analysis. Metals results for sample 24-Ma0000297 have now been replaced by the repeat results.

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:

Katyana Gausel	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.

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