



ENGEO Limited
124 Montreal Street, Sydenham
Christchurch, 8023
(03) 328 9012
www.engeo.co.nz



Project Number 024181.000.001

**Preliminary Site Investigation and
Detailed Site Investigation**

160 Bangor Road, Darfield, Canterbury 7571

Submitted to:
Hughes Developments Limited
21 Worcester Boulevard
Christchurch Central
Christchurch

Executive Summary

Site Address	160 Bangor Street	
Legal Description	Section 2 Survey Office Plan 438579	
Site Investigation Area	Approximately 130. ha	
Proposed Redevelopment / Land Use	Residential redevelopment (10% produce consumption) with small reserves located through the central of the site	
Adopted land use scenario from the NES:CS	Residential 10% produce consumption with small sections within the proposed plan being recreational land use	
Historical / Current Land Use	Rural residential land comprising largely of pastoral grazing paddocks with a residential dwelling and tennis court, associated farm sheds, sheep / stock pens and ancillary structures	
Analytical Results	<i>Exceedance(s) of human health criteria</i>	Yes
	<i>Exceedance(s) of environmental discharge criteria</i>	Yes
	<i>Exceedance(s) of regional background criteria</i>	Yes
Applicable HAIL activity as defined by the NESCS (Soil)	A8: Livestock dip or spray race operations A17: Storage tanks for fuel E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition G5: Waste disposal to land 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. Largely associated with hazardous building materials and general spraying of paddocks overtime.	
Conclusions and Recommendations	The DSI identified localised contamination hotspots and elevated concentrations above background across parts of the site, with exceedances of applicable human health (both residential (10% produce and recreational land uses) and environmental criteria (notably in the dwelling halo soils, in burn pit areas and around a presumed underground storage tank). On this basis, the site is not suitable for the proposed residential redevelopment until these hotspots are appropriately remediated, and construction-phase risks are managed to prevent off-site sediment / runoff impacts. Remediation is expected to be primarily targeted excavation and disposal and / or managed reuse / encapsulation where appropriate, supported by validation sampling. A Remedial Action Plan (RAP) is required to support the resource consent application (including proposed remedial strategy, earthworks / management controls and validation requirements).	

ENGEO Document Control:

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SQEP Certifying Statement

I certify that the site has been assessed in accordance with current New Zealand Regulations and guidance documents and that this report has been prepared in general accordance with the Ministry for the Environment's Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand, 2021.

I am considered by ENGEO Limited to be a suitably qualified and experienced practitioner (SQEP) able to certify reports pursuant to the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011, based on the company's definition of a SQEP as given below.



Hazel Atkins, CEnvP

30 June 2026

ENGEO Limited requires that a SQEP has the following Qualifications / Experience:

- Tertiary science or engineering qualification relevant to environmental assessment.
- A minimum of ten years of relevant experience.
- Registration with a professional body that assess and certifies environmental professionals in the competency criteria of training, experience, professional conduct, and ethical behaviour.

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1 Introduction

1.1 Background

ENGEO Ltd was engaged by Hughes Developments Limited to undertake a Preliminary Site Investigation and Detailed Site Investigation at 160 Bangor Road, Darfield, (herein referred to as 'the site', shown in Figure 1). This work has been carried out in accordance with our signed agreement dated 28 May 2026.

It is understood that Hughes Developments Limited proposes a 23-stage residential subdivision of the site for residential land use (10% produce consumption), including small recreational reserves within the central portion of the site. ENGEO has been engaged to support the associated resource consent application. The subdivision plan sourced from Hughes Development in June 2026 is presented on Figure 2. ENGEO completed a due diligence Preliminary and Detailed Site Investigation in 2023 (ENGEO, 2023), which included a desk-based review and limited sampling of potential contaminating areas. This work identified localised contamination and highlighted areas where further investigation may be required at later stages to better define site conditions. As the project has progressed and is now proposed to proceed under the Fast Track consenting pathway, additional information is required to support the current stage of development and the consent process. Accordingly, targeted updates to the previous investigations are necessary to ensure they remain fit for purpose and aligned with current regulatory requirements.

This environmental investigation has been undertaken to satisfy the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (the 'NESCS', 2011).

This investigation also addresses the requirements of regional regulations covering discharges to the environment from contaminated sites during and post-redevelopment works; namely, the Canterbury Land and Water Regional Plan ('the CLWRP'; ECan, 2015) as well as Selwyn District Council (SDC).

1.2 Objectives of the Assessment

The objective of the preliminary site investigation (PSI) was to gather information relating to current and historical land uses to identify potentially contaminating activities included on the Hazardous Activities and Industries List (HAIL; MfE, 2011b); and to develop a preliminary conceptual site model (PCSM) to assess the potential exposure pathways present at the site.

The objective of the detailed site investigation (DSI) was to obtain data relating to the type, extent and concentration of contaminants of potential concern identified during the desktop assessment. The information gathered has been used to assess whether the identified contaminants of concern pose a potential unacceptable risk to human health or identified environmental receptors and soil is suitable to remain on-site.

1.3 Scope of Works

To meet the objectives of the investigation, ENGEO undertook the following tasks:

- Completed a desktop study of relevant and publicly available environmental and geological information for the site.
- Review of the 2023 due diligence report (ENGEO, 2023), including identifying previously assessed HAIL areas and interpreting results alongside the 2026 supplementary sampling to support the updated understanding of site conditions.

- Site walkover to confirm the current land use and visually assess the presence of any activities or industries listed on the HAIL or evidence of any potential contamination.
- Development of a preliminary Conceptual Site Model ('CSM') to identify potential contaminant linkages.
- Conduct field investigations and collect soil samples for analysis in areas where the CSM identifies potentially complete contaminant exposure pathways.
- Compared analytical results against Tier 1 screening criteria for the protection of human health and ecological receptors, as well as local soil disposal acceptance criteria.
- Preparation of a Preliminary and Detailed Site Investigation Report summarising the findings, including a revised CSM, to inform potential remediation and future development options.

This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines (CLMG) No. 1: Reporting on Contaminated Sites in New Zealand (MfE, 2021a) and CLMG No 5: Site Investigation and Analysis of Soils (MfE, 2021b). The investigation was supervised, and the report reviewed and approved by a suitably qualified and experienced contaminated land practitioner in accordance with national environmental regulations for soil contamination.

2 Site Information

2.1 General

The property at 160 Bangor Road, Darfield comprises an irregularly shaped parcel of land. The site location is shown on Figure 1 with key features displayed.

The site is predominantly used for rural residential purposes and sheep grazing, including a residential dwelling located within the central-western portion of the site, a tennis court immediately south of the dwelling, and farm sheds and ancillary structures to the north. Outside of the developed central-western area, the site is largely undeveloped and consists of grassed paddocks with scattered mature trees and hedging.

Surrounding land use is characterised by a mix of rural residential and agricultural activities. A small water pump station is present in the piece of land along the northern boundary line of the site. Land to the north mainly comprises grazing paddocks. West Coast Road bounds the site to the northeast, with rural residential and recreational land use (McHughs Plantation Reserve) located to the east of West Coast Road. Land to the southeast, south, and west of the site comprises predominantly rural residential lifestyle blocks.

Key site information is summarised in Table 1.

Table 1: Site Information

Item	Description
Legal Description	SECTION 2 SURVEY OFFICE PLAN 438579
Current Land Use	Rural residential land use and sheep farming
Site Area	130.39 ha
Local and Regional Authority	Selwyn District Council and Environment Canterbury

2.2 Topography

The site is generally flat with localised undulations across paddock areas. Ground elevations range from approximately 206 m RL to 211 m RL. A prehistoric flow channel (paleochannel) is present within the eastern portion of the site, extending and flowing from the northern boundary toward the south, as shown on Figure 1. Overall, the site exhibits a very gentle slope, estimated to be less than 5°, generally falling toward the south.

2.3 Geological Setting

The site has been regionally mapped by GNS to be underlain by dominantly alluvial gravel, sand, and silt of the Springston Formation, and by Forsyth et al. (2008) as being underlain by grey river alluvium.

2.4 Hydrology and Hydrogeology

The site overlies an unconfined to semi-confined aquifer system. Depth to groundwater is indicated by Canterbury Maps to be greater than 50 m below ground level.

There are no active groundwater abstractions located on the site. There are two unused wells on site and two active abstractions are located within 100 m of the site:

- L35/0276 (R.M. Stewart): located on-site; unused; depth 28.0 m; no recorded water level.
- L35/0277 (R. Logan): located on-site; unused and capped; depth 264.8 m; highest recorded groundwater level 106.37 m below ground level.
- L35/0980 (Selwyn District Council): located immediately north of the site boundary; used for irrigation and public water supply; depth 246.8 m; initial groundwater level 150.85 m below ground level.
- BX22/0006 (Selwyn District Council): located adjacent to the northern site boundary; used for public water supply; depth 245.0 m; highest recorded groundwater level 135.5 m below ground level.

Bores L35/0980 and BX22/0006 form part of the provisional protection zones for community drinking water supplies. These protection zones extend marginally into the northwestern portion of the site, as shown on Figure 1.

No discharge consents are registered on the site; however, several discharge consents are present within 250 m of the site. These are predominantly associated with domestic wastewater disposal to land within surrounding residential properties, and operational stormwater discharges associated with Selwyn District Council infrastructure located along the northern boundary of the site.

A man-made drain or water race traverses the site in a north to south direction (refer Figure 1). The drain originates from agricultural land to the north of the site and is used for surface water and stormwater runoff / discharge from within the site. The drain connects to a wider drainage network that ultimately discharges to the Hawkins River, located approximately 1.6 km west of the site; however, discharge from the site drainage system occurs further downstream, approximately 5 km to the south.

ENGEO observed the drain to be flowing and generally clear, with minor localised algal growth.

2.5 Groundwater Sensitivity

Groundwater beneath the site is considered to be of low sensitivity in accordance with the Ministry for the Environment (MfE) guidance criteria. This assessment is based on the following site specific factors:

- Groundwater is encountered at significant depth, typically greater than 50 m below ground level and exceeding 100 m in nearby bores.
- The aquifer is unconfined to semi-confined and is not artesian, which reduces the potential for pressurised lateral migration of contaminants.
- Groundwater beneath the site is of a quality suitable for abstraction; however, the depth to groundwater provides a degree of natural protection from surface-derived contaminants.
- Although active groundwater abstractions are adjacent to the site, these are screened within deeper aquifer units and are therefore unlikely to be affected by shallow contamination sources.
- The site is not located in close proximity to sensitive surface water bodies. The on-site drain is considered a minor receptor and is not classified as sensitive. The Hawkins River is located over 1 km from the site to the west.

Based on these factors, the potential for contaminant migration via groundwater pathways and subsequent discharge to sensitive receptors is considered low.

3 Site History

ENGEO obtained and reviewed available environmental and historical information from a number of sources to investigate the past uses of the site and surrounding areas. Information from these searches relevant to the site is summarised below.

3.1 Listed Land Use Register

Environment Canterbury Regional Council (ECan) maintains a Listed Land Use Register (LLUR) of past and current land uses within the Canterbury Region. The LLUR documents properties on which potentially hazardous activities have been undertaken. The potentially hazardous activities are defined on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) (MfE, 2011).

Identifying a HAIL activity on the site triggers the requirement for a contaminated land assessment prior to development under the NESCS.

The ECan LLUR property statement was requested by ENGEO on 9 June 2026 for the site and is presented in Appendix 1. A summary of the statement is provided below in Table 2.

Table 2: LLUR Summary

Period From	Period To	HAIL Activity(s)	LLUR Category
Unknown	Present	A17: Storage tanks of drums for fuel, chemicals or liquid waste.	Not Investigated
Unknown	Present	G5: Waste disposal to land	Not investigated
Pre 1940s	Present	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. Largely associated with hazardous building materials and general spraying of paddocks overtime.	Investigation yet to be reviewed

Notes: Multiple HAIL activities related to farming on this property were identified in a preliminary site investigation, submitted as a part of plan change application to Selwyn District Council (refer to Section 3.5).

3.2 Historical Aerial Photographs

Historical aerial photographs available on Canterbury and Google Maps were viewed in September of 2023 and reviewed in June 2026. The relevant and applicable findings in relation to our investigation are summarised in Table 3 below, with historical aerial imagery attached in Appendix 2.

Table 3: Historical Aerial Photographs

Date	Description
1940 – 1944	A planted section of the site is present in the western paddock of the site. A dwelling is present in a cleared section of the plantation area. The remainder of the site is comprised of several paddock areas. Several piles of hay / stock feed are present in the centres of the various paddocks. The majority of the surrounding sites are paddock areas presumed to be used for agricultural purposes. McHughes plantation reserve is present to the northeast of the site across West Coast Road.
1955 – 1959	A barn structure has been constructed to the north of the dwelling along with a smaller shed to the east of the barn. The plantation is still present to the north and south of the dwelling area. A wool shed has been constructed adjacent to the plantation to the east. The surrounding sites appear mainly unchanged from the previous aerial photograph.

Date	Description
1975 – 1979	The dwelling is still present on the site. The barn to the north of the dwelling has been extended to the east. Another barn structure has been constructed to the south of the woolshed. The plantation to the south of the dwelling appears to have either been cleared and re-planted or significantly thinned. The remainder of the site is still open paddock areas. The surrounding sites appear mainly unchanged from the previous aerial photograph.
1980 – 1984	An additional barn structure has been constructed to the southeast of the wool shed. The remainder of the site and surrounding area remains mainly unchanged.
1985 – 1989	The site and surrounding area remain mainly unchanged from the previous aerial photograph.
1995 – 1999	A pool is visible to the northwest of the dwelling. A small structure is present in one of the paddocks to the northwest of the dwelling. Visible sheep / stock pens are present to the north of the wool shed. The forest area is still present through the centre of the site to the north and south of the dwelling. The remainder of the site is still paddock area with various shelter belts present. The surrounding sites appear mainly unchanged. Some new dwellings have been constructed to the sites in the southeast along Cridges Road.
2004 – 2010	Two round silos are visible to the southwest of the wool shed. The remainder of the site and surrounding areas appear mainly unchanged.
2010 – 2014	A presumed offal pit is visible in one of the northern paddocks on the site located to the west of a shelter belt. Some small piles of presumed manure are present in a paddock adjacent to the east of the wool shed. The southern end of the forest area has been thinned out. A tennis court is visible to the south of the dwelling. Small pens or dog kennels are present to the west of the wool shed. The remainder of the site is still paddocked with sheep visible across the site. The sites to the west and northwest have undergone residential lifestyle block development with several smaller land sections present with associated dwellings and outbuildings present.
2015 – 2019	The presumed offal pit is still visible in one of the northern paddocks on-site. The roof appears to have been removed from the shed located in a paddock to the northwest of the dwelling. Two small sheds are visible near the dwelling. All other site structures appear mainly unchanged. Residential development has occurred to the east across West Coast Road. A small water pump station has been constructed on the site along the northern boundary line.
2020 – 2025	The site and surrounding area remain mainly unchanged from the previous aerial photograph.

3.3 Certificate of Titles

A review of the current and historical certificate of title was completed with no information related to potential contaminating activities identified. The Certificates of Title are attached in Appendix 3.

3.4 Selwyn District Council Property File

The property file held by Selwyn District Council was reviewed in September 2023. The information below was gathered from the property file:

- 1 March 1973 – Building permit for a shed.
- 22 December 1975 – Building permit for a foul house and shed.
- 2 May 1978 – Building permit application for a haybarn.
- 16 December 1982 – Building permit application for a garage to be erected onto existing dwelling.
- 28 April 1992 – Building permit for extension to existing house and garage for residential use.

The client also noted that one or both of the dwellings were occupied by the Omarama Pest Destruction Board / Rabbit Board. No further evidence was identified during the PSI to indicate that any bulk storage of chemicals was stored on the site.

3.5 Relevant Previous Reports

URS – Geo-environmental desk study to support private plan change, 160 Bangor Road, Darfield – Revision 1. Dated 25 October 2014.

URS completed a combined geo-environmental assessment of 160 Bangor Road, Darfield in 2014. At that time, the Canterbury Regional Council LLUR did not record any information for the site. URS reviewed historical aerial imagery from 1941 and 2004, which indicated that a dwelling was present by 1941 and had been substantially extended by 2004, with a tennis court, swimming pool, sheds and silos also evident.

A site walkover undertaken in November 2014, including discussions with the landowner, indicated that the property had been owned since the 1980s and used for sheep farming and cropping, with the land also leased for barley cultivation.

In addition to the dwellings, site structures comprised farm storage sheds and a wool shed. URS identified an approximately 2,500 L above-ground steel fuel tank adjacent to a farm shed, historically used for refuelling farm vehicles but reportedly unused for about 10 years at the time of the assessment. An underground storage tank was also understood to be present east of the same shed.

Vent and dispensing infrastructure was present in the tank area, although the age, size and condition of the underground tank were unknown. URS also noted that no other bulk chemical storage was identified by the landowner. Several former and active ofal pits were reported on the property, including one open pit observed to be approximately 3 m deep and containing sheep carcasses.

4 Current Site Conditions

An initial site walkover and due diligence investigation was completed in September 2023, with an additional walkover and intrusive investigation completed in June 2026 by ENGEO Environmental Scientists.

Observations of conditions present at the site are summarised in Table 4. Photographs taken during the site visit in 2023 is included in Appendix 4, with updated photographs from the 2026 investigation in Appendix 5.

Table 4: Current Site Conditions

Site Conditions	Comments
Overview	The site is a sheep farm with large paddock areas. The middle of the site is a eucalyptus plantation with a clearing towards the centre of the plantation with the residential dwelling. A swimming pool and tennis court are located near the dwelling. A large barn is present to the north of the dwelling. In the north-eastern paddock from the dwelling is a wool shed and two large barn structures.
Site Building(s)	Dwelling: Concrete ring foundation, timber weatherboard cladding, cement board or timber soffits, metal roofing materials. Pool shed: Concrete foundation, timber framing, metal and timber cladding, metal and clearlight roofing materials. Woodshed: No foundation, timber framing, metal cladding and roofing materials. Barn north of dwelling: Concrete and open earth foundation, timber framing, metal cladding and roofing materials, presumed asbestos fuse board on interior wall. Woolshed: Concrete ring foundation, concrete cinder block, timber and metal claddings, metal roofing materials. Hay-shed: Open earth ground, timber piles, metal roofing material. Large multi-bay barn: No interior access so unknown foundation type, metal cladding and metal roofing material.

Site Conditions	Comments
Potential Sources of Contamination	On-site buildings with potential asbestos containing claddings or lead based paint present in a degraded condition. Three on-site burn-off areas / burn piles were observed across the site in 2023, with two located in the vicinity of the woolshed and one located north of the barn adjacent to the dwelling (refer Figure 3). Burn pile 1 comprised burnt plastic (presumed bailage wrap), burnt twine, and ashy soils. Burn pile 2 comprised burnt hay or bailage, with no obvious plastic or other anthropogenic materials present. Burn pile 3 comprised green waste, minor concrete fragments, and timber palings. At the time of the 2026 site walkover, burn pile 3 remained present and evidence of more recent burning was observed. An old, degraded drum labelled "poison" was also observed adjacent to a small water pump near burn pile 3, indicating the potential presence of hazardous substances. A stock run is present to the north of the woolshed where drenching is presumed to have been undertaken in the run. A section of the run has a concrete foundation. During the 2023 site walkover, an open offal pit was observed within a northern paddock. The pit contained sheep and lamb carcasses, along with miscellaneous farm and domestic waste including plastic chemical containers, bailage wrap, timber palings, a chilly bin, and plastic buckets. The pit was not intrusively investigated at that time due to its depth and associated health and safety risks. During the subsequent 2026 site walkover, the offal pit was observed to have been closed, with a grassed soil mound present over the former pit location. This suggests the pit may have been backfilled and capped, indicating the potential for uncontrolled burial of waste materials beneath the mound. An above ground petrol pump dispenser and vent line was present to the east of the barn building (north of the dwelling). It is presumed that the below ground storage tank is still present in this area (however unconfirmed). No details on the size, date of use or whether the tank is still filled was unable to be determined. An above ground diesel storage tank was present to the western side of the barn (north of the dwelling). The tank is approximately 1,600-2,000 L and appeared to be empty during the site walkover and did not appear to have been used in some time.
Potential for On- or Off-Site Migration of Contaminants	Due to the flat topography of the area, there is a low risk from any runoff from the site onto neighbouring sites / areas. There is a potential for the water race / stormwater drain on-site to bring low concentrations of contaminants on-site however the drain does not appear to cross any HAIL sites upstream. There is also a low risk from off-site contamination to migrate onto the site.
Limitations	No visual inspection was undertaken into the dwelling or dwelling subfloor or into the large multi-bay barn structure. No intrusive investigation was undertaken around the below ground storage tank or within the former offal pits and mound material.
Other Comments	In 2023 small amounts of smaller (20 L) chemical containers were observed in the barn to the north of the dwelling. The chemical containers were mostly empty and didn't appear to have been used in some time. All containers were stored on concrete with no staining present below the containers.

5 Preliminary Conceptual Site Model

A contaminant is a substance with the potential to cause harm to human health and / or on-site or nearby environmental receptors. This environmental risk assessment uses a source–pathway–receptor (SPR) linkage methodology to develop the preliminary conceptual site model (PCSM) and identify potential exposure pathways at the site. For a contaminant to present a risk, all three components are required to be present and connected. The three components of a conceptual site model are:

- **Source:** the origin of contamination (e.g., deteriorating asbestos- or lead-containing materials, fuel storage systems, burn or waste areas, or undocumented fill).
- **Pathway:** the route by which contaminants can migrate and / or a receptor can be exposed (e.g., ingestion, inhalation of dust / fibres / vapour, dermal contact, or transport via surface water or groundwater).
- **Receptor(s):** people, ecological receptors, and other sensitive systems that could be affected (including groundwater and surface water, which are regulated and may have cultural value).

This section presents a summary of potential contamination sources (recognised by the MfE as 'HAIL' activities), key pathways for contaminant mobilisation, and key receptors relevant to the site.

5.1 Potential HAIL Activities – Contamination Sources

Based on the information reviewed as part of the PSI and observations during the site walkover, the following potential sources of contamination have been identified, as detailed in Table 5. Activities identified are recognised by the MfE as 'HAIL' activities (Hazardous Activity and Industry List). The potential HAIL category and potential contaminants of concern associated with the development site are summarised below, with locations of each potential HAIL activity present within Figure 3.

Table 5: Summary of Contamination Sources

HAIL Category	Contamination Source	Contaminants of Concern
A8: Livestock dip or spray race operations	Historical sheep dip operations used pesticide formulations for ectoparasite control, with dip fluids often spilled, leaked, or discharged to land or unlined soakage areas. This may have resulted in localised shallow soil contamination, with limited vertical migration based on soil conditions.	Heavy metals / metalloids including mercury, organochlorine pesticides (OCPs) and organophosphorus pesticides (ONOPs)
A17: Storage tanks for fuel	Above ground storage tank through leaks, spills, or overfills onto surface material.	Heavy metals / metalloids, total petroleum hydrocarbons (TPHs)
	The unknown condition of the old underground storage tank means contents may have leaked into adjacent soils.	

HAIL Category	Contamination Source	Contaminants of Concern
E1: Asbestos products manufacture or disposal including sites with buildings containing asbestos products known to be in a deteriorated condition	Buildings constructed prior to the year 2000, therefore asbestos products may be present in shallow soils nearby.	Asbestos fines and / or fibres
G5: Waste disposal to land	Active and historical offal pits may contain carcasses and other waste materials (including chemical containers and timber), which can cause soil contamination through leachate and the burial of waste within deep excavations.	Heavy metals / metalloids, OCPs and polycyclic aromatic hydrocarbons (PAHs)
	Three burn piles observed, consisting of green waste and plastic. Evidence of burning was noted, indicating potential hydrocarbon build-up in shallow soils.	Heavy metals / metalloids and PAHs
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	Construction and demolition of structures onsite before the year 2000, on which lead-based paints may have been used.	Lead
	General agricultural use over a long period, including grazing, may have involved the periodic application of agrichemicals across the paddocks.	Heavy metals / metalloids including mercury

5.2 Potential Contamination Pathways

The potential pathways for contaminant exposure to both people and the environment (where present) are interconnected and can include:

- Direct contact with soil, including dermal absorption and ingestion.
- Release and exposure through airborne dispersion.
- Discharge of sediment and leached contaminants via overland flow, including transport through site drainage features and / or discharge to nearby or on-site watercourses.

Contaminants may be released during activities such as demolition and excavation works at the site, resulting in exposure via dermal contact or inhalation. Exposure via ingestion may occur if contaminated soils is consumed and contaminated soils may reach off-site receptors during construction works due to vehicle movements, stockpiling or soil or poor erosion and sediment controls.

Migration and exposure via groundwater, including leaching and mobilisation of contaminants to the underlying aquifer, is not considered a significant pathway at this site due to the depth to groundwater (>50 m bgl), with soil sorption further limiting leaching to groundwater.

Potential factors which can impact movement and / or migration of contaminants on-site include:

- Erosion of disturbed and cleared areas that contribute to sediment transport and deposition.
- Stripping of topsoil material.
- Uncontrolled movement of vehicles and plant.
- Surface water drainage pathways and culverts forming preferential migration pathways.
- Level of rainfall.

5.3 Potential Receptors

A summary of key receptors related to the project development that require consideration in relation to on-site contaminants is summarised in Table 6 below.

Table 6: Summary of Identified Site Receptors

Receptor	Potential Pathways of Exposure
Current site users	If left unmanaged, may be exposed to contamination within surface soils through ingestion, inhalation of dust, and / or dermal contact from close contact with exposed soils.
Construction and maintenance workers	
Future site users	
Adjacent site users / neighbouring residential properties	Long-term off-site exposure is considered low due to the flat topography and limited overland flow pathways. However, neighbouring residents may be exposed during soil disturbance (e.g., construction) via dust / odour or via contaminated sediment / surface water transported through drainage channels extending beyond the site boundary.
Groundwater	Leaching of contaminants from site soil and transport via groundwater. However, as outlined in Section 2.5, groundwater is considered 'not sensitive' and is at significant depth, therefore is not considered a potential receptor for the site.
Surface water	By direct discharge of leached contaminants into the stormwater drain present on-site via overland flow, or remobilisation in sediment as a response to erosion, scour or soil disturbance during earthworks.
Other environmental receptors (sensitive ecosystems and terrestrial flora and fauna)	Direct exposure to potential contaminated soils and contaminated surface water uptake that supports terrestrial vegetation.

5.4 Preliminary Conceptual Site Model

A PCSM for potential sources, pathways and receptors that have the potential to impact the proposed redevelopment is presented as Table 7.

Table 7: Preliminary Conceptual Site Model

Potential Source of Contamination	Contaminants of Potential Concern	Possible Extent of Contamination	Exposure Route and Pathways	Receptors	SPR Linkage Assessment
Historical sheep dip operations (HAIL ID: A8)	Heavy metals / metalloids including mercury, OCPs and ONOPs	Shallow soils within the woolshed area	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
				On-site terrestrial flora and fauna	
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	Surrounding environment; Surface water and stormwater drains – aquatic habitats	
Presumed underground storage tank (UST) and above ground storage tanks (HAIL ID: A17)	Heavy metals / metalloids and TPHs	Shallow soils within the footprint of the tanks and deeper subsurface materials in the vicinity of the UST	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
				On-site terrestrial flora and fauna	
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	Surrounding environment; Surface water and stormwater drains – aquatic habitats	
Construction of structures pre – 2000 containing asbestos (HAIL ID: E1)	Asbestos containing material (ACM), asbestos fines	Shallow soil within current building footprints and halos	Inhalation of asbestos fibres through wind-blown dust (neighbouring property owners) Direct exposure to site workers (inhalation)	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
Historical offal pits (HAIL ID: G5)	Heavy metals / metalloids, OCPs and PAHs	Extent of buried waste material beneath topsoil	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
				On-site terrestrial flora and fauna	
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	Surrounding environment; Surface water and stormwater drains – aquatic habitats	

Potential Source of Contamination	Contaminants of Potential Concern	Possible Extent of Contamination	Exposure Route and Pathways	Receptors	SPR Linkage Assessment
Burn piles (HAIL ID: G5)	Heavy metals / metalloids and PAHs	Shallow soils surrounding bare / burnt surfaces	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna	
				Surrounding environment; Surface water and stormwater drains – aquatic habitats	
Use of lead-based paints in construction (HAIL ID: I)	Lead	Shallow and underlying material within building halo	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna	
				Surrounding environment; Surface water and stormwater drains – aquatic habitats	
General farming operations – paddocks (HAIL ID: I)	Heavy metals / metalloids including mercury	Shallow soils across paddock coverage	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Unknown risk – further investigation required
			Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna	
				Surrounding environment; Surface water and stormwater drains – aquatic habitats	

6 Intrusive Investigation

6.1 Investigation Rationale

In support of the proposed development, and based on the updated desktop review and site walkover, several areas of potential contamination risk were identified (refer Table 7). These are primarily associated with historical and ongoing agricultural activities, along with discrete HAIL-related features identified during earlier due diligence works.

ENGEO undertook two stages of investigation comprising an initial due diligence assessment in 2023 and a subsequent targeted intrusive investigation to support fast-track consenting in 2026. All fieldwork and sampling activities were carried out in general accordance with the Ministry for the Environment's Contaminated Land Management Guidelines No. 5 (CLMG No. 5): Site Investigation and Analysis of Soils (MfE, 2021b). The purpose of these investigations was as follows:

- September 2023 (Due Diligence Investigation): To undertake an initial assessment of potential contamination associated with identified HAIL activities. This included limited near-surface soil sampling focused on discrete areas of concern to identify contaminants of concern and inform a preliminary understanding of site risk. The investigation was not intended to provide full spatial coverage across the site but to support due diligence and early-stage project decision-making.
- June 2026 (Targeted Intrusive Investigation): Site walkover and targeted near-surface sampling to refine the environmental dataset, including broader paddock characterisation for soil reuse / disposal, delineation of known contamination (including lead near the dwelling), and further investigation of higher-risk areas (e.g. woolshed and agrichemical use areas).

Contaminants of concern were selected based on historical site use and observed features. Given the site's long-term agricultural use, potential contamination is expected to be localised and associated with specific operational areas (e.g. building materials, agrichemical use areas and burn-off locations). Heavy metals were therefore the primary focus due to their persistence and association with agricultural activities, with additional analytes (including pesticides, TPHs and PAHs) assessed in higher-risk areas, where indicated, by site observations or previous investigations.

6.2 Field Investigation Methodology

A sample location plans of both investigations is attached in Figures 4 – 4b.

6.2.1 Sampling Phase 1 – September 2023

An ENGEO Environmental Scientist completed a site walkover and intrusive soil investigation targeting areas of potential contamination identified during the desktop review. Soil samples were collected from manually excavated shallow holes using a spade. Sampling locations were refined in the field based on visual and olfactory indicators of contamination (e.g. staining, burnt material, vegetation stress), particularly in the vicinity of burn piles and above- and underground storage tanks.

A total of 28 surface soil samples were collected, including targeted sampling within the dwelling halo, woolshed area, identified burn piles, and storage tank locations.

6.2.2 Sampling Phase 2 – June 2026

ENGEO undertook a targeted follow-up investigation focusing on previously identified areas of concern, including the dwelling halo and burn pile 3. Additional sampling at burn pile 3 (locations LPNM, LBPN, and LBPS) was undertaken to confirm contaminant concentrations and assess the extent of impacts.

A portable X-ray fluorescence (XRF) analyser was used as a field screening tool to identify potential hotspots and guide step-out sampling to define the horizontal and vertical extent of contamination, within areas surrounding the dwelling halo, where previous contamination had been identified. Soil samples were manually collected, placed in sealed bags, and screened using the XRF prior to laboratory selection. Shallow and sub-surface soils were screened using the XRF during excavation to approximately 0.3 m bgl to assess vertical contaminant distribution and inform the need for further excavation. At dwelling locations, soil samples were typically collected from the surface (approximately 0.1 m bgl) and from underlying topsoil (approximately 0.3 m bgl).

Additional targeted surface sampling was undertaken within the woolshed area to assess soils within the sheep handling / run area, where historical sheep dipping activities were inferred based on site observations.

General topsoil samples were also collected across each paddock to provide site-wide coverage and characterise background conditions.

All samples were field screened for visual and olfactory indicators of contamination, and all test locations were reinstated to a safe, flat condition following sampling.

6.2.3 Laboratory Analysis Schedule

A summary of laboratory testing for contaminants of concern with associated areas and methodology is presented in Table 8.

Table 8: Sampling and Analysis Schedule

Area of Concern	Depth of Sample (m bgl)	Investigation Location	Material Type	Analytical Suite
Phase 1 Investigation (September 2023)				
Area around woolshed	0.0 – 0.2	S1, S2, S3, S4, S5, S6, S7	[TOPSOIL] Gravelly SILT	Heavy metals / metalloids
Burn pile 1	0.0 – 0.2	S8, S9, S10	Ashy SILT	Heavy metals / metalloids and PAHs
Burn pile 2	0.0 – 0.2	S11, S12, S13	Ashy SILT	Heavy metals / metalloids and PAHs
Burn pile 3	0.0 – 0.2	S18, S19, S20, and S21	Ashy SILT with trace plastic and timber	Heavy metals / metalloids and PAHs
Below ground storage tank and dispenser pump	0.0 – 0.2	S14 and S15	[TOPSOIL] SILT	Heavy metals / metalloids and TPHs
Above ground storage tank	0.0 – 0.2	S16 and S17	[TOPSOIL] SILT	Heavy metals / metalloids and TPHs
Lead around dwelling	0.0 – 0.2	S22, S23, S24, S25, S26, S27, and S28	[TOPSOIL] SILT	Lead
Asbestos around dwelling	0.0 – 0.2	S22, S24, S25, S27, and S28	[TOPSOIL] SILT	Asbestos presence / absence
Phase 2 Investigation (May 2026)				
Woolshed and sheep dipping area	0.0 – 0.2	S29, S30, S31, S32, S33, S34, S34 and S36	[TOPSOIL] Gravelly SILT	Heavy metals / metalloids including mercury, OCPs and ONOPs
Lead delineation around dwelling	0.1	S37, S38, S39, S40, S41, S42, S43 and S44	[TOPSOIL] SILT	Lead
	0.3		Sandu SILT	
Paddocks	0.0 – 0.2	S45, S46, S47, S48, S49, S50, S51, S52, S53, S54, S55, S56, S57, S58, S59, S60, S61, S62, S63 and S64	[TOPSOIL] SILT	Heavy metals / metalloids including mercury
Burn Pile	0.0 – 0.2	LBPN, LBPM and LBPS	Ashy SILT	Heavy metals / metalloids and PAHs

6.3 Quality Assurance / Quality Control

6.3.1 Sample Quality Control

The quality assurance / quality control (QA / QC) procedures employed during the environmental investigations included:

- Prior to sampling and between each sample location, all sampling equipment (e.g., hand auger and spade) was decontaminated using a triple-wash procedure consisting of potable water, a Decon 90 solution, and a final rinse with deionised water to prevent cross-contamination.
- Soil samples were collected using a clean pair of nitrile gloves for each sample and placed directly into laboratory-supplied sample containers. Each sample was assigned a unique identification number, and the collection location was recorded at the time of sampling.
- Following collection, all samples were immediately stored in chilled conditions and transported under standard chain-of-custody procedures to Hills Laboratories, an International Accreditation New Zealand (IANZ)-accredited facility, for chemical analysis. Standard sample registers and chain-of-custody records were maintained for all samples in accordance with regulatory requirements.

6.3.2 Laboratory Quality Control

Hill Laboratories was selected to perform analysis of all samples. Review of the laboratory Quality Assurance Report (reference 4154157) identified six notable QA / QC issues. These issues primarily relate to spike and sample spike recoveries for selected PAH, OCP, and ONOP analytes. However, the affected analytes were either reported below detection limits or at low concentrations and are not considered to be of concern.

The reported QC deviations are not believed to have a significant effect on the findings or recommendations of this report, and the dataset is therefore considered suitable for interpretation. Further details of the QA / QC issues are provided in the laboratory QA / QC report included in Appendix 6.

7 Investigation Findings

7.1 Ground Conditions

Ground conditions encountered during the intrusive investigation are summarised in Table 9. No intrusive investigation of the active offal pit identified in 2023 was undertaken due to its depth and associated health and safety risks. At the time, the pit was deeply excavated and contained visible farm and domestic waste materials, including animal carcasses and general refuse. During the 2026 site walkover, the former offal pit location was observed to be covered by a grassed soil mound, with no visible staining, odour, or vegetation stress. The only remaining indication of its presence was the localised raised topography relative to the surrounding paddock, suggesting the pit has been backfilled and capped, with the potential for buried waste remaining beneath the surface.

Two additional areas previously identified as potential offal pit locations were investigated by trenching in 2023; however, no waste materials or visual indicators of past disposal activities were encountered. No visual evidence of these features was identified during the 2026 site walkover.

Three burn-off areas were identified on-site in 2023, with visual evidence of waste materials observed within each location. During the 2026 site walkover, burn piles 1 and 2 were no longer evident, with no clear visual indicators of their former presence. Burn pile 3 remained present, with evidence of recent burning observed, including additional green waste and timber materials. This indicates ongoing or more recent use of this area for disposal by burning.

In the vicinity of the woolshed, areas of reduced grass cover were observed; however, no obvious chemical staining or other visual indicators of contamination were identified.

Across the paddocks, ground conditions generally comprised pasture with intermittent areas of small-scale cropping. No visual evidence of burn-off areas, waste disposal, or deviations from the generally flat site topography were observed.

Table 9: Soil Descriptions

Investigation Location	Depth, m bgl	Soil Description
Woolshed area	0.0 – 0.2	[TOPSOIL] SILT with minor sand and trace rootlets; brown.
Burn piles 1 and 2	0.0 – 0.2	Ashy SILT with minor sand and trace plastic; grey-brown.
Above ground and underground storage tanks	0.0 – 0.2	[TOPSOIL] SILT with minor sand and trace rootlets; brown.
Burn pile 3	0.0 – 0.2	Ashy SILT with trace sand and green waste, plastic and timber; grey-brown.
Dwelling	0.0 – 0.2	[TOPSOIL] SILT with minor sand and trace rootlets; brown.
	0.3	Sandy SILT; brown.
Paddocks	0.0 – 0.2	[TOPSOIL] SILT with minor sand and trace rootlets; brown.

7.2 Risk and Regulatory Screening Assessment

7.2.1 Tier 1 Risk Assessment Criteria

Analytical results were assessed to determine consenting requirements and options for disposal of any soil which may be taken off-site.

Human Health Criteria

- Soil contaminant standards from the Methodology for Deriving Contaminants in Soil to Protect Human Health (“the Methodology”; MfE, 2011c) for residential (10% produce) land use across the entire site, and recreational land use for areas proposed for recreational reserves in the proposed plan.
- Residential B criteria from National Environmental Protection (Assessment of Site Contamination) Measure (NEPM, 2013, Australia).

- The soil guideline values for all land uses from the New Zealand Guidelines for Assessing and Managing Asbestos in Soil (GAMAS; BRANZ, 2024).
- In accordance with Contaminated Land Management Guidelines No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (CLMG 2; MfE, 2011b) for contaminants not listed above.

If necessary based on contaminant concentrations on-site, protocols to assist with mitigating risks to earthworks contractors during the redevelopment works will be outlined in a Site Management Plan or Remedial Action Plan. Users of surrounding properties (during redevelopment and future site use) are considered to be adequately protected provided that risks to redevelopment workers and future users of the site are acceptable.

The NESCS does not provide soil contaminant standards for maintenance or excavation worker exposure scenario, which have much more direct exposure to contaminants but over shorter duration of long-term land use scenarios. Typical health risk triggers for implementation of specific management controls arise from levels of contaminants exceeding anticipated regional background or ambient conditions.

Environmental Criteria

The results were compared to the 'Soil Guideline Values for the Protection of Ecological Receptors' (Eco-SGVs; Landcare Research, 2019) for typical soils and an aged contaminant source and a residential / recreational land use. The Eco-SGVs have also been adopted as high-level screening criteria to assess potential risks to ecological receptors, and to assess whether the site meets the definition of 'contaminated land' under the CLWRP.

Results were also compared against the ANZG Default Guideline Values (DGVs) for sediment quality, as published in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality, to assess potential risks to downgradient aquatic habitats from sediment that may be mobilised to the on-site stormwater drain.

7.2.2 Disposal and Cleanfill Criteria

Canterbury Cleanfill Assessment Criteria: Background Criteria

In order to inform consenting requirements and whether the soils are likely suitable for disposal as cleanfill in Canterbury, soil results have also been compared to published regional background concentrations from the following sources:

- For metals / metalloids and OCPs: Background concentrations of selected trace elements in Canterbury (Tonkin and Taylor, 2007). Level 2 regional background concentrations were adopted based on a 'Yellow Brown Stony' soil type.
- For additional OCPs: Ambient Concentrations of Selected Organochlorines in Soils, MfE (1998). Mean soil concentrations for Provincial Centre land use.
- For PAHS: Background PAH Urban Soils Christchurch - Background Concentrations of Polycyclic Aromatic Hydrocarbons in Urban Christchurch Soils (Tonkin and Taylor, 2007).

- The laboratory limit of reporting (LOR) for other contaminants (such as TPHs), where no natural background level of a given contaminant is available, or where the natural background limit is below the limit of reporting. The recorded presence of asbestos below the LOR is also considered an exceedance of the natural background levels.

National Clean Fill Definition

The publication Waste Management Institute of New Zealand Technical Guidelines for Disposal to Land (September 2023) should also be referred to for cleanfill classifications.

Fill Facility Disposal Criteria

Waste screening criteria to assess options for off-site disposal are summarised below:

- Class A Landfill Screening Criteria: Module 2 Hazardous Waste Guidelines – Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004).
- Burwood Resource Recovery Park (BRRP) Burwood Landfill soil acceptance criteria: Landfill Soil Acceptance Criteria. Retrieved online from:
<https://ccc.govt.nz/assets/Documents/Services/Rubbish-recycling/Burwood-landfill/Burwood-Landfill-soil-acceptance-criteria.pdf>

7.2.3 Assessment of Results

The soil results summary tables are included in Appendix 7 compares soil contaminant concentrations in the samples tested across both investigations. Table 1 compares results with the adopted investigation criteria for risk assessment, with Table 2 comparing against background and waste classifications. Full analytical laboratory reports are included in Appendix 6.

A summary of the chemical and asbestos testing results is provided below:

Woolshed Area:

- Heavy metal and OCP concentrations across samples analysed were below the adopted human health (residential 10% produce) and recreational land uses criteria and environmental assessment criteria.
- ONOPs were not detected in any of the samples analysed as results were below laboratory reporting limits.
- Arsenic, cadmium, copper, lead, and zinc concentrations in nine of the 15 soil samples collected from the woolshed area were elevated above regional background concentrations. All samples also contained OCPs above background concentrations, specifically 4,4'-DDE.
- Samples analysed remained below the DVG sediment quality guidelines for both heavy metals and OCPs.
- Concentrations of contaminants remained below both the Class A Landfill Screening and Burwood Landfill Acceptance criteria.

Burn Piles:

- Analytical results from burn piles 1 (S8–S10) and 2 (S11–S13) indicate that:
 - Heavy metals and PAHs were below the human health (10% produce) and recreational land uses criteria and environmental criteria.
 - Sample locations were also below the DVG sediment quality guidelines for both heavy metals and PAHs.
 - Heavy metals were elevated above regional background concentrations in all six samples; however, PAH concentrations remained below background. Contaminants predominantly remained below both the Class A Landfill Screening and Burwood Landfill Acceptance criteria, except for sample location S10, which exceeds the Class A Screening Criteria.
- At burn pile 3, three sample locations exceeded the human health (10% produce) criteria. Arsenic and lead exceeded at S18 and S21, while arsenic also exceeded the criterion at LBPS. Lead concentrations in S21 and arsenic concentrations in LBPS also exceeded the human health recreational land use criteria.
- Heavy metal concentrations in samples S18, S21, LBPN, and LBPS exceeded both the adopted environmental criteria and the DVG sediment quality guidelines.
- All seven samples analysed from burn pile 3 contained heavy metals at concentrations above regional background.
- PAHs were detected above background concentrations at S19 and LBPN, while concentrations at the remaining locations were below background. PAHs remained below the human health (10% produce) and environmental criteria, and below the DVG sediment quality guidelines, at burn pile 3.
- Five samples from burn pile 3, and sample S10 from burn pile 1, exceeded the Class A landfill criteria. Burn pile 3 material also exceeded the Burwood Landfill acceptance criteria.

Presumed Underground Storage Tank

- Heavy metal concentrations in the two surface soil samples collected from near the underground storage tank area (S14 and S15) were elevated above regional background concentrations for most analytes; however, all concentrations remained below the applicable human health and environmental criteria and did not exceed the DVG sediment quality guidelines.
- TPH concentrations were detected in both samples, with results below the human health (10% produce) criteria. However, C15–C34 fraction concentrations exceeded the applicable environmental criterion (300 mg/kg) at both S14 (2,100 mg/kg) and S15 (9,800 mg/kg). Total TPH concentrations in both samples also exceeded the DVG sediment quality guidelines.
- Concentrations of contaminants remained below both the Class A Landfill Screening and Burwood Landfill Acceptance criteria.

Above Ground Storage Tank

- Cadmium, copper, lead, zinc and TPH (C15–C34) concentrations across the two samples analysed were elevated above regional background concentrations; however, heavy metal and TPH concentrations remained below the applicable human health, environmental and DVG sediment quality criteria.
- Concentrations of contaminants remained below both the Class A Landfill Screening and Burwood Landfill Acceptance criteria.

Dwelling Halo

- No asbestos was detected in any of the samples analysed from the dwelling halo.
- A total of seven of the 23 samples analysed (S22–S26 at 0.0–0.2 m bgl, and S38 and S42 at 0.1 m bgl) exceeded both the human health (10% produce) criteria and DVG sediment quality guidelines for lead across the two shallow soil intervals assessed (0.0–0.2 m and 0.3 m bgl). Of these:
 - Three samples (S22, S25 and S42) also exceeded the applicable environmental criteria.
 - All 23 samples analysed at both depths reported lead concentrations elevated above regional background concentrations.
- Fourteen sample locations across both surface and underlying material tested exceeded the Class A Landfill Screening criteria, with samples S22, S25 and S41 also exceeding the Burwood Landfill Acceptance criteria.

Paddocks

- Heavy metal concentrations remained below the applicable human health (10% produce), environmental, and DVG sediment quality criteria.
- Heavy metal concentrations were generally below regional background concentrations, except for cadmium in nine of the 20 paddock samples, which were slightly elevated above the adopted background concentration of 0.14 mg/kg. The maximum cadmium concentration reported was 0.17 mg/kg.
 - To assess whether cadmium concentrations across the paddocks could reasonably be considered within natural background variation, ENGEO calculated the 95% Upper Confidence Limit of the Mean (95% UCL) for cadmium in topsoil using USEPA ProUCL software. The results, presented in Appendix 8, indicate a 95% UCL of 0.15 mg/kg for cadmium.
- Concentrations of contaminants remained below both the Class A Landfill Screening and Burwood Landfill Acceptance criteria.

8 Conceptual Site Model

The PCSM from Section 5 has been updated based on the findings of the intrusive investigation and is summarised in Table 10.

Table 10: Conceptual Site Model

Potential Source of Contamination	Contaminants of Potential Concern	Exposure Route and Pathways	Receptors	SPR Linkage Assessment	
Historical sheep dip operations (HAIL ID: A8)	Heavy metals / metalloids including mercury, OCPs and ONOPs	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers	Incomplete Linkage Associated soil samples: S1 – S7 and S29 – S36 While heavy metals and OCPs were detected at concentrations above background levels in topsoil across the woolshed area, all results were below the relevant human health criteria for residential land use. ONOPs were below laboratory detection limits. Accordingly, the potential risk to redevelopment workers undertaking ground-disturbing works, and to future end users, is considered low. General soil management practices during construction and redevelopment are required and considered sufficient to protect site workers.	
			Surrounding residents during earthworks		
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna	Incomplete Linkage Associated soil samples: S1 – S7 and S29 – S36 Concentrations of contaminants of concern across the woolshed area were below the adopted environmental assessment criteria and DVG sediment quality guideline. The exposure to ecological receptors and aquatic habitats at concentrations that may present a risk is therefore considered highly unlikely.	
			Surrounding environment; Surface water and stormwater drains – aquatic habitats		
Presumed underground storage tank (UST) and above ground storage tanks (HAIL ID: A17)	Heavy metals / metalloids and TPHs	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers	Linkage Unknown Associated area: UST – S14 and S15 Topsoil concentrations were below the human health criteria for residential and residential land uses, with some analytes elevated above background levels. No at-depth sampling was undertaken, and the presence and location of the tank remain unconfirmed. As such, further investigation during construction is recommended to verify the tank's presence and assess any associated subsurface contamination.	Incomplete Linkage Associated area: Above ground storage tank – S16 and S17 Heavy metals and TPH concentrations in topsoil were below the relevant human health criteria for residential and recreational land uses, although some concentrations were elevated above background levels. The risk to future end use is therefore considered low, and only general soil management practices are required to protect redevelopment workers.
			Surrounding residents during earthworks		
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna	Complete Linkage Associated area: UST – S14 and S15 Heavy metal concentrations remain below relevant guidelines, however concentrations of TPHs exceeded the environmental criteria and DVG sediment quality guideline within shallow soils tested. Remediation or additional analysis with the application of appropriate sediment control measures during earthworks will be required.	Incomplete Linkage Associated area: Above ground storage tank – S16 and S17 Contaminant concentrations in the above ground storage tank footprint were below the adopted environmental criteria and DVG sediment quality guideline; therefore, risk to ecological receptors and aquatic habitats is considered low.
			Surrounding environment; Surface water and stormwater drains – aquatic habitats		

Potential Source of Contamination	Contaminants of Potential Concern	Exposure Route and Pathways	Receptors	SPR Linkage Assessment	
Construction of structures pre – 2000 containing asbestos (HAIL ID: E1)	Asbestos containing material (ACM), asbestos fines	Inhalation of asbestos fibres through wind-blown dust (neighbouring property owners) Direct exposure to site workers (inhalation)	Future site users / site redevelopment workers Surrounding residents during earthworks	Unlikely Linkage Associated soil samples: S22, S24 – S28 No asbestos was detected in samples and no potential asbestos containing materials were observed on or within soils during the site walkover or sampling. The associated risk to development workers carrying out ground disturbing works is considered to be low based on information to date. We do not consider that management practices beyond the overarching management procedures are necessary at this site. Demolition surveys before removal of buildings that pre-date 2000s is recommended as confirmation.	
Historical offal pits (HAIL ID: G5)	Heavy metals / metalloids, OCPs and PAHs	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Linkage Unknown In the 2023 investigation, sampling of the identified offal pit was not completed because the pit was active, open, and unsafe to access, and the two anecdotal offal pits were not identified. In the 2026 investigation, this area was observed as a grassed-over mound. The presence, depth, and extent of potential contamination in the offal pit therefore remain unconfirmed. Additional investigation during earthworks in this area is recommended, including deeper sampling to determine the depth and extent of buried offal waste.	
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna Surrounding environment; Surface water and stormwater drains – aquatic habitats		
Burn piles (HAIL ID: G5)	Heavy metals / metalloids and PAHs	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Incomplete Linkage Associated areas: Burn pile 1 and 2 (sample locations S8 – S13) While heavy metals were elevated above background, all contaminant concentrations were below the relevant human health criteria for residential and recreational land uses. Risk to redevelopment workers during ground disturbance is considered low, and only general management practices are required.	Complete Linkage Associated areas: Burn pile 3 Arsenic and lead concentrations exceeded the human health criteria for both residential and recreational land uses. Targeted remediation of shallow soils surrounding the burnt area will be required.
			On-site terrestrial flora and fauna	Incomplete Linkage Associated areas: Burn pile 1 and 2 (sample locations S8 – S13)	Complete Linkage Associated areas: Burn pile 3 Arsenic, lead and zinc exceeded the environmental criteria in shallow soils, requiring remediation or appropriate sediment controls during earthworks.
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	Surrounding environment; Surface water and stormwater drains – aquatic habitats	Contaminant concentrations were below the adopted environmental criteria and DVG sediment quality guideline; therefore, risk to ecological receptors and aquatic habitats is considered low.	Complete Linkage Associated areas: Burn pile 3 Arsenic, cadmium, lead and zinc exceeded the DVG sediment quality guideline in shallow soils, presenting an unacceptable risk to aquatic habitats. Accordingly, remediation or appropriate sediment controls will be required during earthworks.

Potential Source of Contamination	Contaminants of Potential Concern	Exposure Route and Pathways	Receptors	SPR Linkage Assessment
Use of lead-based paints in construction (HAIL ID: I)	Lead	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Complete Linkage Associated soil samples: In exceedance of residential: S22 – S26 at 0.0 – 0.2 m bgl, S38 and S42 at 0.1 m bgl. (in exceedance of recreational): S22 – S26 at 0.0 – 0.2 m bgl, S38 and S42 at 0.1 m bgl. Lead concentrations exceeded the human health criteria for residential land use across topsoil material surrounding the dwelling halo. Targeted remediation of shallow soils surrounding the dwelling will be required.
			On-site terrestrial flora and fauna	Complete Linkage Associated soil samples (in exceedance): S22 and S25 at 0.0 – 0.2 m bgl and S42 at 0.1 m bgl. Lead concentrations exceeded the environmental criteria within shallow soils tested. Current site conditions present an unacceptable, medium to high risk to the terrestrial environment. Remediation or additional analysis with the application of appropriate sediment control measures during earthworks will be required.
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	Surrounding environment; Surface water and stormwater drains – aquatic habitats	Complete Linkage Associated soil samples (in exceedance): S22 – S26 at 0.0 – 0.2 m bgl, S38 and S42 at 0.1 m bgl. Lead concentrations exceeded the DVG sediment quality guideline within shallow soils tested. Current site conditions present an unacceptable risk to aquatic habitats. Remediation or additional analysis with the application of appropriate sediment control measures during earthworks will be required.
General farming operations – paddocks (HAIL ID: I)	Heavy metals / metalloids including mercury	Direct exposure resulting in soil ingestion, inhalation of dust, and / or dermal contact	Future site users / site redevelopment workers Surrounding residents during earthworks	Incomplete Linkage Associated areas: Burn pile 1 and 2 (sample locations S8 – S13) Heavy metal concentrations were below the relevant human health criteria for residential and recreational land uses and were generally below background levels. The slight elevation in cadmium above background is considered to represent a low risk. Accordingly, no specific management measures are considered necessary.
		Direct discharge to soils; leaching or remobilisation of sediment to waterways	On-site terrestrial flora and fauna Surrounding environment; Surface water and stormwater drains – aquatic habitats	Incomplete Linkage Associated samples: S45 – S64 Contaminant concentrations within topsoil material across the paddock areas of site were below the adopted environmental criteria and DVG sediment quality guideline; therefore, risk to ecological receptors and aquatic habitats is considered low.

9 Discussion

9.1 Suitability for Development

Results of testing to date indicate the site is suitable for the proposed redevelopment, subject to targeted remediation of contamination hotspots identified across the site. These hotspots present a potential risk to future residents, users of recreational amenity areas, and / or terrestrial ecological receptors, with several locations exceeding Tier 1 human health criteria (for both residential and recreational land uses) and environmental criteria.

The identified hotspots are generally associated with near-surface soils within old dwelling halos and historical burning areas. These areas are currently proposed for reserve or recreational use; however, contaminant concentrations in these areas still exceed applicable recreational human health and environmental criteria. Accordingly, targeted remediation will be required in areas of prior to redevelopment, irrespective of the proposed land use.

Outside of the defined hotspots, contaminant concentrations are below the adopted Tier 1 screening criteria, and these materials are considered suitable for the proposed redevelopment and may be reused or retained on-site.

A summary of identified contamination hotspots requiring remediation is presented in Table 11 and shown on Figure 5.

Table 11: Summary of Identified Contamination Hotspots

Hotspot ID	Risk Exceedance
1 – Burn pile 3 (Blue polygon: Figure 5)	Human health (residential – 10% produce) criteria, environmental criteria for terrestrial ecology and DVG sediment quality guideline
2 – Dwelling halo (Red polygon: Figure 5)	Human health (residential – 10% produce) criteria, environmental criteria for terrestrial ecology and DVG sediment quality guideline
3 – Presumed UST (Orange polygon: Figure 5)	Environmental criteria for terrestrial ecology and DVG sediment quality guideline

These hotspots are recommended to be remediated prior to commencement of bulk topsoil and fill stripping. Options for remediation are likely limited to excavation and removal, but it may be plausible to retain some contaminated material provided it does not present ongoing risk through demonstration of the following:

- The material can be reused in areas of lower sensitivity land use (e.g. recreational reserve or stormwater reserve areas); and
- It does not present an ongoing ecological risk to aquatic environments through direct uptake, leaching, or sediment discharge.

If the above cannot be achieved, early removal of these hotspots is recommended to minimise the risk of cross-contamination and enable the remaining site soils to be safely reused on-site.

9.2 Construction Phase Risks

The updated CSM identifies potentially complete SPR linkages associated with soil disturbance during redevelopment, primarily the generation of airborne dust and odours, and the potential for uncontrolled discharges to the central stormwater drain. These risks are considered low to moderate due to the short duration of construction works but require active management through implementation of a Contaminated Site Management Plan, which would be incorporated into the Remedial Action Plan (RAP) required due to the remediation required. Additional construction phase risks, requiring allowance in budget and program include:

- Completion of investigations either prior to or during bulk earthworks to test and report current uncharacterised areas of the site. Areas not sampled should be assumed to be contaminated. Areas currently considered uncharacterized include:
 - The presumed UST area, where the presence, condition, and contents of the tank, and the potential for surrounding soil contamination, are unknown. If a tank is present, it should be appropriately removed from site.
 - The confirmed offal pit which has been recently backfilled and mounded over, where the extent of waste materials and potential for underlying soil contamination have not been identified or investigated. Depending on the geotechnical and earthworks requirements for the site; waste material may require remediation.
 - Suspected offal pit areas, where the presence or absence of historical disturbance and associated contamination has not been confirmed.
- The survey and removal of asbestos from any buildings that pre-date 2000, and potential for additional asbestos management should accidental discoveries arise.

9.3 Soil Disposal

Based on the analytical results, soils within areas associated with historical HAIL activities (including burn piles, the woolshed, tank locations, and inferred offal pits; refer Figure 6; dark blue polygons) contain contaminant concentrations above background but below human health criteria. While remediation is not required, these soils do not meet cleanfill criteria and must be treated as managed fill.

Soils outside these areas, within the paddocks across the site (green polygon, Figure 6) are considered to be within natural background variation and are suitable for classification as cleanfill. Although cadmium is marginally elevated (95% UCL of 0.15 mg/kg compared to a background value of 0.14 mg/kg), this is considered to reflect natural variation and does not preclude cleanfill classification.

Within the defined managed fill areas (blue polygon), soils are not suitable for cleanfill disposal. Woolshed soils are likely suitable for disposal at a lower-class landfill (e.g. Weatsheaf), subject to facility acceptance criteria. Soils from Burn Pile 2 exceed Class A landfill criteria and will require disposal at a higher-class facility (e.g. Burwood). Other soils requiring off-site disposal are expected to meet acceptance criteria for disposal at Burwood.

Soils from the three identified contamination hotspots exceed both Burwood and Class A landfill acceptance criteria and will require disposal to an appropriately licensed higher-class facility. All relevant analytical data will need to be provided to the receiving facility as part of waste acceptance procedures.

TCLP testing is currently being undertaken on samples exceeding Burwood criteria for heavy metals to assess leachability and confirm disposal pathways. Disposal classifications may be refined following receipt of these results and will be confirmed in the RAP, if required.

9.4 Sustainability Options

Outside the identified hotspots, the remaining surface soils are considered suitable for on-site retention and reuse. In particular, paddock soils across the site are likely to meet cleanfill criteria, whereas soils within and immediately surrounding identified HAIL activity areas are unlikely to do so. Off-site disposal of soil to landfill would represent a significant project cost and increase the development's carbon footprint through additional truck movements and haulage. ENGEO therefore recommends that these factors be considered during redevelopment planning, particularly in relation to bulk stripping and reuse of site-won material, and at building consent stage where localised undercutting beneath shallow foundations may be required.

9.5 Regulatory Context

In the Canterbury region, management of potentially contaminated soils is covered by the following regulations:

- Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NESCS, 2011).
- The Canterbury Land and Water Regional Plan ('the CLWRP'; Environment Canterbury, 2015).

An assessment of these regulations is summarised below.

9.5.1 The NESCS

The intent of the NESCS is to protect the human health of the site's end users and the surrounding populations.

Applicability

The NESCS may apply to specific activities on sites where an activity on the HAIL (MfE, 2011a) has, or is more likely than not to have occurred. We understand that a future redevelopment is likely to include subdivision, a change in land use, and earthworks in order to form the future residential development.

Given that HAIL activities have been identified and activities described in Section 5(2) of the NESCS are proposed, the NESCS is considered applicable to the future redevelopment works at the site.

ENGEO has not been provided with proposed soil disturbance or disposal volumes. Based on the overall site area of 1,301,000 m², permitted activity requirements under Regulation 8(3) of the NESCS would limit earthworks to approximately 65,050 m³ of disturbance (25 m³ per 500 m²) and 13,010 m³ of disposal per year.

However, given that contaminant concentrations exceed the applicable human health criteria for both residential and recreational land uses, the proposed change in land use and subdivision would not appear to meet the requirements for a permitted activity under Section 8(4) or a controlled activity under Section 9(3) of the NESCS. The subdivision and change in land use are therefore likely to require resource consent as **restricted discretionary activities under Section 10 of the NESCS**.

A Remedial Action Plan (RAP) will be required as a condition on the resource consent to address the identified ground contamination. A Site Validation Report (SVR) will also be required as a condition of consent. If materials containing concentrations above the human health-based criteria remain on-site following redevelopment, a long-term site management plan (LTSMP) may be required to inform appropriate management of future minor earthworks, such as subsurface service repairs.

9.5.2 Canterbury Land and Water Regional Plan

The CLWRP (ECan, 2015) sets out consent requirements for managing discharges to the environment from land containing elevated concentrations of contaminants.

Contaminated land is defined in the plan as follows:

“Contaminated land means 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”*

Heavy metals and petroleum hydrocarbon concentrations exceed the environmental criteria and sediment quality guidelines across the site. Therefore, ENGEO consider the extent of contamination to be reasonably likely to cause adverse environmental effects given proximity to stormwater drainage and ecological receptors. The site therefore likely meets the definition of contaminated land under the CLWRP.

Groundwater is expected to occur at depths greater than 50 m bgl; therefore, risks to groundwater are considered low.

The primary surface water receptor is the stormwater drain, which traverses the site in close proximity to identified contamination. In the absence of controls, there is potential for contaminant mobilisation via erosion and sediment transport pathways. However, the relatively flat topography, together with implementation of appropriate erosion and sediment control measures, is expected to limit off-site migration, and residual risks to surface water receptors are considered to be low.

An erosion and sediment control plan (ESCP) will likely be required by the Regional Council prior to soil disturbance. The requirement for environmental discharge consents should also be confirmed in consultation with a council planner.

10 Recommendations

The investigations have identified contaminated soils at the site that are considered to present an unacceptable risk to human health and the environment. Based on the current data, targeted remediation of identified areas exceeding the human health and environmental criteria for both residential and recreational land uses will be required before the site is considered suitable for the proposed redevelopment. The following recommendations are made:

- Early consideration of construction-phase activities is recommended, including opportunities for the sustainable reuse of excavated soils elsewhere on the site or wider property (subject to appropriate management controls), or potential risk mitigation through design where practicable. Preparation of a Remedial Action Plan (RAP) to establish preferred remediation and management strategies for reducing the level of risk associated with contamination on-site.

Prepared in accordance with CLMG No. 1, the RAP will include:

- A summary of the preferred remediation and management options selected for implementation throughout the different areas on-site.
 - A protocol for further investigation and testing to quantify ecological risk should it be proposed to retain site soils on-site.
 - A protocol for further delineating and remediating the identified contamination hotspots to an acceptable level (defined as below the NESCS criteria for residential land use).
 - A protocol and / or design for on-site encapsulation, blending, or treatment methodology selected by the client, retention or off-site disposal.
 - Protocols for management of risk to site workers, members of the public, and environmental receptors during earthworks, this is required within managed fill areas.
 - Protocols for investigation and management of soils within untested areas, including currently unidentified contamination sources which may be encountered through accidental discovery.
 - Requirements for validation testing and reporting to confirm suitability of the site for ongoing residential land use.
- It is also noted that no soil sampling has been conducted beneath existing buildings (e.g., sheds and farmhouses) or existing stockpiles; these areas will require characterisation following site clearance to determine appropriate disposal options.

No further investigation is required to support the current resource consent application. However, additional targeted investigation and risk assessment should be undertaken in uncharacterised areas under SQEP supervision, either prior to or during earthworks. Specific areas requiring further investigation include:

- Presumed underground storage tank (UST): Undertake controlled excavation to confirm tank condition and contents. Remove any residual contents prior to tank removal, with all works undertaken in general accordance with MfE guidelines for petroleum UST removal and under SQEP supervision. If contamination is identified, soils may require excavation and disposal to a licensed facility.
- Former confirmed offal pit (northern area mounded over): Excavate to remove waste materials for disposal at a licensed landfill. Undertake confirmatory soil sampling at the base of the excavation, with additional excavation if contamination exceeds applicable criteria. Backfill under geotechnical supervision.
- Suspected offal pit areas: Undertake topsoil stripping of the areas during bulk earthworks to confirm whether historical disturbance has occurred. Manage any impacted soils in accordance with the RAP.

11 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, their professional advisors, the relevant territorial authorities, and decision-makers appointed under the Fast-Track Approvals Act 2024 in support of the substantive application being made by Hughes Developments Limited for the Bangor Village Project. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

Report prepared by



Charlie Stevenson

Environmental Scientist

Report reviewed by



Hazel Atkins, CEnvP

Associate Environmental Consultant

12 References

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- URS, 2014. Geo-environmental desk study to support private plan change, 160 Bangor Road, Darfield – Revision 1. Dated 25 October 2014.

Figures



- Legend**
- ECan Wells
 - Community Drinking Water Protection Zones
 - Site boundary
 - Prehistoric flow channel
 - Stormwater Drain

0 100 m 200 m

© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Site Location Plan

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure No.: 1

Date: 14-09-2023

Checked: HA

Proj No: 24181

Scale:
1:6000

Version:
Final



- Legend**
- Site boundary
 - 2023 active offal pit, infilled 2026
 - Suspected offal pit
 - Woolshed / sheep drenching area
 - Burn piles
 - Presumed below ground storage tank
 - Above ground storage tank
 - Dwelling

0 50 m 100 m
© Nearmap
ENGEO
Produced by **Datanest.earth**

Title: Environmental Areas of Concern - Contamination Sources		
Client: Hughes Developments		Size: A3
Project: 160 Bangor Road	Drawn: CS	Figure No.: 3
Date: 17-06-2026	Checked: HA	
Proj No: 24181	Scale: 1:4800	Version: Final



Legend

- Site boundary
- 2026 Soil Sample Locations
- 2023 Soil Sample Location

0 100 m 200 m

© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Environmental Sampling Plan

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure No.: 4

Date: 14-09-2023

Checked: HA

Proj No: 24181

Scale:
1:5800

Version:
Final



Legend

-  Site boundary
-  2026 Soil Sample Locations
-  2023 Soil Sample Location

0 5 m 10 m

© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Environmental Sampling Plan

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure: 4a

Date: 14-09-2023

Checked: HA

Proj No: 24181

Scale: 1:320

Version:
Final



Legend

- Site boundary
- 2026 Soil Sample Locations
- 2023 Soil Sample Location

0 5 m 10 m
© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Environmental Sampling Plan

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure: 4b

Date: 14-09-2023

Checked: HA

Proj No: 24181

Scale: 1:365

Version:
Final



- Legend**
- Presumed UST Remediation
 - Dwelling Halo Estimated Remediation
 - Burn Pile 3 Estimated Remediation
 - Site boundary

0 25 m 50 m
© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Identified Contamination Hotspots

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure No.: 5

Date: 17-06-2026

Checked: HA

Proj No: 24181

Scale: 1:2100

Version:
Final



Legend

- Site boundary
- Managed Fill Areas
- Estimated Cleanfill Area

0 100 m 200 m

© Nearmap

ENGEO

Produced by **Datanest.earth**

Title: Managed Fill vs Cleanfill Estimates

Client: Hughes Developments

Size: A3

Project:
160 Bangor Road

Drawn: CS

Figure No.: 6

Date: 17-06-2026

Checked: HA

Proj No: 24181

Scale:
1:6000

Version:
Final

Appendix 1: Listed Land Use Register



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.

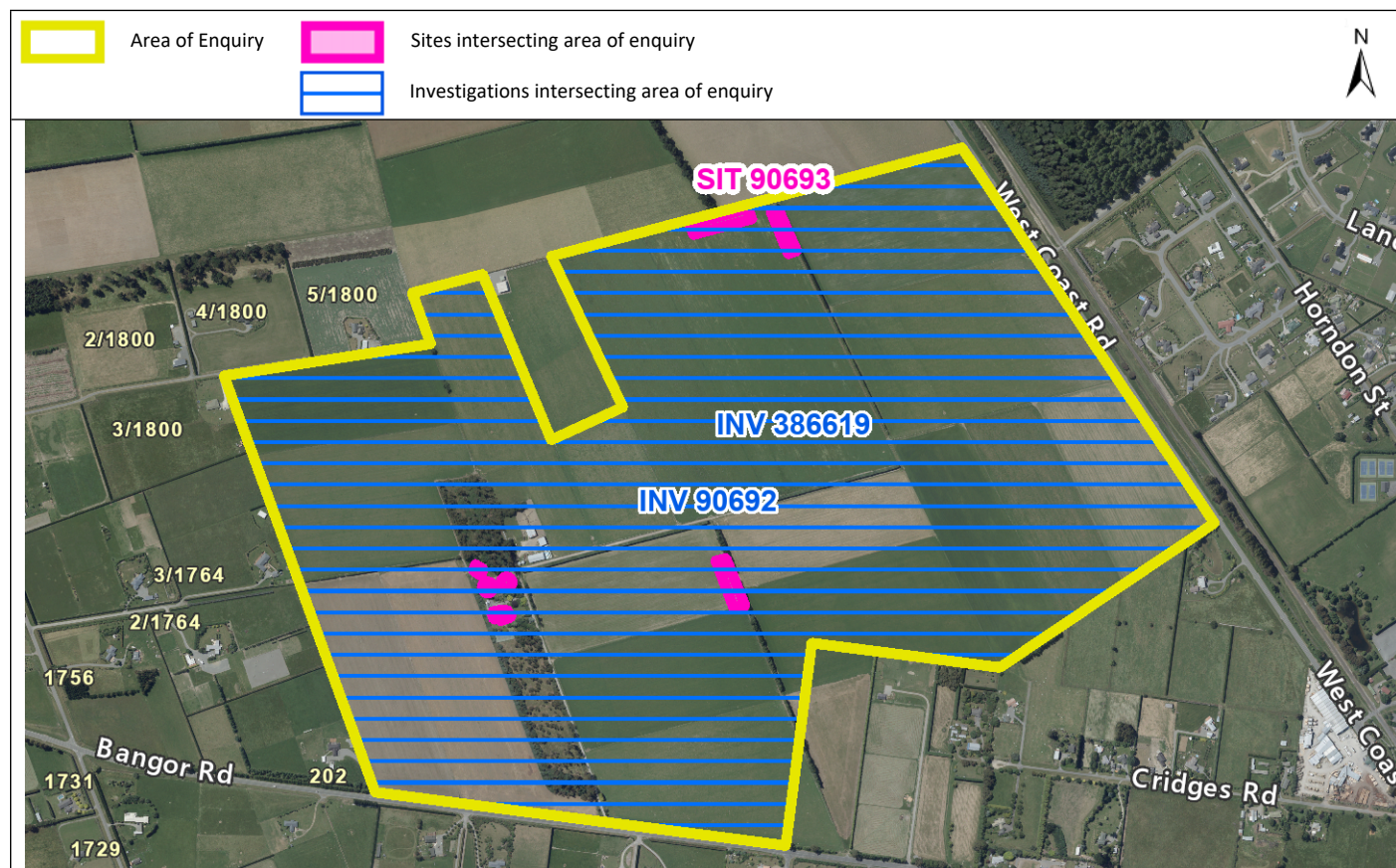
Yours sincerely

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 ENQ462778

Date generated: 09 June 2026
Land parcels: Section 2 SO 438579



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

Site number	Name	Location	HAIL activity(s)	Category
90693	160 Bangor Road, Darfield	160 Bangor Road, Darfield	A17 - Storage tanks or drums for fuel, chemicals or liquid waste; G5 - Waste disposal to land; I - Any other land;	Yet to be reviewed

More detail about the sites

Site 90693: 160 Bangor Road, Darfield (Intersects enquiry area.)

Category: Yet to be reviewed
Definition: Investigation reports have been received for this site, but we have not yet reviewed them.

Location: 160 Bangor Road, Darfield

Legal description(s): Section 2 SO 438579

HAIL activity(s):

Period from	Period to	HAIL activity
Unknown	Present	Storage tanks or drums for fuel, chemicals or liquid waste
Unknown	Present	Storage tanks or drums for fuel, chemicals or liquid waste
Unknown	Present	Waste disposal to land (excluding where biosolids have been used as soil conditioners)
Unknown	Present	Waste disposal to land (excluding where biosolids have been used as soil conditioners)
Pre 1940s	Present	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

Notes:

15 Apr 2015

HAIL activities related to farming on this property were identified in a preliminary site investigation, submitted as part of a plan change application to Selwyn District Council.



Investigations:

INV 90692

Letter report - Geo-environmental desk study to support private plan change, 160 Bangor Road, Darfield, revision 1

URS New Zealand Limited - Preliminary Site Investigation

25 Oct 2014

Summary of investigation(s):

A preliminary site investigation (PSI) was prepared to support a plan change for this 130ha property. The PSI included a review of regional council records, a review of two historical aerial photographs (1941 and 2004), and a site walkover and interview with the land-owner. The PSI did not source historical aerial photographs for other years, or review records and property information held by the Selwyn District Council. The report identified that the site has been used for mixed agricultural use. HAIL activities identified were two fuel storage tanks located near the farm buildings, and several offal pits. No sheep dips were identified or known to have been located on the property however the report states that it is possible that one could have been present.

INV 386619

Combined Preliminary and Detailed Site Investigation 160 Bangor Road, Darfield, Canterbury

ENGEO - Detailed Site Investigation

21 Jun 2024

Summary of investigation(s):

Environment Canterbury has received a Detailed Site Investigation report that includes all or part of the property you have selected.

A DSI seeks to identify the type, extent and level of contamination (if any) in an area. Soil, soil-gas or water samples will have been collected and analysed.

This investigation has not been summarised.

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.

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)

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.

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:

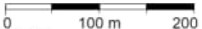
(03) 353 9007 or toll free
on 0800 EC INFO (32 4636)
email ecinfo@ecan.govt.nz

Appendix 2: Aerial Photographs



Legend

□ Site Boundary



LINZ CC BY 4.0 © Imagery Basemap contributors, Land Information New Zealand, Environment Canterbury



Produced by [Datanest.earth](https://www.datanest.com)

Title: 1940-1944 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2a
Size:
A4

Version: Final



Legend

Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors, New Zealand Aerial Mapping, Environment Canterbury, Land Information New Zealand

ENGEO

Produced by Datanest.earth

Title: 1955-1959 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2b
Size:
A4

Version: Final



Legend

□ Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors, Land Information New Zealand, Environment Canterbury

ENGEO

Produced by **Datanest**.earth

Title: 1975-1979 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2c
Size:
A4

Version: Final



Legend

 Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors, Land
Information New Zealand, Ministry for Primary Industries,
Environment Canterbury

ENGEO

Produced by **Datanest**.earth

Title: 1980-1984 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2d
Size:
A4

Version: Final



Legend

 Site Boundary

LINZ CC BY 4.0 © Imagery Basemap contributors, Ministry
for Primary Industries, Environment Canterbury



Produced by **Datanest.earth**

Title: 1985-1989 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF
Checked: DR

Figure: 2e
Size:
A4

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:800

Version:	Final
----------	-------



Legend

□ Site Boundary

0 100 m 200 m

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Information New Zealand, Ministry for Primary Industries,
Environment Canterbury

ENGEO

Produced by [Datanest.earth](https://www.datanest.com)

Title: 1995-1999 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2f
Size:
A4

Version: Final



Legend

 Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors,

ENGEO

Produced by [Datanest.earth](https://datanest.earth)

Title: 2004-2010 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2g
Size:
A4

Version: Final



Legend

□ Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors,
Environment Canterbury

ENGEO

Produced by [Datanest.earth](https://www.datanest.com)

Title: 2010-2014 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2h
Size:
A4

Version: Final



Legend

Site Boundary

0 100 m 200 m

LINZ CC BY 4.0 © Imagery Basemap contributors,
Environment Canterbury

ENGEO

Produced by Datanest.earth

Title: 2015-2019 Aerial Photograph

Client: Hughes Developments

Project:
160 Bangor Road

Drawn: NF

Date: 14-09-2023

Checked:
DR

Proj No.: 24181

Scale: 1:8000

Figure: 2i
Size:
A4

Version: Final

Appendix 3: Certificates of Title



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy**




R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier **548760**
Land Registration District **Canterbury**
Date Issued 07 June 2011

Prior References
CB47A/154

Estate Fee Simple
Area 126.3900 hectares more or less
Legal Description Section 2 Survey Office Plan 438579
Original Registered Owners
[REDACTED]

Interests

Subject to Section 59 Land Act 1948 (affects part formerly Rural Section 39129)

Subject to a right (in gross) to convey electricity, telecommunications and computer media over parts marked A and B and a right of way and right to convey water over part marked B all on SO 438579 in favour of Selywn District Council created by Easement Instrument 8781543.6 - 7.6.2011 at 2:37 pm

Subject to a right (in gross) to convey electricity over part marked A on SO 438579 in favour of Orion New Zealand Limited created by Easement Instrument 8781543.8 - 7.6.2011 at 2:37 pm

12731081.1 Departmental dealing correcting Grantee in memorial 8781543.6 to Selwyn District Council - 9.5.2023 at 7:00 am



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R.W. Muir
Registrar-General
of Land

Identifier **548760**
Land Registration District **Canterbury**
Date Issued 07 June 2011

Prior References
CB47A/154

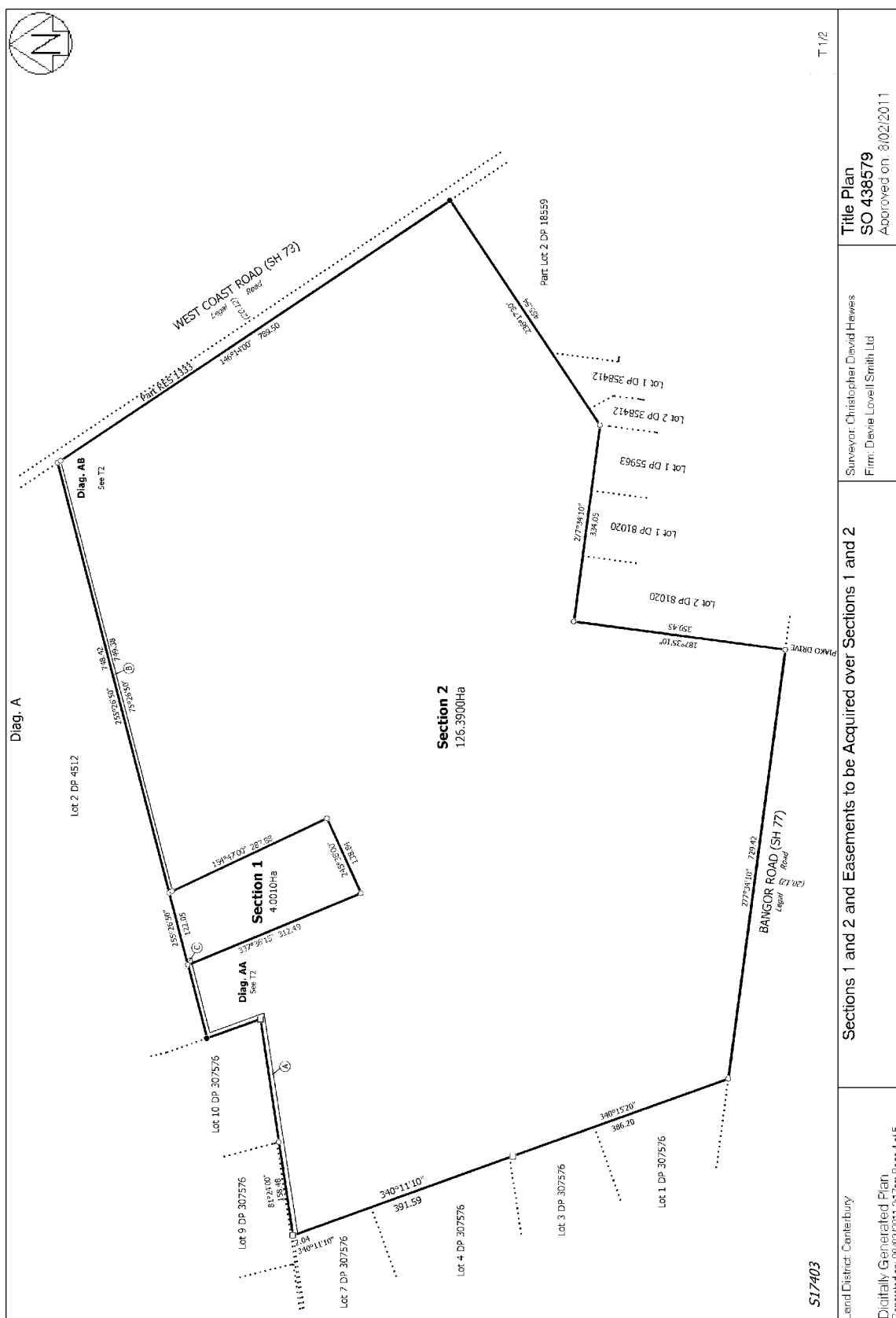
Estate Fee Simple
Area 126.3900 hectares more or less
Legal Description Section 2 Survey Office Plan 438579
Registered Owners
[REDACTED]

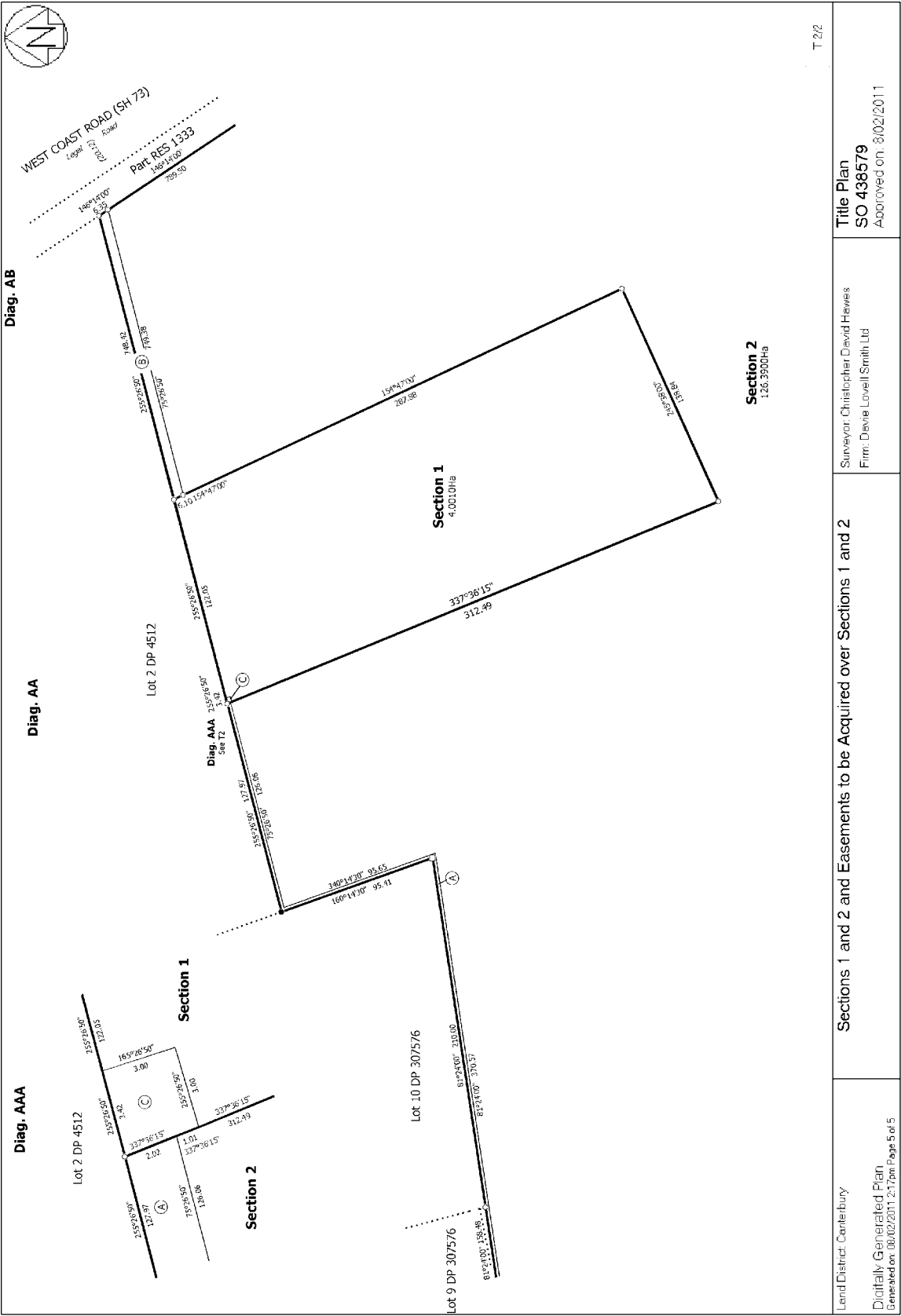
Interests

Subject to Section 59 Land Act 1948 (affects part formerly Rural Section 39129)

Subject to a right (in gross) to convey electricity, telecommunications and computer media over parts marked A and B and a right of way and right to convey water over part marked B all on SO 438579 in favour of Selwyn District Council created by Easement Instrument 8781543.6 - 7.6.2011 at 2:37 pm

Subject to a right (in gross) to convey electricity over part marked A on SO 438579 in favour of Orion New Zealand Limited created by Easement Instrument 8781543.8 - 7.6.2011 at 2:37 pm





T 22

Land District: Canterbury	Sections 1 and 2 and Easements to be Acquired over Sections 1 and 2	Surveyor: Christopher David Hawes Firm: David Lovell Smith Ltd	Title Plan SO 438579 Approved on: 8/02/2011
Digitally Generated Plan Generated on: 18/02/2011 2:17pm Page 5 of 5			



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Historical Search Copy**




R.W. Muir
Registrar-General
of Land

Constituted as a Record of Title pursuant to Sections 7 and 12 of the Land Transfer Act 2017 - 12 November 2018

Identifier CB47A/153
Land Registration District Canterbury
Date Issued 19 August 1999

Prior References
CB34B/47

Estate Fee Simple
Area 4.0000 hectares more or less
Legal Description Lot 2 Deposited Plan 81020

Original Registered Owners
[REDACTED]

Interests

Subject to Section 59 Land Act 1948 (affects part formerly in CT CB3D/1452)
A409803.4 Mortgage to The National Bank of New Zealand Limited - 10.6.1999 at 11.24 am
A421051.4 Bond pursuant to Section 108(2)(b) Resource Management Act 1991 by The Selwyn District Council -
19.8.1999 at 12.30 pm
5923846.1 Discharge of Mortgage A409803.4 - 8.3.2004 at 9:00 am

Reference:

Prior CT: 34B/47

Document No.: A421051.3



REGISTER

LT69

47A/153

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT 1952

This Certificate dated the 19th day of August One Thousand Nine Hundred and Ninety Nine under the seal of the Registrar-General of Land, New Zealand, for the Land Registration District of CANTERBURY

WITNESSETH that

is seised of an estate in fee simple (subject to such reservations, restrictions, encumbrances and interests as are notified by memorial endorsed hereon) in the land hereinafter described, delineated on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 4.0000 hectares, more or less being LOT 2 DEPOSITED PLAN 81020

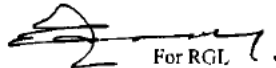


for Registrar-General of Land

Subject to Section 59 Land Act 1948 (affects part formerly in CT 3D/1452)

A409803.4 Mortgage to The National Bank of New Zealand Limited - 10.6.1999 at 11.24

A421051.4 Bond under Section 108(2)(b) Resource Management Act 1991 by The Selwyn District Council - 19.8.1999 at 12.30


For RGL.

47A/153

1



**RECORD OF TITLE
UNDER LAND TRANSFER ACT 2017
FREEHOLD
Search Copy**




R.W. Muir
Registrar-General
of Land

Identifier **CB47A/153**
Land Registration District **Canterbury**
Date Issued 19 August 1999

Prior References
CB34B/47

Estate Fee Simple
Area 4.0000 hectares more or less
Legal Description Lot 2 Deposited Plan 81020
Registered Owners
[REDACTED]

Interests

Subject to Section 59 Land Act 1948 (affects part formerly in CT CB3D/1452)
A421051.4 Bond pursuant to Section 108(2)(b) Resource Management Act 1991 by The Selwyn District Council -
19.8.1999 at 12.30 pm

Approvals A421051-1		Registered Proprietor I hereby certify that this plan was approved by the Solihby District Council pursuant to Section 227(1)(a) of the Resource Management Act 1991 on the 17 th day of April 1999.		Authorised Officer <i>[Signature]</i>	
CERTIFICATE OF TITLE AT SOLIHBY		Lot 1 57A, 152		Lot 2 57A, 153	
Total Area 138.4520ha		Comprised in CT 34U/47			
T. Michael Geoffrey Branthwaite Registered Surveyor and holder of an annual practicing certificate (for who may act as a registered surveyor pursuant to section 227 of the Survey Act 1989) hereby certifies that this plan has been prepared in accordance with the provisions of the Land Transfer Act 1952 and that the boundaries shown hereon have been made in accordance with the Survey Regulations 1977 or any regulations made in substitution thereof. Dated at Dunstburgh this 3rd day of June 1999 Signature <i>[Signature]</i> Field Book P. Inverness Road Reference Plans MP's 4312, 14131, 16330, 18558, 55063, 57440, 78807 SD 10298 Contract <i>[Signature]</i> Furnished Approved as to Survey by <i>[Signature]</i> 17/7/99 Deputy Chief Surveyor Deposited this 17th day of August 1999 Registrar-General of Land No. DP 81020 Received 23-6-99 Landed					

The map shows three main lots:

- Lot 1:** A large triangular lot labeled "PT 2 DP 55963". It contains two smaller rectangular lots labeled "DP 4.0000ha" and "DP 4.0020ha". The boundary between Lot 1 and Lot 2 is labeled "CRIDGES ROAD Legal Road".
- Lot 2:** A rectangular lot labeled "PT 2 DP 18559". Its boundary with Lot 1 is labeled "DP 16539".
- Lot 3:** A large rectangular lot labeled "PT 2 DP 55963". Its boundary with Lot 1 is labeled "BANGOR ROAD Legal Road (SH No 77)". Its boundary with Lot 2 is labeled "WEST COAST ROAD Legal Road (SH No 73)".

Other features include a north arrow pointing towards the top left, a scale bar indicating 1:25000, and various bearings and distances along the boundaries.



Appendix 4: 2023 Site Photographs



Onsite dwelling looking west from lawn area



Onsite dwelling looking south



Onsite tennis court to south of dwelling



Eucalyptus plantation to south of tennis court looking south

Date taken:	2023-09-13	Taken by:	NF
Approved by:	DR	Page No:	1 of 6



Pool area to west of dwelling



Inside of barn to north of dwelling



Barn to north of the dwelling looking west



Small amount of chemical containers stored in barn to north of dwelling

Date taken:	2023-09-13	Taken by:	NF
Approved by:	DR	Page No:	2 of 6



Visible vent by area of presumed underground storage tank



Above ground storage tank to west of barn



Fuel dispenser by area of presumed below ground storage tank

Date taken: 2023-09-13

Taken by: NF

Approved by: DR

Page No: 3 of 6



Wool shed with stock yard areas looking south



Looking west towards multi-bay barn



Hay barn located southeast of wool shed



Feed silos to south of wool shed

Date taken:	2023-09-13	Taken by:	NF
Approved by:	DR	Page No:	4 of 6



Offal pit contents in northern paddock



Northern paddocks onsite



Offal pit contents in northern paddock



Northern paddocks on-site

Date taken:	2023-09-13	Taken by:	NF
Approved by:	DR	Page No:	5 of 6



Burn pile 1 to west of woolshed



Burn pile 2 to northwest of woolshed



Burn pile to north of barn



Evidence of anthropogenic material in burn pile 3



Appendix 5: 2026 Site Photographs



Photo 1: Woolshed/ area of sheep dip operations



Photo 2: Minor cropping within one of the paddocks



Photo 3: Delineation sampling around residential dwelling



Photo 4: General representation of patrol grazing paddocks



Appendix 6: Analytical Laboratory Reports

Certificate of Analysis

Page 1 of 7

Client:	Engeo Limited	Lab No:	3365212	SPv4
Contact:	Natalie Flatman	Date Received:	15-Sep-2023	
	C/- Engeo Limited	Date Reported:	20-Sep-2023	
	PO Box 373	Quote No:		
	Christchurch 8140	Order No:		
		Client Reference:	24181.000.001	
		Submitted By:	Natalie Flatman	

Sample Type: Soil

Sample Name:	SS1 13-Sep-2023	SS2 13-Sep-2023	SS3 13-Sep-2023	SS4 13-Sep-2023	SS5 13-Sep-2023
Lab Number:	3365212.1	3365212.2	3365212.3	3365212.4	3365212.5

Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	9	5	5	4
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.14	0.20	0.13
Total Recoverable Chromium	mg/kg dry wt	17	15	14	15
Total Recoverable Copper	mg/kg dry wt	9	8	12	7
Total Recoverable Lead	mg/kg dry wt	14.8	14.4	11.9	15.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	9	10	9	9
Total Recoverable Zinc	mg/kg dry wt	78	66	83	65

Sample Name:	SS6 13-Sep-2023	SS7 13-Sep-2023	SS8 13-Sep-2023	SS9 13-Sep-2023	SS10 13-Sep-2023
Lab Number:	3365212.6	3365212.7	3365212.8	3365212.9	3365212.10

Individual Tests					
Dry Matter	g/100g as rcvd	-	-	75	74

Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	-	-	4	4
Total Recoverable Cadmium	mg/kg dry wt	-	-	0.29	0.30
Total Recoverable Chromium	mg/kg dry wt	-	-	16	17
Total Recoverable Copper	mg/kg dry wt	-	-	9	14
Total Recoverable Lead	mg/kg dry wt	-	-	18.4	18.8
Total Recoverable Nickel	mg/kg dry wt	-	-	11	11
Total Recoverable Zinc	mg/kg dry wt	-	-	177	186

Heavy Metals with Mercury, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	4	5	-	-
Total Recoverable Cadmium	mg/kg dry wt	< 0.10	0.10	-	-
Total Recoverable Chromium	mg/kg dry wt	16	16	-	-
Total Recoverable Copper	mg/kg dry wt	8	8	-	-
Total Recoverable Lead	mg/kg dry wt	13.9	22	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	-	-
Total Recoverable Nickel	mg/kg dry wt	11	9	-	-
Total Recoverable Zinc	mg/kg dry wt	60	58	-	-

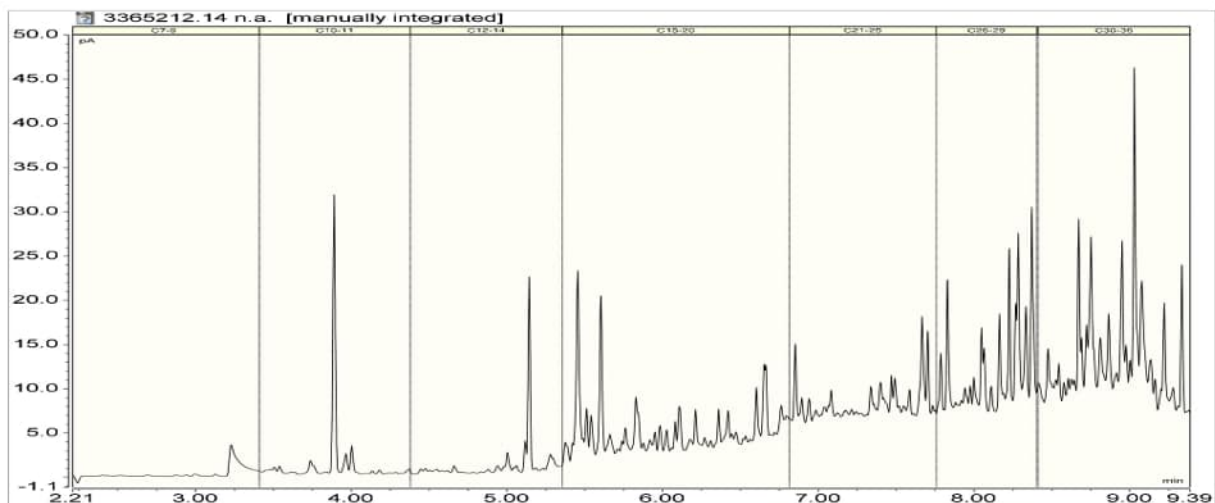
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.4	< 0.3
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	< 0.012
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.013	< 0.012
Acenaphthylene	mg/kg dry wt	-	-	< 0.013	< 0.012
Acenaphthene	mg/kg dry wt	-	-	< 0.013	< 0.012
Anthracene	mg/kg dry wt	-	-	< 0.013	< 0.012
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.012

Sample Type: Soil						
Sample Name:		SS6 13-Sep-2023	SS7 13-Sep-2023	SS8 13-Sep-2023	SS9 13-Sep-2023	SS10 13-Sep-2023
Lab Number:		3365212.6	3365212.7	3365212.8	3365212.9	3365212.10
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.032	< 0.032	< 0.029
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.031	< 0.032	< 0.029
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Chrysene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Fluoranthene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Fluorene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Naphthalene	mg/kg dry wt	-	-	< 0.07	< 0.07	< 0.06
Perylene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Phenanthrene	mg/kg dry wt	-	-	< 0.013	< 0.013	< 0.012
Pyrene	mg/kg dry wt	-	-	< 0.013	0.019	0.016
Sample Name:		SS11 13-Sep-2023	SS12 13-Sep-2023	SS13 13-Sep-2023	SS14 13-Sep-2023	SS15 13-Sep-2023
Lab Number:		3365212.11	3365212.12	3365212.13	3365212.14	3365212.15
Individual Tests						
Dry Matter	g/100g as rcvd	72	71	67	78	65
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	5	5	5	3
Total Recoverable Cadmium	mg/kg dry wt	0.15	0.24	0.26	0.35	0.37
Total Recoverable Chromium	mg/kg dry wt	15	15	14	17	14
Total Recoverable Copper	mg/kg dry wt	8	10	15	15	17
Total Recoverable Lead	mg/kg dry wt	14.5	15.7	13.2	164	45
Total Recoverable Nickel	mg/kg dry wt	10	10	9	11	10
Total Recoverable Zinc	mg/kg dry wt	79	95	155	112	128
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4	< 0.4	< 0.4	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	0.017	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.014	< 0.014	0.026	-	-
Acenaphthylene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Acenaphthene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.033	< 0.034	< 0.036	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.033	< 0.034	< 0.036	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Chrysene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Fluoranthene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Fluorene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Naphthalene	mg/kg dry wt	< 0.07	< 0.07	< 0.08	-	-

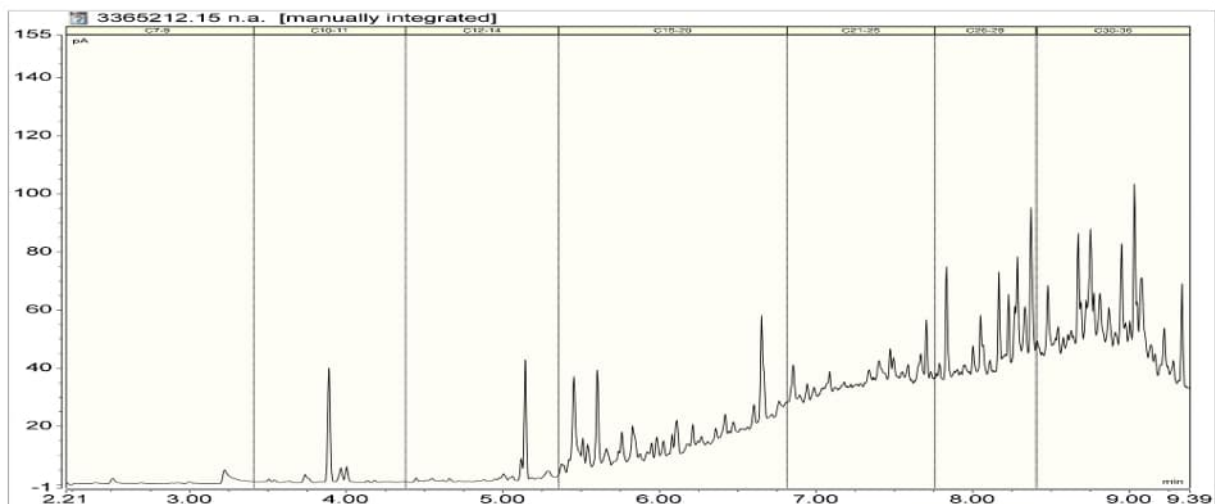
Sample Type: Soil						
Sample Name:		SS11 13-Sep-2023	SS12 13-Sep-2023	SS13 13-Sep-2023	SS14 13-Sep-2023	SS15 13-Sep-2023
Lab Number:		3365212.11	3365212.12	3365212.13	3365212.14	3365212.15
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Perylene	mg/kg dry wt	< 0.014	< 0.014	< 0.015	-	-
Phenanthrene	mg/kg dry wt	< 0.014	< 0.014	0.016	-	-
Pyrene	mg/kg dry wt	< 0.014	< 0.014	0.121	-	-
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	-	-	-	29	56
C10 - C14	mg/kg dry wt	-	-	-	171	330
C15 - C36	mg/kg dry wt	-	-	-	2,100	9,800
Total hydrocarbons (C7 - C36)	mg/kg dry wt	-	-	-	2,300	10,200
Sample Name:		SS16 13-Sep-2023	SS17 13-Sep-2023	SS18 13-Sep-2023	SS19 13-Sep-2023	SS20 13-Sep-2023
Lab Number:		3365212.16	3365212.17	3365212.18	3365212.19	3365212.20
Individual Tests						
Dry Matter	g/100g as rcvd	75	75	63	59	73
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	4	69	6	6
Total Recoverable Cadmium	mg/kg dry wt	0.27	0.19	1.40	0.30	0.12
Total Recoverable Chromium	mg/kg dry wt	18	14	48	14	16
Total Recoverable Copper	mg/kg dry wt	12	9	105	21	15
Total Recoverable Lead	mg/kg dry wt	25	22	220	25	140
Total Recoverable Nickel	mg/kg dry wt	11	9	12	11	10
Total Recoverable Zinc	mg/kg dry wt	140	93	460	170	115
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	< 0.4	< 0.4	< 0.4
1-Methylnaphthalene	mg/kg dry wt	-	-	< 0.016	0.026	< 0.014
2-Methylnaphthalene	mg/kg dry wt	-	-	< 0.016	0.037	< 0.014
Acenaphthylene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Acenaphthene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Anthracene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[a]anthracene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	< 0.038	< 0.040	< 0.032
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	< 0.038	< 0.040	< 0.032
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[e]pyrene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Benzo[k]fluoranthene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Chrysene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Fluoranthene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Fluorene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Naphthalene	mg/kg dry wt	-	-	< 0.08	0.09	< 0.07
Perylene	mg/kg dry wt	-	-	< 0.016	< 0.017	< 0.014
Phenanthrene	mg/kg dry wt	-	-	0.028	0.026	< 0.014
Pyrene	mg/kg dry wt	-	-	< 0.016	0.017	< 0.014
Total Petroleum Hydrocarbons in Soil						
C7 - C9	mg/kg dry wt	< 20	< 20	-	-	-
C10 - C14	mg/kg dry wt	< 20	< 20	-	-	-
C15 - C36	mg/kg dry wt	111	152	-	-	-
Total hydrocarbons (C7 - C36)	mg/kg dry wt	119	163	-	-	-

Sample Type: Soil						
Sample Name:		SS21 13-Sep-2023	SS22 13-Sep-2023	SS23 13-Sep-2023	SS24 13-Sep-2023	SS25 13-Sep-2023
Lab Number:		3365212.21	3365212.22	3365212.23	3365212.24	3365212.25
Individual Tests						
Dry Matter	g/100g as rcvd	59	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	-	2,100	390	790	1,450
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	23	-	-	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.35	-	-	-	-
Total Recoverable Chromium	mg/kg dry wt	22	-	-	-	-
Total Recoverable Copper	mg/kg dry wt	37	-	-	-	-
Total Recoverable Lead	mg/kg dry wt	2,900	-	-	-	-
Total Recoverable Nickel	mg/kg dry wt	10	-	-	-	-
Total Recoverable Zinc	mg/kg dry wt	1,060	-	-	-	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.5	-	-	-	-
1-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
2-Methylnaphthalene	mg/kg dry wt	< 0.017	-	-	-	-
Acenaphthylene	mg/kg dry wt	< 0.017	-	-	-	-
Acenaphthene	mg/kg dry wt	< 0.017	-	-	-	-
Anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.041	-	-	-	-
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.041	-	-	-	-
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[e]pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.017	-	-	-	-
Benzo[k]fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Chrysene	mg/kg dry wt	< 0.017	-	-	-	-
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.017	-	-	-	-
Fluoranthene	mg/kg dry wt	< 0.017	-	-	-	-
Fluorene	mg/kg dry wt	< 0.017	-	-	-	-
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Naphthalene	mg/kg dry wt	< 0.09	-	-	-	-
Perylene	mg/kg dry wt	< 0.017	-	-	-	-
Phenanthrene	mg/kg dry wt	< 0.017	-	-	-	-
Pyrene	mg/kg dry wt	< 0.017	-	-	-	-
Sample Name:		SS26 13-Sep-2023		SS27 13-Sep-2023		SS28 13-Sep-2023
Lab Number:		3365212.26		3365212.27		3365212.28
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	290		210		130

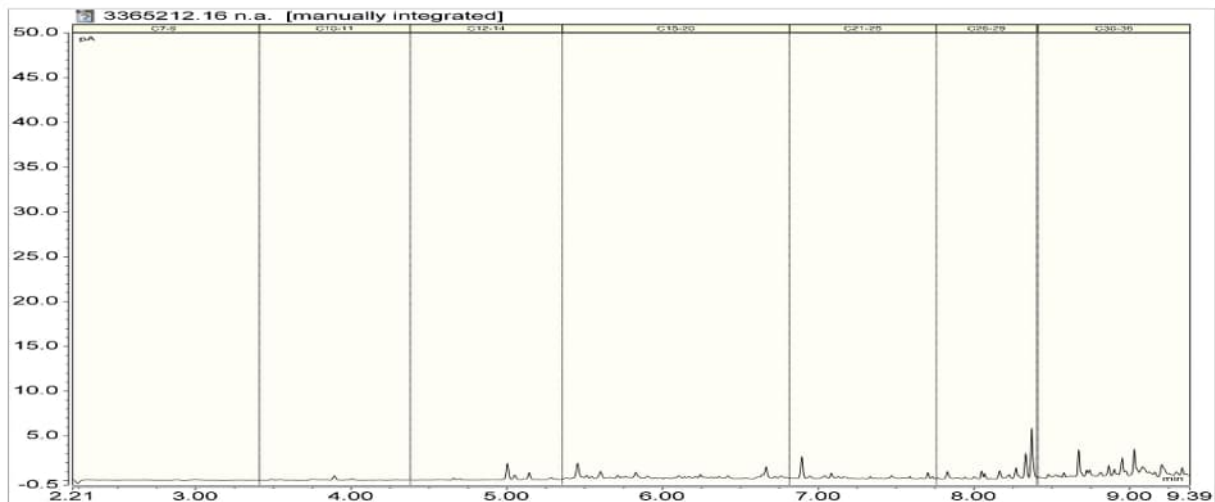
3365212.14
SS14 13-Sep-2023
Client Chromatogram for TPH by FID

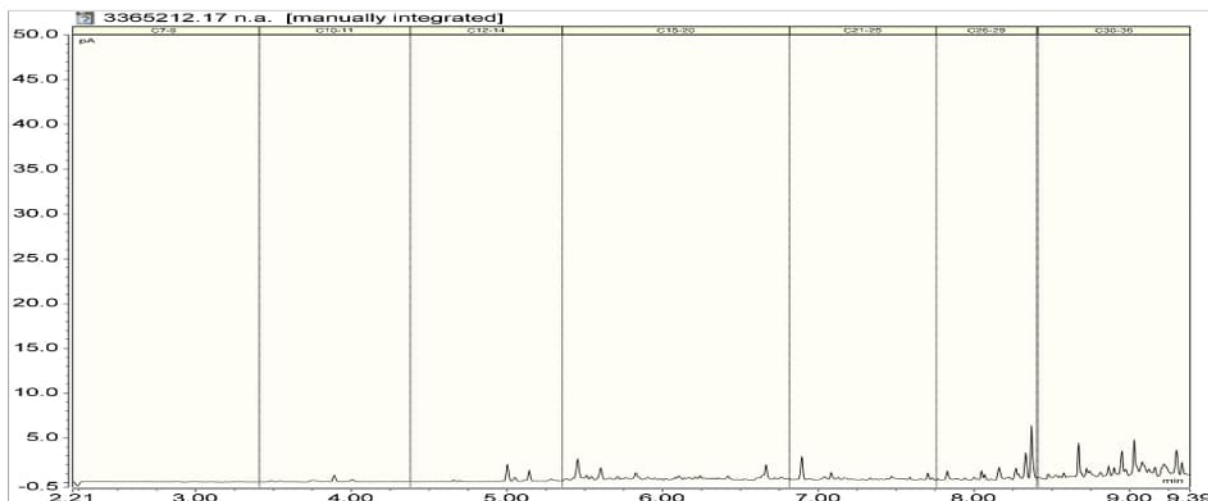


3365212.15
SS15 13-Sep-2023
Client Chromatogram for TPH by FID



3365212.16
SS16 13-Sep-2023
Client Chromatogram for TPH by FID





Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Individual Tests			
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-28
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%.	-	22-28
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	8-13, 18-21
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	8-21
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2.	-	22-28
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2.	0.4 mg/kg dry wt	22-28
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	8-13, 18-21
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	8-13, 18-21
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	8-21
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-7
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	8-13, 18-21
Total Petroleum Hydrocarbons in Soil			

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Client Chromatogram for TPH by FID	Small peaks associated with QC compounds may be visible in chromatograms with low TPH concentrations. QC peaks are as follows: one peak in the C12 - 14 band, the C21 - 25 band and the C30 - 36 band. All QC peaks are corrected for in the reported TPH concentrations.	-	14-17
C7 - C9	Solvent extraction, GC-FID analysis. In-house based on US EPA 8015.	20 mg/kg dry wt	14-17
C10 - C14	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	20 mg/kg dry wt	14-17
C15 - C36	Solvent extraction, GC-FID analysis. Tested on as received sample. In-house based on US EPA 8015.	40 mg/kg dry wt	14-17
Total hydrocarbons (C7 - C36)	Calculation: Sum of carbon bands from C7 to C36. In-house based on US EPA 8015.	70 mg/kg dry wt	14-17

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

Testing was completed between 15-Sep-2023 and 20-Sep-2023. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental



Version Number: 3

Date Issued: October 2021

Authorised By: LB

Controlled Document

Client Name:	ENGEO Ltd	Job Number:	T010888	Total Samples Received:	5
Client Address:	124 Montreal Street, Sydenham, Christchurch	Site Reference / Address:	24181.000.001	Date Received:	14/09/2023
Client Reference:	24181.000.001			Date Analysed:	15/09/2023
Client Contact:	Natalie Flatman			Date Reported:	15/09/2023

ASBESTOS IN SOIL ANALYSIS REPORT (PRESENCE/ABSENCE)

Laboratory Sample Number	Client Sample Number	General Description		Results	Comments
T010888.1	SS22	SS22		Organic Fibres	No Asbestos Detected QA/QC Reviewed
		Received Soil Weight (g)	Dry Soil Weight (g)		
		586.01	512.98		
T010888.2	SS24	SS24		Organic Fibres	No Asbestos Detected
		Received Soil Weight (g)	Dry Soil Weight (g)		
		589.94	506.74		
T010888.3	SS25	SS25		Organic Fibres	No Asbestos Detected
		Received Soil Weight (g)	Dry Soil Weight (g)		
		546.45	413.36		
T010888.4	SS27	SS27		Organic Fibres	No Asbestos Detected
		Received Soil Weight (g)	Dry Soil Weight (g)		
		539.95	445.62		
T010888.5	SS28	SS28		Organic Fibres	No Asbestos Detected
		Received Soil Weight (g)	Dry Soil Weight (g)		
		609.74	548.31		

Note: In addition to the initially identified asbestos fibres, the semi-quantification analysis of positive samples may detect other types of asbestos fibres.

Method References and Disclaimers

Samples were analysed in accordance with: AS4964-2004 Australian Standard - Method for Qualitative Identification of Asbestos in Bulk Samples

Samples are reported 'As Received'. Terra Scientific takes no responsibility for sampling processes, client sample descriptions and sample locations as these were provided by the client.

Disclaimers:

The results presented in this report relate specifically to the samples submitted for this job.

The detection limit is 0.1g/1kg as stated in the AS4964-2004.

This report shall not be reproduced, except in full, without the written consent of the Key Technical Person assigned to this report.

For any queries regarding this report, please do not hesitate to contact the laboratory and speak with the Key Technical Person.

Jessica Griffin
Managing Director
Key Technical Person

Quality Assurance Report

Page 1 of 20

Client:	Engeo Limited	Lab No:	4234220	QCPv1
Contact:	Natalie Flatman	Date Received:	04-Jun-2026	
	C/- Engeo Limited	Date Reported:	11-Jun-2026	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	24181.000.001	
		Submitted By:	Jonathan Hupman	

Sample Specific QCs

Organochlorine Pesticides Screening in Soil

		4234220.1	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	101	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS

		4234220.1	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate	%	94	40 – 120	No

Organochlorine Pesticides Screening in Soil

		4234220.2	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	102	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS

		4234220.2	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate	%	93	40 – 120	No

Organochlorine Pesticides Screening in Soil

		4234220.3	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	111	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS

		4234220.3	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate	%	88	40 – 120	No

Organochlorine Pesticides Screening in Soil

		4234220.4	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	91	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS

		4234220.4	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate	%	93	40 – 120	No

Organochlorine Pesticides Screening in Soil

		4234220.5	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	91	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS

		4234220.5	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate	%	98	40 – 120	No

Organochlorine Pesticides Screening in Soil

		4234220.6	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene	%	112	40 – 120	No

Organonitro&phosphorus Pesticides Screen in Soil by GCMS			
	4234220.6	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate %	96	40 – 120	No
Organochlorine Pesticides Screening in Soil			
	4234220.7	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene %	105	40 – 120	No
Organonitro&phosphorus Pesticides Screen in Soil by GCMS			
	4234220.7	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate %	100	40 – 120	No
Organochlorine Pesticides Screening in Soil			
	4234220.8	Control Limits	Outside Limit (Yes/No)
2,4,5,6-tetrachloro-m-xylene %	106	40 – 120	No
Organonitro&phosphorus Pesticides Screen in Soil by GCMS			
	4234220.8	Control Limits	Outside Limit (Yes/No)
Triphenylphosphate %	96	40 – 120	No
Polycyclic Aromatic Hydrocarbons Screening in Soil			
	4234220.45	Control Limits	Outside Limit (Yes/No)
1-methylnaphthalene-d10 %	90	65 – 130	No
Benzo[a]pyrene-d12 %	112	70 – 140	No
Fluoranthene-d10 %	120	66 – 130	No
Polycyclic Aromatic Hydrocarbons Screening in Soil			
	4234220.46	Control Limits	Outside Limit (Yes/No)
1-methylnaphthalene-d10 %	101	65 – 130	No
Benzo[a]pyrene-d12 %	103	70 – 140	No
Fluoranthene-d10 %	100	66 – 130	No
Polycyclic Aromatic Hydrocarbons Screening in Soil			
	4234220.47	Control Limits	Outside Limit (Yes/No)
1-methylnaphthalene-d10 %	82	65 – 130	No
Benzo[a]pyrene-d12 %	107	70 – 140	No
Fluoranthene-d10 %	114	66 – 130	No
Blank QCs			
Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.1			
	Results	Control Limits	Outside Limit (Yes/No)
Acetochlor mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Alachlor mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0031	No
Atrazine mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Atrazine-desethyl mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Atrazine-desisopropyl mg/kg dry wt	< 0.10 ± 0.044	0.0 – 0.0123	No
Azaconazole mg/kg dry wt	< 0.03 ± 0.0098	0.0 – 0.0031	No
Azinphos-methyl mg/kg dry wt	< 0.10 ± 0.042	0.0 – 0.0123	No
Benalaxyl mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Bitertanol mg/kg dry wt	< 0.10 ± 0.022	0.0 – 0.0123	No
Bromacil mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Bromopropylate mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Butachlor mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Captan mg/kg dry wt	< 0.10 ± 0.051	0.0 – 0.0123	No
Carbaryl mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No

Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.1

		Results	Control Limits	Outside Limit (Yes/No)
Carbofuran	mg/kg dry wt	< 0.05 ± 0.011	0.0 – 0.0062	No
Chlorfluazuron	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Chlorothalonil	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Chlorpyrifos	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Chlorpyrifos-methyl	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Chlortoluron	mg/kg dry wt	< 0.10 ± 0.041	0.0 – 0.0123	No
Cyanazine	mg/kg dry wt	< 0.05 ± 0.025	0.0 – 0.0062	No
Cyfluthrin	mg/kg dry wt	< 0.06 ± 0.031	0.0 – 0.0076	No
Cyhalothrin	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Cypermethrin	mg/kg dry wt	< 0.12 ± 0.047	0.0 – 0.0151	No
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Diazinon	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Dichlofluanid	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Dichloran	mg/kg dry wt	< 0.2 ± 0.019	0.0 – 0.0154	No
Dichlorvos	mg/kg dry wt	< 0.09 ± 0.0085	0.0 – 0.0062	No
Difenoconazole	mg/kg dry wt	< 0.09 ± 0.0085	0.0 – 0.0087	No
Dimethoate	mg/kg dry wt	< 0.10 ± 0.042	0.0 – 0.0123	No
Diphenylamine	mg/kg dry wt	< 0.10 ± 0.049	0.0 – 0.0123	No
Diuron	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Fenpropimorph	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Fluazifop-butyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Fluometuron	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Flusilazole	mg/kg dry wt	< 0.05 ± 0.022	0.0 – 0.0062	No
Fluvalinate	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0044	No
Furalaxyl	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Haloxifop-methyl	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Hexaconazole	mg/kg dry wt	< 0.05 ± 0.016	0.0 – 0.0062	No
Hexazinone	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3 ± 0.12	0.0 – 0.031	No
Kresoxim-methyl	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Linuron	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Malathion	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Metalaxyl	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Methamidophos	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Metolachlor	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0031	No
Metribuzin	mg/kg dry wt	< 0.05 ± 0.026	0.0 – 0.0062	No
Molinate	mg/kg dry wt	< 0.10 ± 0.049	0.0 – 0.0123	No
Myclobutanil	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Naled	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Norflurazon	mg/kg dry wt	< 0.10 ± 0.052	0.0 – 0.0123	No
Oxadiazon	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Oxyfluorfen	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Paclobutrazol	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Parathion-ethyl	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No

Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.1

		Results	Control Limits	Outside Limit (Yes/No)
Parathion-methyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Pendimethalin	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Permethrin	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.00175	No
Pirimicarb	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Pirimiphos-methyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Prochloraz	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Procymidone	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Prometryn	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Propachlor	mg/kg dry wt	< 0.05 ± 0.032	0.0 – 0.0062	No
Propanil	mg/kg dry wt	< 0.2 ± 0.12	0.0 – 0.0123	No
Propazine	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Propiconazole	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0044	No
Pyriproxyfen	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Quizalofop-ethyl	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Simazine	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Simetryn	mg/kg dry wt	< 0.05 ± 0.025	0.0 – 0.0062	No
Sulfentrazone	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.10 ± 0.046	0.0 – 0.0123	No
Tebuconazole	mg/kg dry wt	< 0.05 ± 0.020	0.0 – 0.0062	No
Terbacil	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Terbuteton	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Terbuthylazine	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Terbuthylazine-desethyl	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Terbutryn	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Thiabendazole	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Thiobencarb	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Tolylfluanid	mg/kg dry wt	< 0.03 ± 0.0093	0.0 – 0.0031	No
Triazophos	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Trifluralin	mg/kg dry wt	< 0.05 ± 0.032	0.0 – 0.0062	No
Vinclozolin	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No

Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.15

		Results	Control Limits	Outside Limit (Yes/No)
Acetochlor	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Alachlor	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0031	No
Atrazine	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Atrazine-desethyl	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Atrazine-desisopropyl	mg/kg dry wt	< 0.10 ± 0.044	0.0 – 0.0123	No
Azaconazole	mg/kg dry wt	< 0.03 ± 0.0098	0.0 – 0.0031	No
Azinphos-methyl	mg/kg dry wt	< 0.10 ± 0.042	0.0 – 0.0123	No
Benalaxyl	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Bitertanol	mg/kg dry wt	< 0.10 ± 0.022	0.0 – 0.0123	No
Bromacil	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Bromopropylate	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Butachlor	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No

Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.15

		Results	Control Limits	Outside Limit (Yes/No)
Captan	mg/kg dry wt	< 0.10 ± 0.051	0.0 – 0.0123	No
Carbaryl	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Carbofuran	mg/kg dry wt	< 0.05 ± 0.011	0.0 – 0.0062	No
Chlorfluazuron	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Chlorothalonil	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Chlorpyrifos	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Chlorpyrifos-methyl	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Chlortoluron	mg/kg dry wt	< 0.10 ± 0.041	0.0 – 0.0123	No
Cyanazine	mg/kg dry wt	< 0.05 ± 0.025	0.0 – 0.0062	No
Cyfluthrin	mg/kg dry wt	< 0.06 ± 0.031	0.0 – 0.0076	No
Cyhalothrin	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Cypermethrin	mg/kg dry wt	< 0.12 ± 0.047	0.0 – 0.0151	No
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Diazinon	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Dichlofluanid	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Dichloran	mg/kg dry wt	< 0.2 ± 0.019	0.0 – 0.0154	No
Dichlorvos	mg/kg dry wt	< 0.09 ± 0.0085	0.0 – 0.0062	No
Difenoconazole	mg/kg dry wt	< 0.09 ± 0.0085	0.0 – 0.0087	No
Dimethoate	mg/kg dry wt	< 0.10 ± 0.042	0.0 – 0.0123	No
Diphenylamine	mg/kg dry wt	< 0.10 ± 0.049	0.0 – 0.0123	No
Diuron	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Fenpropimorph	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Fluazifop-butyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Fluometuron	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Flusilazole	mg/kg dry wt	< 0.05 ± 0.022	0.0 – 0.0062	No
Fluvalinate	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0044	No
Furalaxyl	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Haloxypop-methyl	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Hexaconazole	mg/kg dry wt	< 0.05 ± 0.016	0.0 – 0.0062	No
Hexazinone	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3 ± 0.12	0.0 – 0.031	No
Kresoxim-methyl	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Linuron	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Malathion	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Metalaxyl	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Methamidophos	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Metolachlor	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0031	No
Metribuzin	mg/kg dry wt	< 0.05 ± 0.026	0.0 – 0.0062	No
Molinate	mg/kg dry wt	< 0.10 ± 0.049	0.0 – 0.0123	No
Myclobutanil	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Naled	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Norflurazon	mg/kg dry wt	< 0.10 ± 0.052	0.0 – 0.0123	No
Oxadiazon	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Oxyfluorfen	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No

Blank 1 - Multiresidue Soil Analysis Worksheet: 4164.15

		Results	Control Limits	Outside Limit (Yes/No)
Paclobutrazol	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Parathion-ethyl	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Parathion-methyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Pendimethalin	mg/kg dry wt	< 0.05 ± 0.030	0.0 – 0.0062	No
Permethrin	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.00175	No
Pirimicarb	mg/kg dry wt	< 0.05 ± 0.021	0.0 – 0.0062	No
Pirimiphos-methyl	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Prochloraz	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Procymidone	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Prometryn	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Propachlor	mg/kg dry wt	< 0.05 ± 0.032	0.0 – 0.0062	No
Propanil	mg/kg dry wt	< 0.2 ± 0.12	0.0 – 0.0123	No
Propazine	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Propiconazole	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0044	No
Pyriproxyfen	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Quizalofop-ethyl	mg/kg dry wt	< 0.05 ± 0.0048	0.0 – 0.0062	No
Simazine	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Simetryn	mg/kg dry wt	< 0.05 ± 0.025	0.0 – 0.0062	No
Sulfentrazone	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.10 ± 0.046	0.0 – 0.0123	No
Tebuconazole	mg/kg dry wt	< 0.05 ± 0.020	0.0 – 0.0062	No
Terbacil	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Terbumeton	mg/kg dry wt	< 0.05 ± 0.027	0.0 – 0.0062	No
Terbuthylazine	mg/kg dry wt	< 0.03 ± 0.012	0.0 – 0.0031	No
Terbuthylazine-desethyl	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.0062	No
Terbutryn	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No
Thiabendazole	mg/kg dry wt	< 0.3 ± 0.019	0.0 – 0.031	No
Thiobencarb	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Tolylfluanid	mg/kg dry wt	< 0.03 ± 0.0093	0.0 – 0.0031	No
Triazophos	mg/kg dry wt	< 0.05 ± 0.028	0.0 – 0.0062	No
Trifluralin	mg/kg dry wt	< 0.05 ± 0.032	0.0 – 0.0062	No
Vinclozolin	mg/kg dry wt	< 0.05 ± 0.029	0.0 – 0.0062	No

Digest Blank 1 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14075.13

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14075.38

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 1 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14076.13

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14076.27

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 1 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.13

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.57

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.57

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

50x Manual Dilution Digest Blank PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.71

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Mercury	mg/kg dry wt	< 0.10 ± 0.066	-0.100 – 0.100	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 1 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14078.13

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14078.33

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No

Digest Blank 1 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14079.13

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Digest Blank 2 PrepWS esDig - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14079.49

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Cadmium	mg/kg dry wt	< 0.10 ± 0.065	-0.100 – 0.100	No
Total Recoverable Chromium	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Copper	mg/kg dry wt	< 2 ± 1.3	-2.0 – 2.0	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Lead	mg/kg dry wt	< 0.4 ± 0.26	-0.40 – 0.40	No
Total Recoverable Nickel	mg/kg dry wt	< 2 ± 1.4	-2.0 – 2.0	No
Total Recoverable Zinc	mg/kg dry wt	< 4 ± 2.7	-4.0 – 4.0	No

Blank 1 PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9748.1

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0028	0.0 – 0.0100	No
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
4,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0023	0.0 – 0.0100	No
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0021	0.0 – 0.0100	No
4,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0017	0.0 – 0.0100	No
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0013	0.0 – 0.0100	No
Endrin	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9749.1

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0028	0.0 – 0.0100	No
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
4,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0023	0.0 – 0.0100	No
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0021	0.0 – 0.0100	No
4,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0017	0.0 – 0.0100	No
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0013	0.0 – 0.0100	No
Endrin	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0022	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9749.1

		Results	Control Limits	Outside Limit (Yes/No)
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18346.1

		Results	Control Limits	Outside Limit (Yes/No)
1-Methylnaphthalene	mg/kg dry wt	< 0.010 ± 0.032	0.0 – 0.0100	No
2-Methylnaphthalene	mg/kg dry wt	< 0.010 ± 0.032	0.0 – 0.0100	No
Acenaphthylene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Acenaphthene	mg/kg dry wt	< 0.010 ± 0.0060	0.0 – 0.0100	No
Anthracene	mg/kg dry wt	< 0.010 ± 0.0060	0.0 – 0.0100	No
Benzo[a]anthracene	mg/kg dry wt	< 0.010 ± 0.0062	0.0 – 0.0100	No
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.010 ± 0.0064	0.0 – 0.0100	No
Benzo[e]pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.010 ± 0.0064	0.0 – 0.0100	No
Benzo[k]fluoranthene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Chrysene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Fluoranthene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Fluorene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Naphthalene	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.050	No
Phenanthrene	mg/kg dry wt	< 0.010 ± 0.0067	0.0 – 0.0100	No
Perylene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9752.1

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
alpha-BHC	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
beta-BHC	mg/kg dry wt	< 0.010 ± 0.0028	0.0 – 0.0100	No
delta-BHC	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
gamma-BHC (Lindane)	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
cis-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
trans-Chlordane	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
2,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
4,4'-DDD	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
2,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0030	0.0 – 0.0100	No
4,4'-DDE	mg/kg dry wt	< 0.010 ± 0.0023	0.0 – 0.0100	No
2,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0021	0.0 – 0.0100	No
4,4'-DDT	mg/kg dry wt	< 0.010 ± 0.0028	0.0 – 0.0100	No
Dieldrin	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan I	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9752.1

		Results	Control Limits	Outside Limit (Yes/No)
Endosulfan II	mg/kg dry wt	< 0.010 ± 0.0026	0.0 – 0.0100	No
Endosulfan sulphate	mg/kg dry wt	< 0.010 ± 0.0013	0.0 – 0.0100	No
Endrin	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No
Endrin aldehyde	mg/kg dry wt	< 0.010 ± 0.0028	0.0 – 0.0100	No
Endrin ketone	mg/kg dry wt	< 0.010 ± 0.0024	0.0 – 0.0100	No
Heptachlor	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Heptachlor epoxide	mg/kg dry wt	< 0.010 ± 0.0031	0.0 – 0.0100	No
Hexachlorobenzene	mg/kg dry wt	< 0.010 ± 0.0029	0.0 – 0.0100	No
Methoxychlor	mg/kg dry wt	< 0.010 ± 0.00048	0.0 – 0.0100	No

Blank 1 PrepWS xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18352.1

		Results	Control Limits	Outside Limit (Yes/No)
1-Methylnaphthalene	mg/kg dry wt	< 0.010 ± 0.032	0.0 – 0.0100	No
2-Methylnaphthalene	mg/kg dry wt	< 0.010 ± 0.032	0.0 – 0.0100	No
Acenaphthylene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Acenaphthene	mg/kg dry wt	< 0.010 ± 0.0060	0.0 – 0.0100	No
Anthracene	mg/kg dry wt	< 0.010 ± 0.0060	0.0 – 0.0100	No
Benzo[a]anthracene	mg/kg dry wt	< 0.010 ± 0.0062	0.0 – 0.0100	No
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Benzo[b]fluoranthene + Benzo[j]fluoranthene	mg/kg dry wt	< 0.010 ± 0.0064	0.0 – 0.0100	No
Benzo[e]pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.010 ± 0.0064	0.0 – 0.0100	No
Benzo[k]fluoranthene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Chrysene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Fluoranthene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Fluorene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Naphthalene	mg/kg dry wt	< 0.05 ± 0.031	0.0 – 0.050	No
Phenanthrene	mg/kg dry wt	< 0.010 ± 0.0067	0.0 – 0.0100	No
Perylene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No
Pyrene	mg/kg dry wt	< 0.010 ± 0.0066	0.0 – 0.0100	No

QC Spike QCs

Screen LCS Mix1&3 - Multiresidue Soil Analysis Worksheet: 4164.2

		Results	Control Limits	Outside Limit (Yes/No)
Atrazine	%	85 ± 29	55 – 115	No
Atrazine-desisopropyl	%	88 ± 40	38 – 108	No
Azaconazole	%	77 ± 36	48 – 99	No
Azinphos-methyl	%	75 ± 37	11.0 – 118	No
Bromacil	%	70 ± 25	34 – 114	No
Carbaryl	%	77 ± 51	30 – 112	No
Carbofuran	%	87 ± 56	33 – 120	No
Chlorpyrifos	%	91 ± 34	65 – 114	No
Chlorpyrifos-methyl	%	91 ± 36	38 – 122	No
Cyfluthrin	%	85 ± 24	34 – 115	No

Screen LCS Mix1&3 - Multiresidue Soil Analysis Worksheet: 4164.2

		Results	Control Limits	Outside Limit (Yes/No)
Diazinon	%	84 ± 29	58 – 112	No
Dichloran	%	88 ± 59	38 – 117	No
Diphenylamine	%	97 ± 39	52 – 111	No
Flusilazole	%	80 ± 42	39 – 106	No
Hexazinone	%	56 ± 20	32 – 81	No
Kresoxim-methyl	%	73 ± 26	62 – 107	No
Malathion	%	86 ± 34	50 – 97	No
Methamidophos	%	52 ± 35	10.0 – 81	No
Metribuzin	%	100 ± 43	30 – 102	No
Myclobutanil	%	77 ± 30	52 – 95	No
Naled	%	0.000 ± 0.019	0.0 – 87	No
Oxadiazon	%	86 ± 28	61 – 106	No
Paclobutrazol	%	86 ± 33	32 – 116	No
Permethrin	%	86 ± 29	44 – 119	No
Pirimicarb	%	13.0 ± 6.9	14.0 – 63	Yes #1
Pirimiphos-methyl	%	94 ± 32	63 – 115	No
Propiconazole	%	73 ± 31	50 – 102	No
Quizalofop-ethyl	%	76 ± 51	49 – 107	No
Sulfentrazone	%	86 ± 57	23 – 132	No
Terbumeton	%	46 ± 20	43 – 99	No
Terbuthylazine-desethyl	%	106 ± 31	55 – 110	No
Terbutryn	%	81 ± 29	49 – 120	No
Thiabendazole	%	15 ± 10	4.0 – 56	No
Triazophos	%	85 ± 32	40 – 104	No
Vinclozolin	%	87 ± 32	52 – 103	No

LCS OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9748.2

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	98 ± 30	80 – 121	No
alpha-BHC	%	100 ± 31	76 – 121	No
beta-BHC	%	101 ± 39	75 – 113	No
delta-BHC	%	103 ± 36	74 – 114	No
gamma-BHC (Lindane)	%	95 ± 27	78 – 116	No
cis-Chlordane	%	91 ± 30	78 – 118	No
trans-Chlordane	%	95 ± 29	76 – 121	No
2,4'-DDD	%	94 ± 34	75 – 114	No
4,4'-DDD	%	100 ± 49	75 – 120	No
2,4'-DDE	%	97 ± 32	73 – 118	No
4,4'-DDE	%	92 ± 47	73 – 116	No
2,4'-DDT	%	93 ± 49	70 – 124	No
4,4'-DDT	%	99 ± 58	65 – 120	No
Dieldrin	%	95 ± 42	84 – 124	No
Endosulfan I	%	96 ± 35	81 – 120	No
Endosulfan II	%	94 ± 42	72 – 117	No
Endosulfan sulphate	%	98 ± 61	76 – 120	No
Endrin	%	99 ± 66	78 – 124	No

LCS OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9748.2				
		Results	Control Limits	Outside Limit (Yes/No)
Endrin aldehyde	%	108 ± 61	84 – 127	No
Endrin ketone	%	87 ± 42	69 – 115	No
Heptachlor	%	99 ± 34	74 – 120	No
Heptachlor epoxide	%	104 ± 30	79 – 119	No
Hexachlorobenzene	%	106 ± 37	77 – 116	No
Methoxychlor	%	101 ± 67	70 – 125	No

LCS OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9749.2				
		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	103 ± 31	80 – 121	No
alpha-BHC	%	103 ± 31	76 – 121	No
beta-BHC	%	91 ± 35	75 – 113	No
delta-BHC	%	104 ± 36	74 – 114	No
gamma-BHC (Lindane)	%	99 ± 28	78 – 116	No
cis-Chlordane	%	95 ± 31	78 – 118	No
trans-Chlordane	%	97 ± 30	76 – 121	No
2,4'-DDD	%	99 ± 36	75 – 114	No
4,4'-DDD	%	110 ± 53	75 – 120	No
2,4'-DDE	%	101 ± 33	73 – 118	No
4,4'-DDE	%	95 ± 48	73 – 116	No
2,4'-DDT	%	97 ± 51	70 – 124	No
4,4'-DDT	%	93 ± 54	65 – 120	No
Dieldrin	%	100 ± 45	84 – 124	No
Endosulfan I	%	104 ± 38	81 – 120	No
Endosulfan II	%	101 ± 45	72 – 117	No
Endosulfan sulphate	%	104 ± 65	76 – 120	No
Endrin	%	101 ± 67	78 – 124	No
Endrin aldehyde	%	115 ± 65	84 – 127	No
Endrin ketone	%	98 ± 48	69 – 115	No
Heptachlor	%	104 ± 36	74 – 120	No
Heptachlor epoxide	%	103 ± 29	79 – 119	No
Hexachlorobenzene	%	105 ± 36	77 – 116	No
Methoxychlor	%	101 ± 67	70 – 125	No

LCS OC/PAH xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18346.2				
		Results	Control Limits	Outside Limit (Yes/No)
1-Methylnaphthalene	%	90 ± 22	78 – 122	No
2-Methylnaphthalene	%	86 ± 21	72 – 117	No
Acenaphthylene	%	100.0 ± 9.1	75 – 118	No
Acenaphthene	%	108 ± 31	84 – 119	No
Anthracene	%	104 ± 32	79 – 121	No
Benzo[a]anthracene	%	108 ± 29	81 – 123	No
Benzo[a]pyrene (BAP)	%	109.0 ± 8.3	76 – 123	No
Benzo[b]fluoranthene + Benzo[j]fluoranthene	%	104 ± 22	80 – 121	No
Benzo[e]pyrene	%	88.0 ± 6.7	78 – 110	No
Benzo[g,h,i]perylene	%	117 ± 21	80 – 124	No
Benzo[k]fluoranthene	%	108 ± 14	79 – 121	No

LCS OC/PAH xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18346.2

		Results	Control Limits	Outside Limit (Yes/No)
Chrysene	%	102 ± 16	83 – 121	No
Dibenzo[a,h]anthracene	%	118 ± 16	78 – 124	No
Fluoranthene	%	107 ± 11	81 – 122	No
Fluorene	%	116 ± 14	86 – 122	No
Indeno(1,2,3-c,d)pyrene	%	114 ± 11	83 – 123	No
Naphthalene	%	105 ± 26	84 – 118	No
Phenanthrene	%	107 ± 15	84 – 120	No
Perylene	%	110.0 ± 8.4	60 – 107	Yes #2
Pyrene	%	104 ± 14	79 – 123	No

LCS OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9752.2

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	80 ± 25	80 – 121	No
alpha-BHC	%	80 ± 25	76 – 121	No
beta-BHC	%	75 ± 29	75 – 113	No
delta-BHC	%	79 ± 27	74 – 114	No
gamma-BHC (Lindane)	%	76 ± 22	78 – 116	Yes #3
cis-Chlordane	%	74 ± 24	78 – 118	Yes #3
trans-Chlordane	%	75 ± 23	76 – 121	Yes #3
2,4'-DDD	%	78 ± 29	75 – 114	No
4,4'-DDD	%	84 ± 41	75 – 120	No
2,4'-DDE	%	80 ± 26	73 – 118	No
4,4'-DDE	%	74 ± 38	73 – 116	No
2,4'-DDT	%	77 ± 41	70 – 124	No
4,4'-DDT	%	72 ± 42	65 – 120	No
Dieldrin	%	78 ± 35	84 – 124	Yes #3
Endosulfan I	%	81 ± 30	81 – 120	No
Endosulfan II	%	78 ± 35	72 – 117	No
Endosulfan sulphate	%	81 ± 51	76 – 120	No
Endrin	%	79 ± 53	78 – 124	No
Endrin aldehyde	%	94 ± 53	84 – 127	No
Endrin ketone	%	76 ± 37	69 – 115	No
Heptachlor	%	80 ± 28	74 – 120	No
Heptachlor epoxide	%	79 ± 23	79 – 119	No
Hexachlorobenzene	%	81 ± 28	77 – 116	No
Methoxychlor	%	78 ± 52	70 – 125	No

LCS OC/PAH xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18352.2

		Results	Control Limits	Outside Limit (Yes/No)
1-Methylnaphthalene	%	93 ± 23	78 – 122	No
2-Methylnaphthalene	%	88 ± 22	72 – 117	No
Acenaphthylene	%	89.0 ± 8.1	75 – 118	No
Acenaphthene	%	99 ± 29	84 – 119	No
Anthracene	%	95 ± 29	79 – 121	No
Benzo[a]anthracene	%	97 ± 26	81 – 123	No
Benzo[a]pyrene (BAP)	%	103.0 ± 7.9	76 – 123	No
Benzo[b]fluoranthene + Benzo[j]fluoranthene	%	101 ± 21	80 – 121	No

LCS OC/PAH xsSHOC - WS: Polycyclic Aromatic Hydrocarbons Soil Analysis: 18352.2

		Results	Control Limits	Outside Limit (Yes/No)
Benzo[e]pyrene	%	83.0 ± 6.4	78 – 110	No
Benzo[g,h,i]perylene	%	102 ± 18	80 – 124	No
Benzo[k]fluoranthene	%	103 ± 13	79 – 121	No
Chrysene	%	99 ± 15	83 – 121	No
Dibenzo[a,h]anthracene	%	102 ± 14	78 – 124	No
Fluoranthene	%	96.0 ± 9.7	81 – 122	No
Fluorene	%	101 ± 12	86 – 122	No
Indeno(1,2,3-c,d)pyrene	%	99.0 ± 9.2	83 – 123	No
Naphthalene	%	102 ± 25	84 – 118	No
Phenanthrene	%	101 ± 15	84 – 120	No
Perylene	%	102.0 ± 7.8	60 – 107	No
Pyrene	%	102 ± 14	79 – 123	No

Sample Spike QCs
Screen Sample Spike Mix1&3 - Multiresidue Soil Analysis Worksheet: 4164.18

		Results	Control Limits	Outside Limit (Yes/No)
Atrazine	%	67 ± 23	55 – 104	No
Atrazine-desisopropyl	%	72 ± 33	41 – 106	No
Azaconazole	%	99 ± 46	59 – 108	No
Azinphos-methyl	%	112 ± 55	5.0 – 147	No
Bromacil	%	116 ± 42	46 – 140	No
Carbaryl	%	79 ± 53	21 – 155	No
Carbofuran	%	76 ± 49	35 – 133	No
Chlorpyrifos	%	91 ± 34	59 – 127	No
Chlorpyrifos-methyl	%	78 ± 31	44 – 115	No
Cyfluthrin	%	150 ± 42	50 – 138	Yes #4
Diazinon	%	70 ± 25	57 – 102	No
Dichloran	%	100 ± 67	32 – 131	No
Diphenylamine	%	107 ± 43	53 – 119	No
Flusilazole	%	98 ± 51	56 – 110	No
Hexazinone	%	121 ± 42	51 – 114	Yes #4
Kresoxim-methyl	%	88 ± 31	64 – 104	No
Malathion	%	98 ± 39	43 – 126	No
Methamidophos	%	87 ± 58	25 – 126	No
Metribuzin	%	89 ± 38	38 – 88	Yes #5
Myclobutanil	%	92 ± 36	55 – 105	No
Naled	%	0.000 ± 0.019	0.0 – 110	No
Oxadiazon	%	89 ± 29	62 – 102	No
Paclobutrazol	%	144 ± 54	38 – 143	Yes #4
Permethrin	%	135 ± 46	58 – 137	No
Pirimicarb	%	74 ± 39	14.0 – 119	No
Pirimiphos-methyl	%	108 ± 37	56 – 125	No
Propiconazole	%	103 ± 43	49 – 124	No
Quizalofop-ethyl	%	110 ± 73	66 – 114	No
Sulfentrazone	%	190 ± 130	36 – 187	Yes #4
Terbutometon	%	71 ± 30	19.0 – 122	No

Screen Sample Spike Mix1&3 - Multiresidue Soil Analysis Worksheet: 4164.18

		Results	Control Limits	Outside Limit (Yes/No)
Terbutylazine-desethyl	%	75 ± 22	55 – 103	No
Terbutryn	%	112 ± 40	51 – 129	No
Thiabendazole	%	65 ± 43	0.0 – 114	No
Triazophos	%	107 ± 41	38 – 125	No
Vinclozolin	%	73 ± 27	52 – 97	No

Spike OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9748.21

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	110 ± 34	83 – 122	No
alpha-BHC	%	110 ± 34	80 – 122	No
beta-BHC	%	110 ± 42	79 – 114	No
delta-BHC	%	115 ± 40	76 – 118	No
gamma-BHC (Lindane)	%	104 ± 30	80 – 117	No
cis-Chlordane	%	100 ± 33	80 – 120	No
trans-Chlordane	%	104 ± 32	79 – 121	No
2,4'-DDD	%	106 ± 39	74 – 120	No
4,4'-DDD	%	117 ± 57	75 – 125	No
2,4'-DDE	%	107 ± 35	74 – 119	No
4,4'-DDE	%	102 ± 52	76 – 120	No
2,4'-DDT	%	93 ± 49	72 – 126	No
4,4'-DDT	%	94 ± 55	63 – 123	No
Dieldrin	%	103 ± 46	86 – 126	No
Endosulfan I	%	106 ± 39	83 – 120	No
Endosulfan II	%	104 ± 46	72 – 119	No
Endosulfan sulphate	%	111 ± 69	78 – 124	No
Endrin	%	105 ± 70	82 – 126	No
Endrin aldehyde	%	122 ± 69	84 – 131	No
Endrin ketone	%	99 ± 48	70 – 119	No
Heptachlor	%	104 ± 36	79 – 123	No
Heptachlor epoxide	%	113 ± 32	81 – 119	No
Hexachlorobenzene	%	113 ± 39	77 – 119	No
Methoxychlor	%	96 ± 64	71 – 133	No

Spike OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9749.25

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	111 ± 34	83 – 122	No
alpha-BHC	%	106 ± 32	80 – 122	No
beta-BHC	%	108 ± 42	79 – 114	No
delta-BHC	%	112 ± 39	76 – 118	No
gamma-BHC (Lindane)	%	104 ± 30	80 – 117	No
cis-Chlordane	%	109 ± 35	80 – 120	No
trans-Chlordane	%	111 ± 34	79 – 121	No
2,4'-DDD	%	114 ± 42	74 – 120	No
4,4'-DDD	%	128 ± 62	75 – 125	Yes #6
2,4'-DDE	%	114 ± 37	74 – 119	No
4,4'-DDE	%	101 ± 51	76 – 120	No
2,4'-DDT	%	114 ± 60	72 – 126	No

Spike OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9749.25

		Results	Control Limits	Outside Limit (Yes/No)
4,4'-DDT	%	108 ± 63	63 – 123	No
Dieldrin	%	114 ± 51	86 – 126	No
Endosulfan I	%	118 ± 43	83 – 120	No
Endosulfan II	%	119 ± 53	72 – 119	No
Endosulfan sulphate	%	119 ± 74	78 – 124	No
Endrin	%	117 ± 78	82 – 126	No
Endrin aldehyde	%	135 ± 76	84 – 131	Yes #6
Endrin ketone	%	115 ± 56	70 – 119	No
Heptachlor	%	116 ± 40	79 – 123	No
Heptachlor epoxide	%	114 ± 32	81 – 119	No
Hexachlorobenzene	%	107 ± 37	77 – 119	No
Methoxychlor	%	119 ± 79	71 – 133	No

Spike OC/PAH PrepWS xsSHOC - WS: Organochlorine Pesticides Soil Analysis: 9752.15

		Results	Control Limits	Outside Limit (Yes/No)
Aldrin	%	106 ± 32	83 – 122	No
alpha-BHC	%	106 ± 32	80 – 122	No
beta-BHC	%	99 ± 38	79 – 114	No
delta-BHC	%	106 ± 37	76 – 118	No
gamma-BHC (Lindane)	%	101 ± 29	80 – 117	No
cis-Chlordane	%	98 ± 32	80 – 120	No
trans-Chlordane	%	101 ± 31	79 – 121	No
2,4'-DDD	%	104 ± 38	74 – 120	No
4,4'-DDD	%	117 ± 57	75 – 125	No
2,4'-DDE	%	107 ± 35	74 – 119	No
4,4'-DDE	%	101 ± 51	76 – 120	No
2,4'-DDT	%	93 ± 49	72 – 126	No
4,4'-DDT	%	87 ± 51	63 – 123	No
Dieldrin	%	104 ± 46	86 – 126	No
Endosulfan I	%	109 ± 40	83 – 120	No
Endosulfan II	%	109 ± 48	72 – 119	No
Endosulfan sulphate	%	110 ± 69	78 – 124	No
Endrin	%	105 ± 70	82 – 126	No
Endrin aldehyde	%	125 ± 71	84 – 131	No
Endrin ketone	%	101 ± 49	70 – 119	No
Heptachlor	%	105 ± 36	79 – 123	No
Heptachlor epoxide	%	109 ± 31	81 – 119	No
Hexachlorobenzene	%	110 ± 38	77 – 119	No
Methoxychlor	%	94 ± 63	71 – 133	No

Reference Material QCs
SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14075.14

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.3 ± 2.2	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.88 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	25.9 ± 3.7	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	14.0 ± 2.6	10.5 – 16.2	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14075.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	35.9 ± 6.7	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	35.9 ± 6.7	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.313 ± 0.077	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	14.4 ± 2.3	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	204 ± 30	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14075.53				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.4 ± 2.2	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.85 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	27.1 ± 3.8	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	14.2 ± 2.6	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	36.3 ± 6.8	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	36.3 ± 6.8	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.357 ± 0.080	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	14.6 ± 2.3	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	207 ± 31	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14076.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.5 ± 2.2	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.86 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	26.2 ± 3.7	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	13.1 ± 2.5	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	32.3 ± 6.1	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	32.3 ± 6.1	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.342 ± 0.079	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	14.9 ± 2.4	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	194 ± 29	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14076.39				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	12.8 ± 2.4	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.94 ± 0.18	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	28.4 ± 4.0	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	14.3 ± 2.6	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	36.7 ± 6.9	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	36.7 ± 6.9	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.407 ± 0.084	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	15.7 ± 2.4	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	210 ± 31	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.7 ± 2.2	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.86 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	26.9 ± 3.8	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	14.3 ± 2.6	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	33.7 ± 6.3	26 – 40	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	33.7 ± 6.3	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.298 ± 0.076	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	14.9 ± 2.4	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	207 ± 31	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.27				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.5 ± 2.2	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.85 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	26.4 ± 3.7	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	13.8 ± 2.6	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	32.6 ± 6.1	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	32.6 ± 6.1	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.322 ± 0.078	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	15.1 ± 2.4	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	202 ± 30	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14077.72				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.9 ± 2.3	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.91 ± 0.17	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	27.1 ± 3.8	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	14.3 ± 2.6	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	34.0 ± 6.4	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	34.0 ± 6.4	26 – 40	No
Total Recoverable Mercury	mg/kg dry wt	0.389 ± 0.083	0.24 – 0.44	No
Total Recoverable Nickel	mg/kg dry wt	14.9 ± 2.4	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	220 ± 33	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14078.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	32.6 ± 6.1	26 – 40	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14078.56				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Lead	mg/kg dry wt	32.0 ± 6.0	26 – 40	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14079.14				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	10.9 ± 2.1	8.9 – 13.5	No
Total Recoverable Cadmium	mg/kg dry wt	0.81 ± 0.16	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	24.3 ± 3.5	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	12.8 ± 2.4	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	31.3 ± 5.9	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	31.3 ± 5.9	26 – 40	No
Total Recoverable Nickel	mg/kg dry wt	13.9 ± 2.3	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	193 ± 29	162 – 230	No

SETOC-704 QC - WS: High Volume Environmental Soils by ICP-MS (HVesTR): 14079.64				
		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Arsenic	mg/kg dry wt	11.4 ± 2.2	8.9 – 13.5	No

		Results	Control Limits	Outside Limit (Yes/No)
Total Recoverable Cadmium	mg/kg dry wt	0.83 ± 0.16	0.67 – 0.99	No
Total Recoverable Chromium	mg/kg dry wt	26.3 ± 3.7	21 – 30	No
Total Recoverable Copper	mg/kg dry wt	13.3 ± 2.5	10.5 – 16.2	No
Total Recoverable Lead	mg/kg dry wt	33.5 ± 6.3	26 – 40	No
Total Recoverable Lead	mg/kg dry wt	33.5 ± 6.3	26 – 40	No
Total Recoverable Nickel	mg/kg dry wt	14.5 ± 2.3	11.6 – 16.7	No
Total Recoverable Zinc	mg/kg dry wt	203 ± 30	162 – 230	No

Analyst's Comments

#1 It was noted that the Laboratory Control Spike (LCS) recovery for this analyte was outside the acceptable recovery range. It is known that some compounds are affected by the un-ashed sand matrix used as the LCS.

#2 The Laboratory Control Sample (LCS) spike recovery for this analyte was above the acceptable recovery range of the method. The corresponding sample result was accepted as the recovery is deemed to be fit for purpose when compared against generic 80-120% limits.

#3 The Laboratory Control Spike (LCS) recovery for this analyte was below the acceptable recovery range of the method. The corresponding sample result was accepted because the sample spike recovery was within the expected range.

#4 The sample spike recovery was elevated and above the acceptable recovery range. The corresponding sample results were accepted as there were no related positives detected in the sample.

#5 The sample spike recovery for this analyte was over the acceptable recovery range of the method. The corresponding sample result was accepted because the recovery is deemed to be fit for purpose when compared against generic 80-120% limits.

#6 The sample spike recovery was elevated and above the acceptable recovery range. The corresponding sample results were accepted as there were no positives detected in the sample.

Certificate of Analysis

Page 1 of 9

Client:	Engeo Limited	Lab No:	4234220	SPV2
Contact:	Natalie Flatman	Date Received:	04-Jun-2026	
	C/- Engeo Limited	Date Reported:	11-Jun-2026	
	PO Box 25047	Quote No:	82742	
	Wellington 6146	Order No:		
		Client Reference:	24181.000.001	
		Submitted By:	Jonathan Hupman	

Sample Type: Soil

Sample Name:	S29 03-Jun-2026	S30 03-Jun-2026	S31 03-Jun-2026	S32 03-Jun-2026	S33 03-Jun-2026
Lab Number:	4234220.1	4234220.2	4234220.3	4234220.4	4234220.5

Individual Tests

Dry Matter	g/100g as rcvd	81	82	77	79	85
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Heavy Metals with Mercury, Screen Level

Total Recoverable Arsenic	mg/kg dry wt	6	6	7	4	3
Total Recoverable Cadmium	mg/kg dry wt	0.10	0.14	0.15	0.17	0.20
Total Recoverable Chromium	mg/kg dry wt	18	17	17	15	13
Total Recoverable Copper	mg/kg dry wt	8	10	10	9	10
Total Recoverable Lead	mg/kg dry wt	16.4	20	15.9	14.1	12.9
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	10	10	10	9
Total Recoverable Zinc	mg/kg dry wt	62	86	69	73	81

Organochlorine Pesticides Screening in Soil

Aldrin	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
alpha-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
beta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
delta-BHC	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
gamma-BHC (Lindane)	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
cis-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
trans-Chlordane	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
2,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
4,4'-DDD	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
2,4'-DDE	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
4,4'-DDE	mg/kg dry wt	0.051	0.020	0.027	0.036	0.035
2,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
4,4'-DDT	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Total DDT Isomers	mg/kg dry wt	< 0.08	< 0.08	< 0.08	< 0.08	< 0.07
Dieldrin	mg/kg dry wt	0.012	0.014	< 0.013	< 0.013	< 0.012
Endosulfan I	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Endosulfan II	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Endosulfan sulphate	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Endrin	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Endrin aldehyde	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Endrin ketone	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Heptachlor	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Heptachlor epoxide	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Hexachlorobenzene	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012
Methoxychlor	mg/kg dry wt	< 0.012	< 0.012	< 0.013	< 0.013	< 0.012



This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.

Sample Type: Soil						
Sample Name:		S29 03-Jun-2026	S30 03-Jun-2026	S31 03-Jun-2026	S32 03-Jun-2026	S33 03-Jun-2026
Lab Number:		4234220.1	4234220.2	4234220.3	4234220.4	4234220.5
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Alachlor	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Atrazine	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Atrazine-desethyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Atrazine-desisopropyl	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Azaconazole	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Azinphos-methyl	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Benalaxyl	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Bitertanol	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Bromacil	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Bromopropylate	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Butachlor	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Captan	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Carbaryl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Carbofuran	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Chlorfluazuron	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Chlorothalonil	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Chlorpyrifos	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Chlorpyrifos-methyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Chlortoluron	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Cyanazine	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Cyfluthrin	mg/kg dry wt	< 0.08	< 0.07	< 0.08	< 0.08	< 0.07
Cyhalothrin	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Cypermethrin	mg/kg dry wt	< 0.15	< 0.14	< 0.15	< 0.15	< 0.14
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Diazinon	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Dichlofluanid	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Dichloran	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Dichlorvos	mg/kg dry wt	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Difenoconazole	mg/kg dry wt	< 0.09	< 0.09	< 0.09	< 0.09	< 0.09
Dimethoate	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Diphenylamine	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Diuron	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Fenpropimorph	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Fluazifop-butyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Fluometuron	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Flusilazole	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Fluvalinate	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Furalaxyl	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Haloxyfop-methyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Hexaconazole	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Hexazinone	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
Kresoxim-methyl	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Linuron	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Malathion	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Metalaxyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Methamidophos	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
Metolachlor	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Metribuzin	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Molinate	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Myclobutanil	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Naled	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
Norflurazon	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12

Sample Type: Soil						
Sample Name:		S29 03-Jun-2026	S30 03-Jun-2026	S31 03-Jun-2026	S32 03-Jun-2026	S33 03-Jun-2026
Lab Number:		4234220.1	4234220.2	4234220.3	4234220.4	4234220.5
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Oxadiazon	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Oxyfluorfen	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Paclobutrazol	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Parathion-ethyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Parathion-methyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Pendimethalin	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Permethrin	mg/kg dry wt	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pirimicarb	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Pirimiphos-methyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Prochloraz	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
Procymidone	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Prometryn	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Propachlor	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Propanil	mg/kg dry wt	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Propazine	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Propiconazole	mg/kg dry wt	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Pyriproxyfen	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Quizalofop-ethyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Simazine	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Simetryn	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Sulfentrazone	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.12	< 0.12	< 0.13	< 0.12	< 0.12
Tebuconazole	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Terbacil	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Terbumeton	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Terbuthylazine	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Terbuthylazine-desethyl	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Terbutryn	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Thiabendazole	mg/kg dry wt	< 0.3	< 0.3	< 0.4	< 0.3	< 0.3
Thiobencarb	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Tolyfluanid	mg/kg dry wt	< 0.03	< 0.03	< 0.04	< 0.03	< 0.03
Triazophos	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Trifluralin	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Vinclozolin	mg/kg dry wt	< 0.06	< 0.06	< 0.07	< 0.06	< 0.06
Sample Name:		S34 03-Jun-2026	S35 03-Jun-2026	S36 03-Jun-2026	S37 0.1 04-Jun-2026	S37 0.3 04-Jun-2026
Lab Number:		4234220.6	4234220.7	4234220.8	4234220.9	4234220.10
Individual Tests						
Dry Matter	g/100g as rcvd	63	78	82	-	-
Total Recoverable Lead	mg/kg dry wt	-	-	-	142	86
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	4	7	-	-
Total Recoverable Cadmium	mg/kg dry wt	0.13	0.12	0.14	-	-
Total Recoverable Chromium	mg/kg dry wt	16	15	15	-	-
Total Recoverable Copper	mg/kg dry wt	11	8	9	-	-
Total Recoverable Lead	mg/kg dry wt	15.1	16.2	15.4	-	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	-	-
Total Recoverable Nickel	mg/kg dry wt	12	10	10	-	-
Total Recoverable Zinc	mg/kg dry wt	68	66	77	-	-
Organochlorine Pesticides Screening in Soil						
Aldrin	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
alpha-BHC	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
beta-BHC	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
delta-BHC	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-

Sample Type: Soil						
Sample Name:		S34 03-Jun-2026	S35 03-Jun-2026	S36 03-Jun-2026	S37 0.1 04-Jun-2026	S37 0.3 04-Jun-2026
Lab Number:		4234220.6	4234220.7	4234220.8	4234220.9	4234220.10
Organochlorine Pesticides Screening in Soil						
gamma-BHC (Lindane)	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
cis-Chlordane	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
trans-Chlordane	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
2,4'-DDD	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
4,4'-DDD	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
2,4'-DDE	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
4,4'-DDE	mg/kg dry wt	0.019	0.052	0.083	-	-
2,4'-DDT	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
4,4'-DDT	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Total DDT Isomers	mg/kg dry wt	< 0.10	< 0.08	0.09	-	-
Dieldrin	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endosulfan I	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endosulfan II	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endosulfan sulphate	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endrin	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endrin aldehyde	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Endrin ketone	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Heptachlor	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Heptachlor epoxide	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Hexachlorobenzene	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Methoxychlor	mg/kg dry wt	< 0.016	< 0.013	< 0.012	-	-
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Acetochlor	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Alachlor	mg/kg dry wt	< 0.05	< 0.05	< 0.05	-	-
Atrazine	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Atrazine-desethyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Atrazine-desisopropyl	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Azaconazole	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Azinphos-methyl	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Benalaxyl	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Bitertanol	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Bromacil	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Bromopropylate	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Butachlor	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Captan	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Carbaryl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Carbofuran	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Chlorfluazuron	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Chlorothalonil	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Chlorpyrifos	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Chlorpyrifos-methyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Chlortoluron	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Cyanazine	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Cyfluthrin	mg/kg dry wt	< 0.10	< 0.08	< 0.07	-	-
Cyhalothrin	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Cypermethrin	mg/kg dry wt	< 0.19	< 0.15	< 0.14	-	-
Deltamethrin (including Tralomethrin)	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Diazinon	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Dichlofluanid	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Dichloran	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Dichlorvos	mg/kg dry wt	< 0.09	< 0.09	< 0.09	-	-
Difenoconazole	mg/kg dry wt	< 0.11	< 0.09	< 0.09	-	-
Dimethoate	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Diphenylamine	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-

Sample Type: Soil						
Sample Name:		S34 03-Jun-2026	S35 03-Jun-2026	S36 03-Jun-2026	S37 0.1 04-Jun-2026	S37 0.3 04-Jun-2026
Lab Number:		4234220.6	4234220.7	4234220.8	4234220.9	4234220.10
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Diuron	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Fenpropimorph	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Fluazifop-butyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Fluometuron	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Flusilazole	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Fluvalinate	mg/kg dry wt	< 0.06	< 0.05	< 0.05	-	-
Furalaxyl	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Haloxifop-methyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Hexaconazole	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Hexazinone	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
IPBC (3-Iodo-2-propynyl-n-butylcarbamate)	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
Kresoxim-methyl	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Linuron	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Malathion	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Metalaxyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Methamidophos	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
Metolachlor	mg/kg dry wt	< 0.05	< 0.05	< 0.05	-	-
Metribuzin	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Molinate	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Myclobutanil	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Naled	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
Norflurazon	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Oxadiazon	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Oxyfluorfen	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Paclobutrazol	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Parathion-ethyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Parathion-methyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Pendimethalin	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Permethrin	mg/kg dry wt	< 0.03	< 0.03	< 0.03	-	-
Pirimicarb	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Pirimiphos-methyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Prochloraz	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
Procymidone	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Prometryn	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Propachlor	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Propanil	mg/kg dry wt	< 0.2	< 0.2	< 0.2	-	-
Propazine	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Propiconazole	mg/kg dry wt	< 0.06	< 0.05	< 0.05	-	-
Pyriproxyfen	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Quizalofop-ethyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Simazine	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Simetryn	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Sulfentrazone	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
TCMTB [2-(thiocyanomethylthio) benzothiazole, Busan]	mg/kg dry wt	< 0.15	< 0.12	< 0.12	-	-
Tebuconazole	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Terbacil	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Terbumeton	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Terbuthylazine	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-
Terbuthylazine-desethyl	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Terbutryn	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Thiabendazole	mg/kg dry wt	< 0.4	< 0.3	< 0.3	-	-
Thiobencarb	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Tolyfluanid	mg/kg dry wt	< 0.04	< 0.03	< 0.03	-	-

Sample Type: Soil						
Sample Name:	S34 03-Jun-2026	S35 03-Jun-2026	S36 03-Jun-2026	S37 0.1 04-Jun-2026	S37 0.3 04-Jun-2026	
Lab Number:	4234220.6	4234220.7	4234220.8	4234220.9	4234220.10	
Organonitro&phosphorus Pesticides Screen in Soil by GCMS						
Triazophos	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Trifluralin	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Vinclozolin	mg/kg dry wt	< 0.08	< 0.06	< 0.06	-	-
Sample Name:	S38 0.1 04-Jun-2026	S38 0.4 04-Jun-2026	S39 0.1 04-Jun-2026	S39 0.3 04-Jun-2026	S40 0.1 04-Jun-2026	
Lab Number:	4234220.11	4234220.12	4234220.13	4234220.14	4234220.15	
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	390	55	55	34	210
Sample Name:	S40 0.3 04-Jun-2026	S41 0.1 04-Jun-2026	S41 0.3 04-Jun-2026	S42 0.1 04-Jun-2026	S42 0.3 04-Jun-2026	
Lab Number:	4234220.16	4234220.17	4234220.18	4234220.19	4234220.20	
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	156	54	34	4,400	199
Sample Name:	S43 0.1 04-Jun-2026	S43 0.3 04-Jun-2026	S44 0.1 04-Jun-2026	S44 0.3 04-Jun-2026	S45 03-Jun-2026	
Lab Number:	4234220.21	4234220.22	4234220.23	4234220.24	4234220.25	
Individual Tests						
Total Recoverable Lead	mg/kg dry wt	171	91	92	60	-
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	4
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	-	0.16
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	19
Total Recoverable Copper	mg/kg dry wt	-	-	-	-	5
Total Recoverable Lead	mg/kg dry wt	-	-	-	-	15.1
Total Recoverable Mercury	mg/kg dry wt	-	-	-	-	< 0.10
Total Recoverable Nickel	mg/kg dry wt	-	-	-	-	13
Total Recoverable Zinc	mg/kg dry wt	-	-	-	-	52
Sample Name:	S46 03-Jun-2026	S47 03-Jun-2026	S48 03-Jun-2026	S49 03-Jun-2026	S50 03-Jun-2026	
Lab Number:	4234220.26	4234220.27	4234220.28	4234220.29	4234220.30	
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	3	3	7	4
Total Recoverable Cadmium	mg/kg dry wt	0.17	0.14	0.15	0.14	0.14
Total Recoverable Chromium	mg/kg dry wt	15	15	15	16	17
Total Recoverable Copper	mg/kg dry wt	6	5	6	5	6
Total Recoverable Lead	mg/kg dry wt	15.0	14.7	15.3	15.4	15.4
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	10	10	11	11
Total Recoverable Zinc	mg/kg dry wt	54	53	54	54	54
Sample Name:	S51 03-Jun-2026	S52 03-Jun-2026	S53 03-Jun-2026	S54 03-Jun-2026	S55 03-Jun-2026	
Lab Number:	4234220.31	4234220.32	4234220.33	4234220.34	4234220.35	
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	4	3	7	3	3
Total Recoverable Cadmium	mg/kg dry wt	0.14	0.15	0.12	0.12	0.13
Total Recoverable Chromium	mg/kg dry wt	15	15	15	15	15
Total Recoverable Copper	mg/kg dry wt	6	5	5	5	6
Total Recoverable Lead	mg/kg dry wt	14.9	14.3	14.3	13.8	14.5
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	10	10	10	10
Total Recoverable Zinc	mg/kg dry wt	54	55	50	56	55
Sample Name:	S56 03-Jun-2026	S57 03-Jun-2026	S58 03-Jun-2026	S59 03-Jun-2026	S60 03-Jun-2026	
Lab Number:	4234220.36	4234220.37	4234220.38	4234220.39	4234220.40	

Sample Type: Soil						
Sample Name:		S56 03-Jun-2026	S57 03-Jun-2026	S58 03-Jun-2026	S59 03-Jun-2026	S60 03-Jun-2026
Lab Number:		4234220.36	4234220.37	4234220.38	4234220.39	4234220.40
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	4	3	4	3
Total Recoverable Cadmium	mg/kg dry wt	0.13	0.16	0.15	0.12	0.15
Total Recoverable Chromium	mg/kg dry wt	15	15	14	15	14
Total Recoverable Copper	mg/kg dry wt	5	6	6	6	5
Total Recoverable Lead	mg/kg dry wt	13.8	14.8	13.4	15.1	13.3
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Recoverable Nickel	mg/kg dry wt	10	10	10	10	9
Total Recoverable Zinc	mg/kg dry wt	52	55	55	55	48
Sample Name:		S61 03-Jun-2026	S62 03-Jun-2026	S63 03-Jun-2026	S64 03-Jun-2026	LBPN 04-Jun-2026
Lab Number:		4234220.41	4234220.42	4234220.43	4234220.44	4234220.45
Individual Tests						
Dry Matter	g/100g as rcvd	-	-	-	-	58
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	-	-	-	-	19
Total Recoverable Cadmium	mg/kg dry wt	-	-	-	-	0.36
Total Recoverable Chromium	mg/kg dry wt	-	-	-	-	35
Total Recoverable Copper	mg/kg dry wt	-	-	-	-	94
Total Recoverable Lead	mg/kg dry wt	-	-	-	-	21
Total Recoverable Nickel	mg/kg dry wt	-	-	-	-	18
Total Recoverable Zinc	mg/kg dry wt	-	-	-	-	480
Heavy Metals with Mercury, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	3	3	4	6	-
Total Recoverable Cadmium	mg/kg dry wt	0.16	0.14	0.14	0.17	-
Total Recoverable Chromium	mg/kg dry wt	15	15	15	16	-
Total Recoverable Copper	mg/kg dry wt	6	6	6	5	-
Total Recoverable Lead	mg/kg dry wt	12.5	14.2	13.7	14.6	-
Total Recoverable Mercury	mg/kg dry wt	< 0.10	< 0.10	< 0.10	< 0.10	-
Total Recoverable Nickel	mg/kg dry wt	10	10	11	11	-
Total Recoverable Zinc	mg/kg dry wt	53	52	56	54	-
Polycyclic Aromatic Hydrocarbons Screening in Soil*						
Total of Reported PAHs in Soil	mg/kg dry wt	-	-	-	-	< 0.5
1-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.018
2-Methylnaphthalene	mg/kg dry wt	-	-	-	-	< 0.018
Acenaphthylene	mg/kg dry wt	-	-	-	-	< 0.018
Acenaphthene	mg/kg dry wt	-	-	-	-	< 0.018
Anthracene	mg/kg dry wt	-	-	-	-	< 0.018
Benzo[a]anthracene	mg/kg dry wt	-	-	-	-	< 0.018
Benzo[a]pyrene (BAP)	mg/kg dry wt	-	-	-	-	0.020
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	-	-	-	-	< 0.042
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	-	-	-	-	< 0.042
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	-	-	-	-	0.037
Benzo[e]pyrene	mg/kg dry wt	-	-	-	-	0.052
Benzo[g,h,i]perylene	mg/kg dry wt	-	-	-	-	0.022
Benzo[k]fluoranthene	mg/kg dry wt	-	-	-	-	< 0.018
Chrysene	mg/kg dry wt	-	-	-	-	< 0.018
Dibenzo[a,h]anthracene	mg/kg dry wt	-	-	-	-	< 0.018
Fluoranthene	mg/kg dry wt	-	-	-	-	< 0.018
Fluorene	mg/kg dry wt	-	-	-	-	< 0.018
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	-	-	-	-	< 0.018
Naphthalene	mg/kg dry wt	-	-	-	-	< 0.09
Perylene	mg/kg dry wt	-	-	-	-	< 0.018
Phenanthrene	mg/kg dry wt	-	-	-	-	0.026

Sample Type: Soil					
Sample Name:		S61 03-Jun-2026	S62 03-Jun-2026	S63 03-Jun-2026	S64 03-Jun-2026
Lab Number:		4234220.41	4234220.42	4234220.43	4234220.44
LBPB 04-Jun-2026					
4234220.45					
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Pyrene	mg/kg dry wt	-	-	-	0.020
Sample Name:		LBPM 04-Jun-2026		LBPS 04-Jun-2026	
Lab Number:		4234220.46		4234220.47	
Individual Tests					
Dry Matter	g/100g as rcvd	74		65	
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	17		210	
Total Recoverable Cadmium	mg/kg dry wt	0.37		0.32	
Total Recoverable Chromium	mg/kg dry wt	27		82	
Total Recoverable Copper	mg/kg dry wt	52		135	
Total Recoverable Lead	mg/kg dry wt	37		105	
Total Recoverable Nickel	mg/kg dry wt	12		11	
Total Recoverable Zinc	mg/kg dry wt	200		370	
Polycyclic Aromatic Hydrocarbons Screening in Soil*					
Total of Reported PAHs in Soil	mg/kg dry wt	< 0.4		< 0.4	
1-Methylnaphthalene	mg/kg dry wt	< 0.014		< 0.016	
2-Methylnaphthalene	mg/kg dry wt	< 0.014		< 0.016	
Acenaphthylene	mg/kg dry wt	< 0.014		< 0.016	
Acenaphthene	mg/kg dry wt	< 0.014		< 0.016	
Anthracene	mg/kg dry wt	< 0.014		< 0.016	
Benzo[a]anthracene	mg/kg dry wt	< 0.014		< 0.016	
Benzo[a]pyrene (BAP)	mg/kg dry wt	< 0.014		< 0.016	
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	mg/kg dry wt	< 0.033		< 0.037	
Benzo[a]pyrene Toxic Equivalence (TEF)*	mg/kg dry wt	< 0.033		< 0.037	
Benzo[b]fluoranthene + Benzo[j] fluoranthene	mg/kg dry wt	< 0.014		< 0.016	
Benzo[e]pyrene	mg/kg dry wt	< 0.014		< 0.016	
Benzo[g,h,i]perylene	mg/kg dry wt	< 0.014		< 0.016	
Benzo[k]fluoranthene	mg/kg dry wt	< 0.014		< 0.016	
Chrysene	mg/kg dry wt	< 0.014		< 0.016	
Dibenzo[a,h]anthracene	mg/kg dry wt	< 0.014		< 0.016	
Fluoranthene	mg/kg dry wt	< 0.014		< 0.016	
Fluorene	mg/kg dry wt	< 0.014		< 0.016	
Indeno(1,2,3-c,d)pyrene	mg/kg dry wt	< 0.014		< 0.016	
Naphthalene	mg/kg dry wt	< 0.07		< 0.08	
Perylene	mg/kg dry wt	< 0.014		< 0.016	
Phenanthrene	mg/kg dry wt	< 0.014		< 0.016	
Pyrene	mg/kg dry wt	< 0.014		< 0.016	

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	1-47
Environmental Solids Sample Preparation	Air dried at 35°C and sieved, <2mm fraction. Used for sample preparation May contain a residual moisture content of 2-5%. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed).	-	9-24

Sample Type: Soil			
Test	Method Description	Default Detection Limit	Sample No
Total of Reported PAHs in Soil	Sonication extraction, GC-MS/MS analysis. In-house based on US EPA 8270.	0.03 mg/kg dry wt	45-47
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.10 - 4 mg/kg dry wt	45-47
Heavy Metals with Mercury, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.10 - 4 mg/kg dry wt	1-8, 25-44
Organochlorine Pesticides Screening in Soil	Sonication extraction, GC-ECD analysis. Tested on as received sample. In-house based on US EPA 8081.	0.010 - 0.06 mg/kg dry wt	1-8
Organonitro&phosphorus Pesticides Screen in Soil by GCMS	Sonication extraction, GC-MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.02 - 0.2 mg/kg dry wt	1-8
Polycyclic Aromatic Hydrocarbons Screening in Soil*	Sonication extraction, GC-MS/MS analysis. Tested on as received sample. In-house based on US EPA 8270.	0.010 - 0.05 mg/kg dry wt	45-47
Dry Matter	Dried at 103°C for 4-22hr (removes 3-5% more water than air dry) , gravimetry. (Free water removed before analysis, non-soil objects such as sticks, leaves, grass and stones also removed). US EPA 3550.	0.10 g/100g as rcvd	1-8, 45-47
Total Recoverable digestion	Nitric / hydrochloric acid digestion. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	-	9-24
Total Recoverable Lead	Dried sample, sieved as specified (if required). Nitric/Hydrochloric acid digestion, ICP-MS, screen level. US EPA 200.2 (modified), APHA 3125 B: Online Edition.	0.4 mg/kg dry wt	9-24
Benzo[a]pyrene Potency Equivalency Factor (PEF) NES*	BaP Potency Equivalence calculated from; Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(j)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Benzo(a)pyrene x 1.0 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Fluoranthene x 0.01 + Indeno(1,2,3-c,d)pyrene x 0.1. Ministry for the Environment. 2011. Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health. Wellington: Ministry for the Environment.	0.024 mg/kg dry wt	45-47
Benzo[a]pyrene Toxic Equivalence (TEF)*	Benzo[a]pyrene Toxic Equivalence (TEF) calculated from; Benzo[a]pyrene x 1.0 + Benzo(a)anthracene x 0.1 + Benzo(b)fluoranthene x 0.1 + Benzo(k)fluoranthene x 0.1 + Chrysene x 0.01 + Dibenzo(a,h)anthracene x 1.0 + Indeno(1,2,3-c,d)pyrene x 0.1. Guidelines for assessing and managing contaminated gasworks sites in New Zealand (GMG) (MfE, 1997).	0.024 mg/kg dry wt	45-47

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

Testing was completed between 05-Jun-2026 and 11-Jun-2026. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

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Kim Harrison MSc
Client Services Manager - Environmental

Appendix 7: Summary of Results Tables

	Heavy Metals / Metalloids								Polycyclic Aromatic Hydrocarbons									Total Petroleum Hydrocarbons				Organochlorine Pesticides								Organophosphorus Pesticides	Asbestos
									(Benzo[a]pyrene Equivalent)			(Other)																			
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Benzo(a,b)fluoranthene	Benzo(a)pyrene	Benzo(a)pyrene TEQ	Benzo(e)pyrene	Benzo(g,h,i)perylene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	C7- C9	C10 - C14	C15 - C34	Total C7 - C36	DDD, 2,4'-	DDD, 4,4'-	DDE, 2,4'-	DDE, 4,4'-	DDT, 2,4'-	DDT, 4,4'-	DDT - Total	Dieldrin	All ONOPs	Presence/ Absence
Human Health Criteria - Residential ¹	20	3 ²	460 ⁶	10000 ⁷	210 ⁸	310	400 ⁹	7400 ⁹	- ¹⁰	- ¹⁰	10	5.7 ¹¹	-	63 ¹²	5 ¹³	1600 ¹²	-	500 ¹²	560 ¹²	NA ¹²	-	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	70	2.6 ¹⁵	Various	-
Upper Guideline Values for Sediment (GV-high) ²	70	10	370	270	220	1	52	410	-	-	-	-	-	-	-	-	50000	-	-	-	550	-	-	-	- ¹⁶	-	-	5 ¹⁶	7 ¹⁶	Various	-
Ecological Soil Guideline Value (Residential / Recreational Land use) ³	80	12	390	240	900	-	-	300	-	22	-	-	-	-	-	-	-	130	110	300	-	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	4.8	-	Various	-
Human Health Criteria - Recreational ⁴	80	400	2700 ⁶	10000 ⁷	880 ⁸	1800	1200 ¹⁷	30000 ¹⁷	- ¹⁸	- ¹⁸	40	73 ¹⁸	-	49 ¹²	5 ¹³	1600 ¹²	-	-	-	-	-	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	- ¹⁴	400	70 ¹⁵	-	-

Sample Location	Depth (m bgl)	Date Sampled	Paddocks																															
S45	0.0 - 0.2	03-Jun-2026	4	0.16	19	5	15.1	<0.1	13	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
S46	0.0 - 0.2		4	0.17	15	6	15	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S47	0.0 - 0.2		3	0.14	15	5	14.7	<0.1	10	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S48	0.0 - 0.2		3	0.15	15	6	15.3	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S49	0.0 - 0.2		7	0.14	16	5	15.4	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S50	0.0 - 0.2		4	0.14	17	6	15.4	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S51	0.0 - 0.2		4	0.14	15	6	14.9	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S52	0.0 - 0.2		3	0.15	15	5	14.3	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S53	0.0 - 0.2		7	0.12	15	5	14.3	<0.1	10	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S54	0.0 - 0.2		3	0.12	15	5	13.8	<0.1	10	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S55	0.0 - 0.2		3	0.13	15	6	14.5	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S56	0.0 - 0.2		3	0.13	15	5	13.8	<0.1	10	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S57	0.0 - 0.2		4	0.16	15	6	14.8	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S58	0.0 - 0.2		3	0.15	14	6	13.4	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S59	0.0 - 0.2		4	0.12	15	6	15.1	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S60	0.0 - 0.2		3	0.15	14	5	13.3	<0.1	9	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S61	0.0 - 0.2	3	0.16	15	6	12.5	<0.1	10	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S62	0.0 - 0.2	3	0.14	15	6	14.2	<0.1	10	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S63	0.0 - 0.2	4	0.14	15	6	13.7	<0.1	11	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S64	0.0 - 0.2	6	0.17	16	5	14.6	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table Notes:
All results and criteria are presented in milligram per kilogram (mg/kg) on a dry weight basis, except asbestos which is reported as % weight of asbestos / weight of sample (%w/w)
Selected results shown; Full results are included in the laboratory reports
LOR: Limit of Reporting; Results below LOR or exceeding no criteria are shown in grey text
- : not analysed or no applicable criteria
m bgl: metres below ground level
NAD: No asbestos detected

Criteria notes:
1: Human Health Criteria for Residential Land use selected in general accordance with CLMG No. 2 (MfE, 2011). Unless otherwise stated, criteria are from MfE (2011) Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (Residential Land Use)
2: Australian and New Zealand Guidelines for Fresh and Marine Water Quality - Upper Guideline Values for Sediment
3: Updated Development of Soil Guideline Values for the Protection of Ecological Receptors (Eco-SGVs): Technical Document (Landcare Research, June 2019). Eco-SGVs for typical soil, aged contamination source, and a residential/recreational land use
4: Human Health Criteria for Recreational Land use selected in general accordance with CLMG No. 2 (MfE, 2011). Unless otherwise stated, criteria are from MfE (2011) Methodology for Deriving Standards for Contaminants in Soil to Protect Human Health (Recreational Land Use)
5: Conservatively assumes soil pH of 5 for produce ingestion pathway.
6: Criterion applies to Cr(VI). Conservatively applied to total Cr laboratory result
7: No limit; 10,000 mg/kg conservatively applied. Derived human health value exceeds values likely to be encountered on-site and phytotoxicity threshold
8: Applies to inorganic lead only
9: Australian National Environment Protection (Assessment of Site Contamination) Measure 2013; Health Investigation Levels for 'Residential A' Land Use
10: Included in Benzo[a]pyrene TEQ; individual criteria not presented
11: US EPA Regional Screening Levels for Residential Soil; values for TR = 10⁻⁴, THQ = 1.0. Retrieved from online database April, 2024.
12: Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand (Revised 2011) (MfE, 2011). Soil Acceptance Criteria for Residential Use; Sandy Silts and contamination depth <1m
13: Canadian Council for Ministers for the Environment (CCME) Soil Quality Guidelines for the Protection of Environmental and Human Health (retrieved from online database April, 2024). Criteria for Residential/Parkland land use
14: Included in Total DDT; individual criteria not presented
15: Criteria applies to Aldrin, Dieldrin, or sum of both
16: Assumes 1% organic content
17: Australian National Environment Protection (Assessment of Site Contamination) Measure 2013; Health Investigation Levels for 'Recreational C' Land Use
18: US EPA Regional Screening Levels for Industrial Soil; values for TR = 10⁻⁴, THQ = 1.0. Retrieved from online database April, 2024.


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	Heavy Metals / Metalloids								Polycyclic Aromatic Hydrocarbons								Total Petroleum Hydrocarbons				Organochlorine Pesticides								Organophosphorus Pesticites	Asbestos	
									(Benzo[a]pyrene Equivalent)			(Other)																			
	Arsenic	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Zinc	Benzo[<i>b</i> , <i>k</i>]fluoranthene	Benzo[<i>a</i>]pyrene	Benzo[<i>a</i>]pyrene TEQ	Benzo[<i>e</i>]pyrene	Benzo[<i>ghi</i>]perylene	Naphthalene	Phenanthrene	Pyrene	Total PAHs	C7 - C9	C10 - C14	C15 - C34	Total C7 - C36	DDD, 2,4'-	DDD, 4,4'-	DDE, 2,4'-	DDE, 4,4'-	DDT, 2,4'-	DDT, 4,4'-	DDT - Total	Dieldrin	All ONOPs	Presence/ Absence
Class A Landfill Screening Criteria ^a	100	20	100	100	100	4	200	200	-	-	-	-	-	200	-	1600	-	-	-	-	-	-	-	-	-	-	-	-	8	Various	-
Burwood Landfill ^a	80	400	2700	>10000	880	1800	800	14000	-	-	40	-	-	-	-	-	-	120	8500	10000	-	-	-	-	-	-	-	400	70	Various	-
Background - Canterbury Region ^a	6.35	0.14	19.89	11.68	19.75	0.07	13.91	69.58	-	0.595 ^a	0.922	-	0.459 ^a	0.029 ^a	0.703 ^a	1.362 ^a	-	-	-	-	-	-	-	0.00152	0.0093 ^a	0.00076	0.012	0.0236 ^a	0.41 ^a	-	-

Sample Location	Depth (m bgl)	Date Sampled
-----------------	---------------	--------------

			Paddocks																																	
S45	0.0 - 0.2	03-Jun-2026	4	0.16	19	5	15.1	<0.1	13	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S46	0.0 - 0.2		4	0.17	15	8	15	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S47	0.0 - 0.2		3	0.14	15	5	14.7	<0.1	10	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S48	0.0 - 0.2		3	0.15	15	8	15.3	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S49	0.0 - 0.2		7	0.14	18	5	15.4	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S50	0.0 - 0.2		4	0.14	17	8	15.4	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S51	0.0 - 0.2		4	0.14	15	8	14.9	<0.1	10	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S52	0.0 - 0.2		3	0.15	15	5	14.3	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S53	0.0 - 0.2		7	0.12	15	5	14.3	<0.1	10	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S54	0.0 - 0.2		3	0.12	15	5	13.8	<0.1	10	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S55	0.0 - 0.2		3	0.13	15	8	14.5	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S56	0.0 - 0.2		3	0.13	15	5	13.8	<0.1	10	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S57	0.0 - 0.2		4	0.16	15	8	14.8	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S58	0.0 - 0.2		3	0.15	14	8	13.4	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S59	0.0 - 0.2		4	0.12	15	8	15.1	<0.1	10	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S60	0.0 - 0.2		3	0.15	14	5	13.3	<0.1	9	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S61	0.0 - 0.2		3	0.16	15	8	12.5	<0.1	10	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S62	0.0 - 0.2		3	0.14	15	8	14.2	<0.1	10	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S63	0.0 - 0.2		4	0.14	15	8	13.7	<0.1	11	56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
S64	0.0 - 0.2		6	0.17	18	5	14.8	<0.1	11	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			

Table Notes:
All results and criteria are presented in milligram per kilogram (mg/kg) on a dry weight basis, except asbestos which is reported as % weight of asbestos / weight of sample (%w/w)
Selected results shown; Full results are included in the laboratory reports
LOR: Limit of Reporting; Results below LOR or exceeding no criteria are shown in grey text
- : not analysed or no applicable criteria
m bgl: metres below ground level
NAD: No asbestos detected

Criteria notes:
1: Hazardous Waste Guidelines: Landfill Waste Acceptance Criteria and Landfill Classification (MfE, 2004). Class A Screening Criteria from Table 1
2: Soil Contaminated Standards for Bunwood Landfill - Burwood Landfill Soil Acceptance Criteria - Table 1
3: Unless otherwise stated, criteria from: Background concentrations of selected trace elements in Canterbury (Tonkin & Taylor, 2007). Level 2 Background Levels (Regional) for Provincial Centre Soil Group.
4: Background PAH Urban Soils Christchurch - Background Concentrations of Polycyclic Aromatic Hydrocarbons in Urban Christchurch Soils (Tonkin and Taylor 2007)
5: Ambient Concentrations of Selected Organochlorines in Soils, MfE (1998). Mean soil concentrations for Provincial Centre land use

Appendix 8: Pro UCL Worksheet

	A	B	C	D	E	F	G	H	I	J	K
1	UCL Statistics for Uncensored Full Data Sets										
2											
3	User Selected Options										
4	Date/Time of Computation			ProUCL 5.2 16/06/2026 10:12:18 am							
5	From File			WorkSheet.xls							
6	Full Precision			OFF							
7	Confidence Coefficient			95%							
8	Number of Bootstrap Operations			2000							
9											
10											
11	Cadmium										
12											
13	General Statistics										
14	Total Number of Observations					20		Number of Distinct Observations			
15								Number of Missing Observations			
16	Minimum					0.12		Mean			
17	Maximum					0.17		Median			
18	SD					0.0154		Std. Error of Mean			
19	Coefficient of Variation					0.107		Skewness			
20											
21	Normal GOF Test										
22	Shapiro Wilk Test Statistic					0.937		Shapiro Wilk GOF Test			
23	1% Shapiro Wilk Critical Value					0.868		Data appear Normal at 1% Significance Level			
24	Lilliefors Test Statistic					0.153		Lilliefors GOF Test			
25	1% Lilliefors Critical Value					0.223		Data appear Normal at 1% Significance Level			
26	Data appear Normal at 1% Significance Level										
27											
28	Assuming Normal Distribution										
29	95% Normal UCL					95% UCLs (Adjusted for Skewness)					
30	95% Student's-t UCL					0.15		95% Adjusted-CLT UCL (Chen-1995)			
31								95% Modified-t UCL (Johnson-1978)			
32											
33	Gamma GOF Test										
34	A-D Test Statistic					0.507		Anderson-Darling Gamma GOF Test			
35	5% A-D Critical Value					0.74		Detected data appear Gamma Distributed at 5% Significan			
36	K-S Test Statistic					0.158		Kolmogorov-Smirnov Gamma GOF Test			
37	5% K-S Critical Value					0.193		Detected data appear Gamma Distributed at 5% Significan			
38	Detected data appear Gamma Distributed at 5% Significance Level										
39											
40	Gamma Statistics										
41	k hat (MLE)					91.73		k star (bias corrected MLE)			
42	Theta hat (MLE)					0.00157		Theta star (bias corrected MLE)			
43	nu hat (MLE)					3669		nu star (bias corrected)			
44	MLE Mean (bias corrected)					0.144		MLE Sd (bias corrected)			
45						Approximate Chi Square Value (0.05)					
46	Adjusted Level of Significance					0.038		Adjusted Chi Square Value			
47											
48	Assuming Gamma Distribution										
49	95% Approximate Gamma UCL					0.15		95% Adjusted Gamma UCL			
50											
51	Lognormal GOF Test										
52	Shapiro Wilk Test Statistic					0.933		Shapiro Wilk Lognormal GOF Test			
53	10% Shapiro Wilk Critical Value					0.92		Data appear Lognormal at 10% Significance Leve			
54	Lilliefors Test Statistic					0.166		Lilliefors Lognormal GOF Test			

	A	B	C	D	E	F	G	H	I	J	K	
55	10% Lilliefors Critical Value					0.176	Data appear Lognormal at 10% Significance Level					
56	Data appear Lognormal at 10% Significance Level											
57												
58	Lognormal Statistics											
59	Minimum of Logged Data					-2.12	Mean of logged Data					
60	Maximum of Logged Data					-1.772	SD of logged Data					
61												
62	Assuming Lognormal Distribution											
63	95% H-UCL					0.15	90% Chebyshev (MVUE) UCL					
64	95% Chebyshev (MVUE) UCL					0.159	97.5% Chebyshev (MVUE) UCL					
65	99% Chebyshev (MVUE) UCL					0.179						
66												
67	Nonparametric Distribution Free UCL Statistics											
68	Data appear to follow a Discernible Distribution											
69												
70	Nonparametric Distribution Free UCLs											
71	95% CLT UCL					0.15	95% BCA Bootstrap UCL					
72	95% Standard Bootstrap UCL					0.15	95% Bootstrap-t UCL					
73	95% Hall's Bootstrap UCL					0.15	95% Percentile Bootstrap UCL					
74	90% Chebyshev(Mean, Sd) UCL					0.154	95% Chebyshev(Mean, Sd) UCL					
75	97.5% Chebyshev(Mean, Sd) UCL					0.165	99% Chebyshev(Mean, Sd) UCL					
76												
77	Suggested UCL to Use											
78	95% Student's-t UCL					0.15						
79												
80	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL											
81	Recommendations are based upon data size, data distribution, and skewness using results from simulation studies.											
82	However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician											
83												

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15	0
16	0.144
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18	0.00343
19	0.0155
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30	0.15
31	0.15
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37	ce Level
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41	78.01
42	0.00185
43	3120
44	0.0163
45	2992
46	2982
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49	0.151
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59	-1.943
60	0.108
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63	0.154
64	0.166
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71	0.15
72	0.15
73	0.15
74	0.159
75	0.178
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Appendix 9:

Statement of Qualifications



Hazel Atkins Qualifications Statement

My name is Hazel Elanor Atkins. I am an Associate Environmental Consultant at ENGEO. Although this is not an Environment Court proceeding, I confirm I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. My qualifications as an expert are set out:

- a) I have a Bachelors in Science (Hons), Earth Sciences, University of Plymouth.
- b) I am a Certified Environmental Practitioner (Number 955) and a member of the Environment Institute of Australia and New Zealand.
- c) I have more than 17 years' experience working with ENGEO and other environmental firms. My work has had a particular focus on:
 - i) Contaminated Site Investigations on residential, commercial, and industrial land;
 - ii) Remediation Option Studies;
 - iii) Quantitative risk assessments;
 - iv) Soil management and remediation.

A full resume can be provided on request. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this assessment are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.