



ENGEO

Combined Preliminary and Detailed Site Investigation

41 - 43 Brigham Creek Road
Whenuapai
Auckland

Submitted to:

41-43 Brigham Creek JV
C/- Maven Associates Ltd
Level 2, 12 - 14 Walls Road
Penrose
Auckland 1061

ENGEO Limited

8 Greydene Place, Takapuna, Auckland 0622
PO Box 33-1527, Takapuna, Auckland 0740
Tel +64 9 972 2205
www.engeo.co.nz

12.08.2021
18614.000.001_03



Contents

1	Introduction.....	3
2	Objectives of the Assessment.....	3
3	Site Description	4
4	Site History	5
4.1	Auckland Council Site Contamination Enquiry.....	5
4.2	Auckland Council Property File Review	5
4.3	Historical Aerial Photograph Review.....	6
5	Current Site Conditions	7
6	Previous Investigation	9
7	Potential HAIL Activities	9
8	Site Investigation	10
8.1	Investigation Methodology	10
8.2	Quality Assurance and Quality Control	12
8.3	Investigation Criteria	13
9	Soil Analysis Results	13
9.1	Summary of Soil Results.....	18
10	Conceptual Model	18
11	Conclusions.....	19
12	Recommendations	20
13	References	21
14	Limitations	22

Tables

Table 1: Site Information

Table 2: Site Setting

Table 3: Property File Summary

Table 4: Historical Aerial Photograph Summary

Table 5: Current Site Conditions

Table 6: Potential Contaminants

Table 7: Summary of Soil Samples Collected and Requested Analyses

Table 8: Soil Chemical Contaminant Concentrations Compared to Investigation Criteria

Table 9: Conceptual Site Model

Appendices

Appendix 1: Site Contamination Enquiry

Appendix 2: Historical Aerial Photographs

Appendix 3: Site Walkover Photographs

Appendix 4: Laboratory Results

ENGEO Document Control:

Report Title	Combined Preliminary and Detailed Site Investigation - 41 - 43 Brigham Creek Road, Whenuapai			
Project No.	18614.000.001	Doc ID	04	
Client	41-43 Brigham Creek JV	Client Contact	Toby Mandeno	
Distribution (PDF)	Toby Mandeno, Maven Associates Ltd			
Date	Revision Details/Status	WP	Author	Reviewer
09/08/2021	Issued to Client	JT	TP	EM
12/08/2021	Revised Report – Issued to Client	JT	TP	EM

1 Introduction

ENGEO Ltd was requested by 41-43 Brigham Creek JV to undertake a Combined Preliminary and Detailed Site Investigation of the property at 41 - 43 Brigham Creek Road, Whenuapai, Auckland (herein referred to as 'the site'). This work has been carried out in accordance with our signed agreement, dated 12 April 2021. The purpose of the assessment was to support your resource consent application for a subdivision at the site.

We have been provided with the Maven Associates Limited Proposed Concept Plan for the site, dated September 2020, which depicts a high-density subdivision made up of 218 approximately 130 m² to 260 m² residential lots accessed by a central road with various additional roads.

ENGEO has previously undertaken an environmental assessment on adjacent sites (ENGEO, 2019). While the results are not directly applicable to the subject site (41 - 43 Brigham Creek Road), similarities are expected given the high probability of shared land use. Soil on adjacent sites exhibited heavy metals and hydrocarbons above published background ranges. However, no exceedances of the relevant human health criteria or environmental discharge criteria were detected.

This combined Preliminary and Detailed Site Investigation (PSI and DSI) has been undertaken to satisfy the requirements of the Resource Management (*National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health*) Regulations 2011, herein referred to as the "NES" (NES, 2011). The investigation provides information regarding the presence of land contaminants that pose a potential human health risk to future site users and site redevelopment workers during earthworks and construction. The results of this investigation have been used to evaluate whether remediation is necessary prior to site redevelopment, and to further assess the resource consents required under the NES.

This investigation also addresses the requirements of regional regulations covering discharges to the environment from contaminated sites during and post-redevelopment works; namely, the Auckland Unitary Plan Operative in part - 15 November 2016 (herein referred to as the AUP; AUP, 2016).

This investigation was undertaken in general accordance with the Ministry for the Environment (MfE) Contaminated Land Management Guidelines No. 1: Reporting on Contaminated Sites in New Zealand (MfE, 2021).

2 Objectives of the Assessment

The PSI component of the work included a desktop review of historical site information and review / assessment of information gathered during the site walkover undertaken. The objective of the PSI was to gather information relating to current and historical potentially contaminating activities at the site.

The DSI was an intrusive investigation, and was undertaken to assess:

- The type, extent and level of contamination within the proposed development site.
- Whether contaminants of concern identified present an unacceptable risk to human health or identified environmental receptors.
- Disposal options for the potentially impacted soil that may be required to be removed from site during development.

- Whether the soils remaining on-site are suitable for the proposed end use.

The soil sampling locations were positioned to target areas on-site where activities listed on the Ministry for the Environment’s Hazardous Activities and Industries List (HAIL) (MfE, 2011a) may have been historically and / or are currently present at the site. Further details of the scope of work are provided in Section 6.

3 Site Description

The site at 41 - 43 Brigham Creek Road is located on rural residential land in Whenuapai, Auckland. The site consists of one main dwelling and pastureland.

Site information is summarised in Table 1, and the site setting is summarised in Table 2.

Table 1: Site Information

Item	Description
Site Description	The western portion of the site contains one large dwelling, with associated garden areas. The balance of the site comprises grass paddocks.
Legal Description	Lot 2 DP 538562
Current Land Use	Rural residential
Proposed Land Use	Residential subdivision
Site Area	51.920 m ²
Territorial Authority	Auckland Council

Table 2: Site Setting

Item	Description
Topography	The site is generally flat, with a slight decrease in elevation at the western boundary, and south-eastern corner of site.
Local Setting	The site is located in a rural residential area within Whenuapai. Auckland Council identifies the area / zone as a “Future Urban Zone”.
Nearest Surface Water & Use	A tributary of the Totara Creek is located approximately 125 meters (m) to the south of the site, and runs west to east.

Item	Description
Geology (GNS, 2021)	<p>The site is mapped by GNS as underlain by Late Pleistocene pumiceous river deposits (Puketoka Formation) comprising pumiceous mud, sand and gravel with muddy peat and lignite; rhyolite pumice, including non-welded and ignimbrite, tephra and alluvia.</p> <p>ENGEO performed a geotechnical investigation concurrent with this PSI / DSI (ENGEO, 2021). The ground conditions encountered on-site were generally in accordance with the mapped geology. Borehole findings are described as follows:</p> <ul style="list-style-type: none"> • Topsoil was encountered within all hand auger boreholes to between 0.2 m and 0.4 m below ground level (bgl). • Alluvial soils of the Puketoka Formation were encountered underlying topsoil at all test locations. This material generally consists of interbedded brown, grey and orange silts and clay soils with variable sand, gravel and organic content. The alluvial soils were generally found to be stiff to hard. Peat was encountered within HA06 from 3.7 m to 5.0 m bgl.
Hydrogeology	<p>Unknown, it is considered likely that groundwater flows west or south towards the Totara Creek.</p>

4 Site History

ENGEO obtained and reviewed available environmental and geological information relevant to the site, including geological maps, historical aerial photographs, certificates of title and the Auckland Council property files. Historical site information obtained during review of this information is summarised in this section.

4.1 Auckland Council Site Contamination Enquiry

The Site Contamination Enquiry response provided by Auckland Council was received on 20 May 2021 (Appendix 1). In preparing the response, the former Auckland Regional Council and current databases were searched for records of closed landfills, bores, air discharge, industrial and trade process consents, contaminated site discharge consents and environmental assessments within approximately 200 metres of the site.

Auckland Council's contamination response identified that past land use included HAIL activities (HAIL A10 – Pesticide use; HAIL ID G5 – waste disposal to land). Evidence of historical horticultural land use is provided in the 1988 image, while filling of a depression on-site (northwest corner) can be observed through images from 1961 – 1988 (Appendix 2).

No relevant records were recorded within a 200 m radius of the site.

4.2 Auckland Council Property File Review

The property file held by Auckland Council was received on 20 April 2021. Relevant findings in relation to our environmental assessment are provided in Table 3 below.

Table 3: Property File Summary

Date	Description
April 1999	Building consent for the construction of a dwelling / garage / storage shed.
June 2004	Application / proposal to undertake a two-lot subdivision involving an existing dwelling and a relocated dwelling.
May 2019	Resource consent to undertake a boundary adjustment between the two properties at 41-43 Brigham Creed Road, and 45 Brigham Creek Road, Whenuapai.

4.3 Historical Aerial Photograph Review

Aerial photographs dating from 1940 to 2017 have been reviewed and are included in Appendix 2 for reference. The aerials were sourced from Auckland Council GeoMaps and Retrolens. Relevant visible features on the site and surrounding area are summarised in Table 4 below.

Table 4: Historical Aerial Photograph Summary

Date	Description
1940	The site comprises grassed paddocks, with a shed present in the centre of the site. Two shelterbelts of trees dissect the centre of the site – one running north / south and a second running east / west. Brigham Creek Road is present adjacent to the northern boundary of the site. A dwelling and associated shed is present on the neighbouring property (45 Brigham Creek Road).
1950	The shed in the centre of the site has been removed. The density / size of the shelterbelts has increased. Minor rural residential development has occurred across the wider site.
1958	A block of residential properties / dwellings have been constructed to the east of the site. Additional vegetation growth is observed in the southeast corner of the site. Vegetation adjacent to the eastern boundary has been removed, and a road (Mamari Road) has been constructed.
1963	Additional residential properties have been constructed to the east of the site, immediately adjacent to the eastern site boundary. The east / west shelterbelt has been removed, and a pathway has been constructed on-site from the north. A depression can be observed in the northwest corner of the site. Given the size, shape and location of the depression (excavated long and narrow trench adjacent to the roadway), it may have been a loading bay excavated for trucks.
1968	No significant changes observed on-site or to the surrounding area.
1972	The pathway from the north has been extended to the southern site boundary. No other significant changes observed on-site or to the surrounding area.
1980	The far northwest of the image shows evidence of horticultural land use, suggesting a shift in land use type within the wider area. No significant changes observed on-site.

Date	Description
1988	Evidence of horticultural activities can be seen on-site, and to the northwest and northeast of the site. The north / south shelterbelt has been removed, but a shelterbelt is now present along the southern site boundary. Additional buildings have been constructed immediately north of the site (likely that this is the construction of the HydroVac buildings). The depression in the northwest corner appears filled.
1996	The pathway through the center of the site has been removed. The entire site is now being used for horticultural purposes, with vegetation present in the southeast corner of the site. A dwelling has been constructed to the south of the site.
2006	The site is no longer used for horticultural purposes. A dwelling has been constructed in the western portion of the site, with a driveway extending from Brigham Creek Road. The site immediately west of the site is being used for horticultural purposes, with a dwelling constructed here as well. There is a minor amount of trees spread across the northern portion of the site, with a shelterbelt running along the western side of the dwelling. Sheds have been erected in the farm east of the site.
2010 / 11	The site to the north (45 Brigham Creek Road) has been extended. No other significant changes observed on-site or to the surrounding area.
2015 / 16	There has been an increase in vegetation within the northern portion of the site. Significant earthworks are underway to the north of the site, across Brigham Creek Road.
2017	The property across Brigham Creek Road is undergoing residential redevelopment. No other significant changes observed on-site or to the surrounding area.

5 Current Site Conditions

A site walkover was completed by ENGEO on 22 and 27 April 2021. Observations of activities and conditions present at the site are summarised in Table 5.

Photographs taken during the site visits are included in Appendix 3.

Table 5: Current Site Conditions

Site Conditions	Comments
Surface Water Appearance	Small areas of pooled water observed – no evidence of contamination (e.g. sheens) observed in this water.
Current Surrounding Land Use	Hydrovac facility to the north, as well as a residential subdivision further to the north (across Brigham Creek Road) and along a portion of the eastern site boundary. The remaining land surrounding the site is rural residential.
Local Sensitive Environments	None observed in the immediate vicinity of the site.
Visible Signs Of Plant Stress	In south-eastern corner of paddock (adjacent to SP04 and HA10 – see Figure 1) were two areas of bare ground suggesting material / soil recently stockpiled here; a stockpile of mostly green waste and some wood (likely untreated) was also observed in this area (refer to photograph 6 in Appendix 3). No evidence of contamination observed (e.g. staining, odours, treated timber, rubbish).
Ground Cover	Predominantly grassed. Larger trees are present along the majority of the site boundaries, within the residential portion of the site and in the southeast.
Potential for On - Or - Off - Site Migration of Contaminants	There is potential for water from the hydrovac facility to the north to impact the site. No significant overland flow paths were observed; as such, if the hydrovac facility is impacting the site it would be via leaching of contaminants to groundwater that then flows beneath the site.
Visible Signs of Contamination	None observed.
Significant Observations	<p>Near the north-eastern site entrance from Mamari Road, there is an area containing a small shed / unit with glass doors in weathered condition, a completely dilapidated shed, a stockpile of potentially treated timber posts and various debris (metal, concrete, empty partially crushed drum [no label]; refer to photographs 4 and 7 in Appendix 3). No potential asbestos containing material (PACM) observed. The only potentially significant contamination source was the stockpiled timber (approximately 2 m by 1 m by 0.5 m high).</p> <p>Two additional stockpiles of potentially treated timber observed in the south-eastern portion of the site, amongst the stand of large trees- one approximately 2 m x 1 m x 0.5 m high containing more circular posts (photograph 3 in Appendix 3) and a second approximately 3 m x 2 m x 0.75 m high containing more square posts (photograph 2 in Appendix 3).</p> <p>Historical aerial photographs identify an area of filling in the northwest corner of site.</p>
Additional Comments	Dwelling not observed for PACM or lead-painted surfaces due to recent construction

6 Previous Investigation

A previous report by ENGEO was available in the Auckland Council property file. The report summarises a desktop environmental assessment of the properties 41-43 and 45 Brigham Creek Road, Whenuapai to support a proposed subdivision (boundary adjustment) between the two sites. The adjustment proposed was to increase the size of 45 Brigham Creek Road to enable later development.

Previous reports were reviewed and identified the following contaminants of concern and associated HAIL activities on the neighbouring property (45 Brigham Creek Road):

- Asbestos and asbestos containing material (ACM) as a result of the buildings on-site prior to 1985.
- Pesticide storage and use associated with horticultural activity.
- Hydrocarbons associated with fuel dispensing.
- Waste oil and chemical storage associated with a workshop.
- Waste disposal to land associated with the drying of soils on-site.

Soil on the adjacent sites exhibited heavy metals and hydrocarbons above the published background ranges. Based on the shared land use at the two sites (41-43 and 45 Brigham Creek Road) similarities between the sites are expected.

7 Potential HAIL Activities

Activities included on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL) (MfE, 2011b) trigger the requirement for an intrusive contaminated land investigation (DSI) prior to redevelopment. Based on the information reviewed as part of this PSI, the following activities listed on the HAIL may have been historically and /or are currently present at the site:

- HAIL ID A10: Persistent pesticide use or storage including sports turfs, market gardens, orchards, glass houses or spray sheds.
 - There is evidence of historical horticultural land use at the site (see 1988 image, Appendix 2).
- HAIL ID A18: Wood treatment of preservation including the commercial use of antisapstain chemicals during milling, or bulk storage of treated timber outside.
 - Stockpiles of wood identified on-site. There is potential for contaminants used for timber treatment to leach into the underlying soils.
- HAIL ID G5: Waste disposal to land (excluding where bio solids have been used as soil conditioners).
 - There is evidence of filling in the northwest corner of the site. Evidence can be seen in historical images from 1961 to 1988.

Given the identification of these potentially hazardous activities on-site, further intrusive works were recommended to assess if the site is suitable for the proposed end land use.

The potential contaminants of concern identified based on the findings of the PSI component of this investigation are summarised in Table 6.

Table 6: Potential Contaminants

Potential Source of Contamination	Primary Contaminants of Concern	Possible Extent of Contamination	HAIL Activity as Defined by the NES (Soil)
Pesticides associated with horticultural activities	Asbestos fines and fibrous asbestos	Shallow soil	Category A10: Persistent pesticide use or storage including sports turfs, market gardens, orchards, glass houses or spray sheds.
Stockpiling of treated timber, resulted in leaching of contaminants	Copper, chromium, arsenic	Shallow soil	Category A18: Wood treatment or preservation including the commercial use of antiseptics during milling, or bulk storage of treated timber outside.
Fill material in northwest corner of site	Heavy metals / metalloids, polycyclic aromatic hydrocarbons, organochlorine pesticides	Shallow soil	Category G5: Waste disposal to land (excluding where bio solids have been used as soil conditioners.

8 Site Investigation

8.1 Investigation Methodology

ENGEO completed the environmental investigation on three days – 22 April, 27 April and 29 June 2021.

The initial sampling event occurred concurrently with the geotechnical investigation on the 22 April 2021. Hand augers were advanced to a maximum depth of 5.0 m, with shallow soil samples collected and analysed for heavy metals, organochlorine pesticides (OCPs) and polycyclic aromatic hydrocarbons (PAHs).

An additional sampling visit was undertaken on 27 April 2021. An environmental scientist attended site, and observed stockpiles containing timber posts. Samples were collected beneath the stockpiles and analysed for contaminants associated with treated timber.

The final sampling visit was undertaken on 29 June 2021. Three hand augers were advanced in the area of filling in the northwest corner (area thought to be associated with a former truck-loading bay). Hand augers were advanced to a maximum depth of 1.3 m below ground level. Fill material comprised brown and grey clayey silts, with trace amounts of gravel, and one piece of plastic observed. No other waste materials, staining or odours were observed. Samples were analysed for OCPs and heavy metals / metalloids.

Table 7 provides a summary of the soil samples analysed. Refer to attached Figure 1 for sample locations.

Table 7: Summary of Soil Samples Collected and Requested Analyses

Sample ID	Sample Depth (m bgl)	Sampling Rationale	Requested Analyses
HA02,HA03, HA04, HA05 HA06, HA09	0.0 – 0.2	Historical horticultural activity on-site. Heavy metals / metalloid analysis for disposal purposes.	Heavy metals / metalloids and organochlorine pesticides
HA08	0.3 – 0.8	Heavy metals / metalloid analysis for disposal purposes. Hydrocarbons identified on adjacent site.	Heavy metals / metalloids and polycyclic aromatic hydrocarbons
HA01	0.0 – 0.4	Historical horticultural activity on-site. Heavy metals / metalloid analysis for disposal purposes.	Heavy metals / metalloids and organochlorine pesticides
HA07	0.0 – 0.3	Historical horticultural activity on-site. Heavy metals / metalloid analysis for disposal purposes.	Heavy metals / metalloids and organochlorine pesticides
HA08	0.0 – 0.3	Historical horticultural activity on-site. Heavy metals / metalloid analysis for disposal purposes. Hydrocarbons identified on adjacent site.	Heavy metals / metalloids, organochlorine pesticides and polycyclic aromatic hydrocarbons
HA09, HA10	0.0 – 0.2	Historical horticultural activity on-site. Heavy metals / metalloid analysis for disposal purposes. Hydrocarbons identified on adjacent site.	Heavy metals / metalloids, organochlorine pesticides and polycyclic aromatic hydrocarbons
Wood SP1	0.0 – 0.1	Stockpiled Timber Posts	Heavy metals / metalloids and organochlorine pesticides
Wood SP2	0.0 – 0.1	Stockpiled Timber Posts	Heavy metals / metalloids and organochlorine pesticides
Wood SP3	Unable to be sampled due to adjacent dilapidated shed restricting access and overgrown vegetation.		

Sample ID	Sample Depth (m bgl)	Sampling Rationale	Requested Analyses
IL01	0.6	Area of historical filling in northwest corner – likely associated with a historical truck loading bay	Heavy metals / metalloids, organochlorine pesticides
IL02	0.4		
IL03	0.5		

The following was undertaken during the investigation:

- All soil samples were screened for visual and olfactory evidence of contamination.
- Samples were compressed directly into laboratory supplied containers using a new pair of nitrile gloves for each sample. Prior to sampling, the equipment was decontaminated using a triple wash procedure with potable water, Decon 90 solution and deionised water.
- All samples were placed directly into a cooled container prior to transport to or Eurofins laboratory under ENGEO standard chain of custody.
- All fieldwork and sampling was undertaken in general accordance with the procedures for the appropriate handling of potentially contaminated soils as described in the MfE Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils (MfE, 2011b).

8.2 Quality Assurance and Quality Control

The quality assurance / quality control (QA / QC) procedures undertaken during the works included:

- The use of standard sample registers and chain of custody records for all samples collected.
- Each soil sample was given a unique identification number.
- Sampling equipment was decontaminated using the triple wash method (as previously stated) between each sample location.
- Eurofins are accredited by National Association of Testing Authorities (NATA) for the analyses performed. Additionally, Eurofins are accredited to AS 4964-2004: *Method for the Qualitative Identification of Asbestos in Bulk Samples* for the analysis of suspected asbestos in soil samples, and to international standard NZS ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories* in accordance with The Building Research Association New Zealand (BRANZ) New Zealand Guidelines for Assessing and Managing Asbestos in Soil.

8.3 Investigation Criteria

Human Health Criteria

The human health criteria referenced in this report were selected from the NES (MfE, 2012). The Soil Contaminant Standard (SCS) for residential land use were selected for comparison to site data. We note that, given the density of the proposed subdivision, application of standard residential land use criteria may be conservative.

For contaminants where human health criteria were not available in the NES, criteria were sourced in accordance with the MfE's Contaminated Land Management Guidelines No.2 – Hierarchy and Application in New Zealand of Environmental Guideline Values (MfE, 2011c).

Environmental Discharge Criteria

In the Auckland region, potential discharges to the environment from land containing elevated levels of contaminants are managed through the AUP (AUP, 2016), operative in part on 15 November 2016. Therefore, the Auckland Council permitted activity criteria referenced in this report were adopted from the AUP.

Background Criteria

The soil analysis results have also been compared to the background concentration for non-volcanic soils in the Auckland region (AC, 2001). This comparison allows for further assessment of consenting requirements under the NES and provides information regarding disposal options for excess spoil.

9 Soil Analysis Results

Table 8 compare soil contaminant concentrations in the samples tested with the adopted investigation criteria. Full analytical laboratory reports are included in Appendix 4.

Table 8: Soil Chemical Contaminant Concentrations Compared to Investigation Criteria

Sample Name	Date	Sample Depth	OCPs		Metals							
			DDT (total)	Chlordanes - total	Arsenic	Cadmium	Chromium ⁴	Copper	Lead	Mercury	Nickel	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Human Health Criteria for High-Density Residential¹			240	NGV	45	230	1,500	>10,000	500	1,000	1,200⁵	60,000⁵
Permitted Activity Criteria²			12	NGV	100	7.5	400	325	250	0.75	105	400
Background Criteria for Inorganic Elements (non-volcanic)³			> LOR	> LOR	12	0.65	55	45	65	0.45	35	180
HA03	22-Apr-21	0.0 - 0.2	< LOR	NT	1.9	0.23	7.5	18	6.9	0.07	2.1	14
HA06	22-Apr-21	0.0 - 0.2	0.01	NT	3.5	0.47	9.8	9.6	12	0.08	4.2	20
HA08	22-Apr-21	0.3 - 0.8	< LOR	NT	8.3	0.1	15	20	18	0.35	5.8	30
HA05	22-Apr-21	0.0 - 0.2	< LOR	NT	2.2	0.1	3.2	3.8	13	0.12	1.4	13
HA04	22-Apr-21	0.0 - 0.2	< LOR	NT	2.7	0.27	6.2	26	8	0.14	2.5	16
HA10	22-Apr-21	0.0 - 0.2	0.09	NT	7.8	0.52	11	20	24	0.18	4.4	38

Sample Name	Date	Sample Depth	OCPs		Metals							
			DDT (total)	Chlordanes - total	Arsenic	Cadmium	Chromium ⁴	Copper	Lead	Mercury	Nickel	Zinc
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Human Health Criteria for High-Density Residential ¹			240	NGV	45	230	1,500	>10,000	500	1,000	1,200 ⁵	60,000 ⁵
Permitted Activity Criteria ²			12	NGV	100	7.5	400	325	250	0.75	105	400
Background Criteria for Inorganic Elements (non-volcanic) ³			> LOR	> LOR	12	0.65	55	45	65	0.45	35	180
HA01	22-Apr-21	0.0 - 0.4	< LOR	NT	5.8	0.39	11	38	13	0.15	6.4	23
HA07	22-Apr-21	0.0 - 0.3	< LOR	NT	4.6	0.03	11	12	20	0.48	7.2	9.5
HA02	22-Apr-21	0.0 - 0.2	< LOR	NT	6.5	0.58	9.2	130	12	0.07	2.8	66
HA08	22-Apr-21	0.0 - 0.3	< LOR	NT	11	1.1	21	100	20	0.26	8.1	67
HA09	22-Apr-21	0.0 - 0.2	< LOR	NT	11	0.77	19	43	25	0.23	11	74
WOOD SP1	27-Apr-21	SURFACE	NT	NT	150	NT	150	190	NT	NT	NT	NT
WOOD SP2	27-Apr-21	SURFACE	NT	NT	200	NT	86	260	NT	NT	NT	NT

Sample Name	Date	Sample Depth	OCPs		Metals							
			DDT (total)	Chlordanes - total	Arsenic	Cadmium	Chromium ⁴	Copper	Lead	Mercury	Nickel	Zinc
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Human Health Criteria for High-Density Residential ¹			240	NGV	45	230	1,500	>10,000	500	1,000	1,200 ⁵	60,000 ⁵
Permitted Activity Criteria ²			12	NGV	100	7.5	400	325	250	0.75	105	400
Background Criteria for Inorganic Elements (non-volcanic) ³			> LOR	> LOR	12	0.65	55	45	65	0.45	35	180
IL01	29-Jun-21	0.6	< LOR	< LOR	1.5	< 0.01	4.6	5.7	5.1	0.07	1.3	< 5
IL02	29-Jun-21	0.4	< LOR	0.01	9.3	0.44	14	18	19	0.28	6.8	35
IL03	29-Jun-21	0.5	< LOR	< LOR	5.2	0.14	12	14	14	0.2	6.3	26

Sample Name	Date	Sample Depth	OCPs		Metals							
			DDT (total)	Chlordanes - total	Arsenic	Cadmium	Chromium ⁴	Copper	Lead	Mercury	Nickel	Zinc
		Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Human Health Criteria for High-Density Residential¹			240	NGV	45	230	1,500	>10,000	500	1,000	1,200⁵	60,000⁵
Permitted Activity Criteria²			12	NGV	100	7.5	400	325	250	0.75	105	400
Background Criteria for Inorganic Elements (non-volcanic)³			> LOR	> LOR	12	0.65	55	45	65	0.45	35	180

Notes:

-- Indicates not available or not referenced because the contaminants were not detected.

NT indicates samples were not analysed for that analyte.

Only detected contaminants are included in the data table. For a full list of results refer to the appended laboratory reports.

1 Human Health Criteria from the NES (NES, 2011), except where noted. Exceedances shaded red.

2 Environmental discharge criteria from the AUP (AC, 2016a). Exceedances underlined.

3 Background Concentrations of Inorganic Elements in Soils from the Auckland Region (AC, 2001). Exceedances in bold

4 Criteria for Chromium VI were conservatively selected.

5 Criteria sourced from National Environment Protection (Assessment of Site Contamination) Measure (NEPM, 2013). Land Use Scenario – Residential "B".

9.1 Summary of Soil Results

A summary of the results is provided below:

- The concentration of arsenic in the two samples of surface soil beneath the stockpiled timber posts (Wood SP1 and Wood SP2) exceeds the SCS for residential land use and the environmental discharge (permitted activity) criterion. Copper and chromium concentrations were also elevated in these samples (above background levels but below residential human health criteria). A sample could not be collected beneath the third timber post stockpile due to restricted access and overgrown vegetation; however soil in this area is considered likely to contain similar levels of arsenic, copper and chromium.
- Five surface soil samples collected from across the paddocks contained one heavy metal (copper or mercury) or DDT above background criteria.
- Trace chlordane (OCP) was detected in one of the three samples collected from the historical fill area in the northwest of the site.

Based on the results of the laboratory analysis, contaminant concentrations (arsenic) above the SCS criteria is limited to shallow soils beneath the timber stockpiles. Shallow soils beneath all three timber-containing stockpiles should be considered contaminated.

Exceedances of background criteria were detected in several site samples – predominantly surface samples collected from the paddocks. The areas of non-cleanfill may be further delineated through step out sampling. Alternatively, topsoil could be re-tested during earthworks as mixing of topsoils may dilute concentrations of metals and OCPs to below background levels. Only copper at two locations was detected at levels for which dilution may be difficult to achieve.

10 Conceptual Model

A conceptual site model has been developed to assess the potential exposure pathways present at the site. A contamination conceptual site model consists of three primary components. For a contaminant to present a risk to human health or an environmental receptor, all three components are required to be present and connected. The three components of a conceptual site model are:

- Source of contamination.
- An exposure route, where the receptor and contaminants come into contact (e.g. ingestion, inhalation, dermal contact).
- Receptor(s) that may be exposed to the contaminants.

The potential source, pathway, receptor linkages at this subject site are provided in Table 9.

Table 9: Conceptual Site Model

Source	Exposure Pathway	Potential Receptor	Acceptable Risk?
Pesticides from historical horticultural activities	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	Yes Some contaminants above background concentrations but no exceedances of human health criteria.
	Leaching of contaminants	Surrounding environment	Yes Some contaminants above background concentrations but no exceedances of environmental discharge criteria.
Contamination from treated timber (copper, chromium, arsenic)	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	No Arsenic was detected in two samples collected beneath timber-containing stockpiles, at a concentration that exceeds the residential land use criterion and the environmental discharge criterion.
	Leaching of contaminants	Surrounding environment	
Historical filling in northwest corner of site	Soil ingestion, inhalation of dust, and / or dermal contact	Site redevelopment workers Future site users	Yes One contaminant slightly above background concentration but no exceedances of human health criteria.
	Leaching of contaminants	Surrounding environment	Yes One contaminant slightly above background concentration but no exceedances of environmental discharge criteria.

11 Conclusions

Due to the presence of arsenic concentrations above the adopted human health criterion at three discrete locations, remediation of soils in these areas is required for the site to be suitable for the proposed redevelopment. The details of recommended remedial works are discussed further in Section 12. Future land development is likely to be considered a restricted discretionary activity under Regulation 10 of the NES.

Although arsenic in soil beneath the timber post stockpiles exceeds the regional environmental discharge criteria, a short-term environmental discharge consent is unlikely to be required under the AUP for soil disturbance at the site as the volume of contaminated material is expected to be below the permitted activity threshold of 200 m³.

The presence of heavy metals and OCPs above regional background levels indicates excess surface soil generated during redevelopment works may not be considered “cleanfill” for disposal purposes or reused at another earthworks site (AUP, 2016). However, as noted above, further delineation sampling may refine the extent of non-cleanfill material and / or earthworks have the potential to dilute low-level contaminants in topsoil to below background levels. Regardless, it is likely that deeper soil can be classified as cleanfill; however, additional testing prior to or as part of redevelopment works is required to confirm this.

12 Recommendations

Based on the results of this investigation, the following is recommended:

Remedial Action Plan

Prepare a Remedial Action Plan (RAP) to support the resource consent application. The RAP will outline remediation requirements for soil impacted by contaminants above human health and environmental discharge criteria, as well as monitoring and management procedures for the balance of the earthworks due to the detection of contaminants above background levels and potential for encountering unidentified contamination.

Contaminated Land Related Consents

Future land subdivision and associated land disturbance is likely to be considered a restricted discretionary activity under Regulation 10.

The analysis results identified contaminant concentrations in the soils above the regional environmental discharge criteria (i.e. permitted activity criterion). On sites with elevated levels of contaminants, soil disturbance requires consent unless the conditions of Rule E30.6.1.2 of the AUP can be met. These conditions include, but are not limited to, a maximum soil disturbance volume of 200 m³ per site with the duration of soil disturbance lasting two months or less. If one or more of the conditions of Rule E30.6.1.2 of the AUP cannot be met, a short-term environmental discharge consent will be required under Rule E30.6.2 of the AUP for soil disturbance associated with redevelopment works.

Completion Reporting

The RAP will include requirements for oversight and validation sampling during earthworks by a suitably qualified and experienced practitioner. Following completion of site earthworks, a Site Validation Report (SVR) will be required to present the validation sampling data and confirm that site earthworks were performed in accordance with the RAP, and that remaining soils do not present an unacceptable risk to human health or the environment.

13 References

- AC, 2001. Auckland Regional Council. (2001). Background Concentration of Inorganic Elements in Soils from the Auckland Region, Auckland Regional Council, Technical Publication No. 153.
- AUP, 2016. Auckland Regional Council. (2016). The Proposed Auckland Unitary Plan Decisions version (notified 19 August 2016).
- BRANZ, 2017. The Building Research Association New Zealand. (2017). New Zealand Guidelines for Assessing and Managing Asbestos in Soil.
- ENGEO, 2019. Desktop Environmental Assessment (2019). 41-43 & 45 Brigham Creek Road, Whenuapai, Auckland. Report reference 16065.000.000_01 (Available in Auckland Council Property File)
- ENGEO, 2021. Geotechnical Investigation (2021). 41-43 Brigham Creek Road, Whenuapai. Report reference 18614.000.001_02.
- GNS, 2021. Institute of Geological and Nuclear Sciences Ltd. 2021. 1:250,000 Geological Map 3, Auckland.
- MfE, 2011b. Ministry for the Environment. (2011). Hazardous Activities and Industries List (HAIL).
- MfE, 2011c. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No. 5: Site Investigation and Analysis of Soils.
- MfE, 2011d. Ministry for the Environment. (2011). Contaminated Land Management Guidelines No.2: Hierarchy and Application in New Zealand of environmental guideline values.
- MfE, 2012. Ministry for the Environment. (2012). Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health.
- MfE, 2021. Ministry for the Environment. (2021). Contaminated Land Management Guidelines No.1: Reporting on Contaminated Sites in New Zealand.
- NEPM, 2013. Australian National Environmental Protection Council. (2013). National Environmental Protection (Assessment of Site Contamination) Measure 1999, Schedule B(1): Guideline on the Investigation Levels for Soil and Groundwater.
- NES, 2011. The Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations (2011).

14 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, 41-43 Brigham Creek JV, their professional advisers and the relevant Territorial Authorities in relation to the specified project brief described in this report. 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 Engineers NZ/ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (09) 972 2205 if you require any further information.

Report prepared by



Tyler Paterson

Environmental Scientist

Report reviewed by



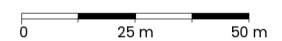
Erika McDonald, CMEngNZ

Principal Environmental Engineer

FIGURES



- Legend**
- Site Boundary
 - ⊕ Investigation Locations
 - △ Wood Stockpile Soil Samples
 - Wood Stockpiles - Not Sampled



Title: Investigation Location Plan		
Client: 41-43 Brigham Creek JV		
Project: 41-43 Brigham Creek Road, Whenuapai	Drawn: TP	Figure No: 1 Size: A4
Date: 20-05-2021	Checked: EM	
Proj No: 18614.000.001_01	Scale: 1:1661	Version: 1.0



APPENDIX 1: Site Contamination Enquiry

7 May 2021

ENGEO Limited
8 Greydene Place
AUCKLAND 0622
Attention: Erika Mcdonald

Dear Erika

Site Contamination Enquiry – 41-43 Brigham Creek Road, Whenuapai

This letter is in response to your enquiry requesting available site contamination information within Auckland Council records for the above site. Please note this report does not constitute a site investigation report; such reports are required to be prepared by a (third-party) Suitably Qualified and Experienced Practitioner.

The following details are based on information available to the Contamination, Air & Noise Team in the Resource Consent Department. The details provided may be from former regional council information, as well as property information held by the former district/city councils. For completeness the relevant property file should also be requested to obtain all historical records and reports via 09 3010101 or online at:

<https://www.aucklandcouncil.govt.nz/buying-property/order-property-report/Pages/order-property-file.aspx>.

1. Hazardous Activities and Industries List (HAIL) Information

This list published by the Ministry for the Environment (MfE) comprises activities and industries that are considered likely to cause land contamination as a result of hazardous substance use, storage, and/or disposal.

Council's records indicate this site has possibly been subject to the following activities that fall within the HAIL:

- HAIL Item (A.10) – Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds.
- HAIL Item (G.5) – Waste disposal to land (excluding where biosolids have been used as soil conditioners) – Uncertified filling.

Council's records indicate the site 41-43 Brigham Creek Road, Whenuapai, has been utilised for horticultural activity. This can be seen in the below image:



Further, a desktop assessment was conducted for the site in 2019. This assessment identified a depression in the north-western corner of the site which has since been filled. Sampling was not undertaken within this property at the time.

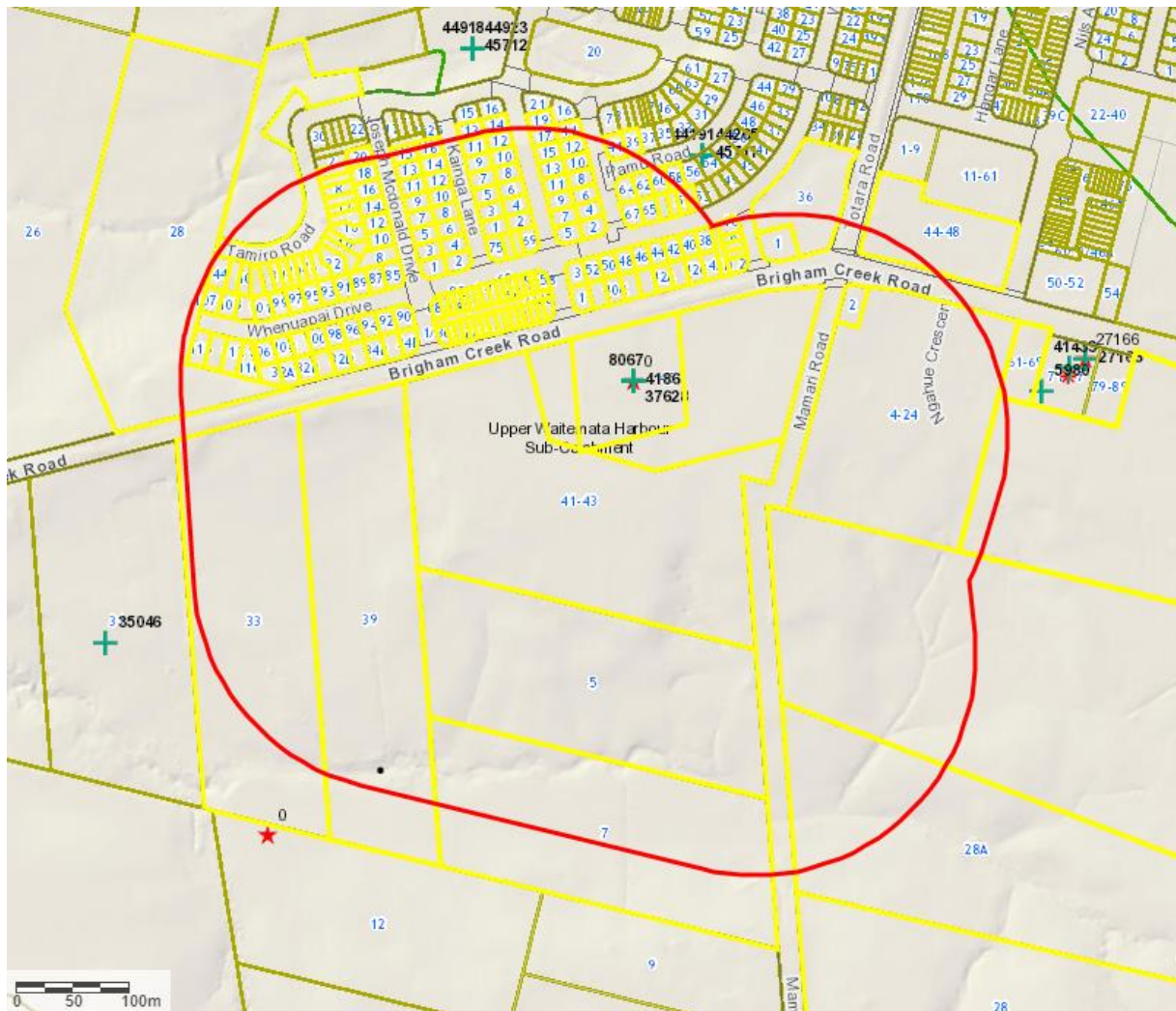
Please note:

- *If you are demolishing any building that may have asbestos containing materials (ACM) in it, you have obligations under the Health and Safety at Work (Asbestos) Regulations 2016 for the management and removal of asbestos, including the need to engage a Competent Asbestos Surveyor to confirm the presence or absence of any ACM.*
- *Paints used on external parts of properties up until the mid-1970's routinely contained lead, a poison and a persistent environmental pollutant. You are advised to ensure that soils affected by old, peeling or flaking paint are assessed in relation to the proposed use of the property, including high risk use by young children.*

2. Consents and Incidents Information (200m radius of the selected site)

The Council database was searched for records of the following activities within approximately 200 metres of the site:

- Pollution Incidents (including air discharges, oil or diesel spills)
- Bores
- Contaminated site and air discharges, and industrial trade process consents
- Closed Landfills
- Air quality permitted activities



Legend:

All Consents +	Closed Landfill (Auckland Council owned) ■
All Applications ■	Closed Landfill (Privately owned) ■
All Permitted Activities *	
All Bores ★	

Relevant details of any pollution incidents and consents are appended to this letter (Attachment A). Please refer to the column titled 'Property Address' on the spreadsheet to aid in identifying corresponding data on the map.

While the Auckland Council has carried out the above search using its best practical endeavours, it does not warrant its completeness or accuracy and disclaims any responsibility or liability in respect of the information. If you or any other person wishes to act or to rely on this information, or make any financial commitment based upon it, it is recommended that you seek appropriate technical and/or professional advice.

If you wish to clarify anything in this letter that relates to this site, please contact contaminatedsites@aucklandcouncil.govt.nz. Any follow up requests for information on other sites must go through the online order process.

Should you wish to request any of the files referenced above and/or listed in the attached spreadsheet for viewing, please contact the Auckland Council Call Centre on 301 0101 and note you are requesting former Auckland Regional Council records (the records department requires three working days' notice to ensure the files will be available).

Please note Auckland Council cost recovers officer's time for all site enquiries. As such an invoice for \$128 for the time involved in this enquiry will follow shortly.

Yours Sincerely,

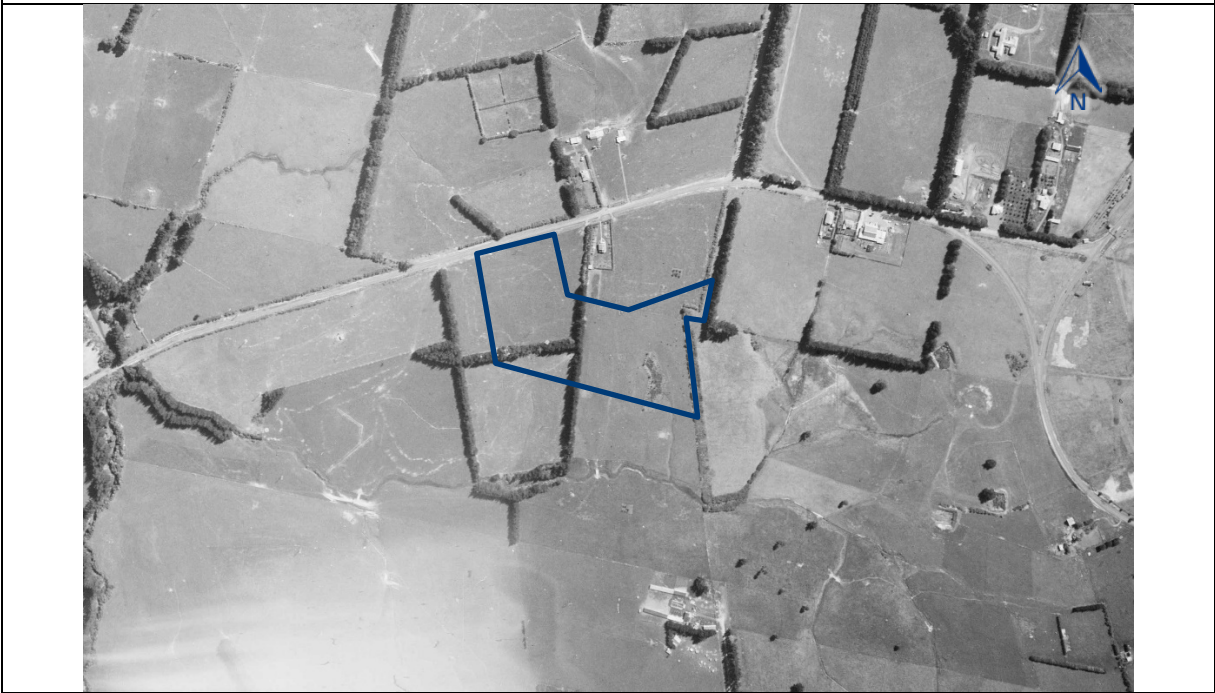
**Contamination, Air and Noise Team
Specialist Unit | Resource Consents
Auckland Council**

APPENDIX 2: Historical Aerial Photographs

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



1940 (Retrolens)



1950 (Retrolens NZ)

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



1958 (Retrolens NZ)



1963 (Retrolens NZ)

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



1968 (Retrolens NZ)

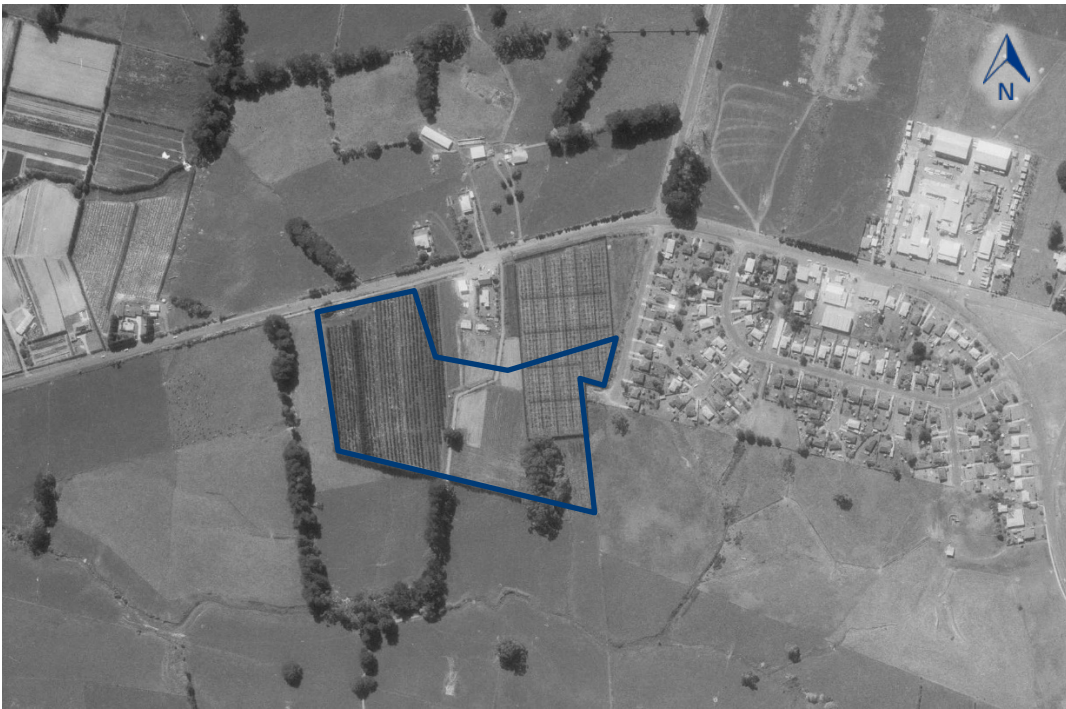


1972 (Retrolens NZ)

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



1980 (Retrolens NZ)



1988 (Auckland Council Geomaps)

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



1996 (Auckland Council Geomaps)



2006 (Auckland Council Geomaps)

Historical Aerial Photographs – 41-43 Brigham Creek Road, Whenuapai



2010/11 (Auckland Council Geomaps)



2015/16 (Auckland Council Geomaps)



2017 (Auckland Council Geomaps)



APPENDIX 3:
Site Walkover Photographs



Arrows indicate the orientation of the following photographs.



Photograph 1: Residential driveway



Photograph 2: Wood stockpile 1



Photograph 3: Wood stockpile 2



Photograph 4: Wood stockpile 3



Photograph 5: Paddock north of dwelling



Photograph 6: View north across central paddock.



Photograph 7: Dilapidated shed



Photograph 8: Dwelling and paddock east of dwelling

APPENDIX 4: Laboratory Results

ENGEO Ltd
6 Antares Place
Rosedale
Auckland New Zealand 0632



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

Attention: Erika McDonald

Report 790274-S
 Project name BRIGHAM CREEK
 Project ID 18614.000.001
 Received Date Apr 23, 2021

Client Sample ID			HA03 0.0-0.2M	HA06 0.0-0.2M	HA08 0.3-0.8M	HA05 0.0-0.2M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K21-Ap45636	K21-Ap45638	K21-Ap45640	K21-Ap45641
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	0.01	-	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	0.01	-	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	-	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	< 0.01
Dibutylchloroendate (surr.)	1	%	95	83	-	105
Tetrachloro-m-xylene (surr.)	1	%	88	90	-	86
Metals M8 (NZ MfE)						
Arsenic	0.1	mg/kg	1.9	3.5	8.3	2.2
Cadmium	0.01	mg/kg	0.23	0.47	0.10	0.10
Chromium	0.1	mg/kg	7.5	9.8	15	3.2
Copper	0.1	mg/kg	18	9.6	20	3.8
Lead	0.1	mg/kg	6.9	12	18	13

Client Sample ID			HA03 0.0-0.2M Soil	HA06 0.0-0.2M Soil	HA08 0.3-0.8M Soil	HA05 0.0-0.2M Soil
Sample Matrix			K21-Ap45636	K21-Ap45638	K21-Ap45640	K21-Ap45641
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
Metals M8 (NZ MfE)						
Mercury	0.01	mg/kg	0.07	0.08	0.35	0.12
Nickel	0.1	mg/kg	2.1	4.2	5.8	1.4
Zinc	5	mg/kg	14	20	30	13
% Moisture	1	%	22	24	38	18
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	-	< 0.03	-
Acenaphthylene	0.03	mg/kg	-	-	< 0.03	-
Anthracene	0.03	mg/kg	-	-	< 0.03	-
Benz(a)anthracene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	-	< 0.03	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	-	0.04	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	-	0.08	-
Benzo(b&j)fluoranthene ^{N07}	0.03	mg/kg	-	-	< 0.03	-
Benzo(g,h,i)perylene	0.03	mg/kg	-	-	< 0.03	-
Benzo(k)fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Chrysene	0.03	mg/kg	-	-	< 0.03	-
Dibenz(a,h)anthracene	0.03	mg/kg	-	-	< 0.03	-
Fluoranthene	0.03	mg/kg	-	-	< 0.03	-
Fluorene	0.03	mg/kg	-	-	< 0.03	-
Indeno(1,2,3-cd)pyrene	0.03	mg/kg	-	-	< 0.03	-
Naphthalene	0.1	mg/kg	-	-	< 0.1	-
Phenanthrene	0.03	mg/kg	-	-	< 0.03	-
Pyrene	0.03	mg/kg	-	-	< 0.03	-
p-Terphenyl-d14 (surr.)	1	%	-	-	89	-
2-Fluorobiphenyl (surr.)	1	%	-	-	62	-

Client Sample ID			HA04 0.0-0.2M Soil	HA10 0.0-0.2M Soil	HA01 0.0-0.4 Soil	HA07 0.0-0.3M Soil
Sample Matrix			K21-Ap45642	K21-Ap45643	K21-Ap45645	K21-Ap45648
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled						
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
2,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
2,4'-DDT	0.01	mg/kg	< 0.01	0.03	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	0.04	< 0.01	< 0.01
4,4'-DDE	0.01	mg/kg	< 0.01	0.01	< 0.01	< 0.01
4,4'-DDT	0.01	mg/kg	< 0.01	0.01	< 0.01	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	0.09	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01

Client Sample ID			HA04 0.0-0.2M	HA10 0.0-0.2M	HA01 0.0-0.4	HA07 0.0-0.3M
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K21-Ap45642	K21-Ap45643	K21-Ap45645	K21-Ap45648
Date Sampled			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Test/Reference	LOR	Unit				
Organochlorine Pesticides (NZ MfE)						
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
Dibutylchloroendate (surr.)	1	%	80	86	67	77
Tetrachloro-m-xylene (surr.)	1	%	83	82	81	83
Metals M8 (NZ MfE)						
Arsenic	0.1	mg/kg	2.7	7.8	5.8	4.6
Cadmium	0.01	mg/kg	0.27	0.52	0.39	0.03
Chromium	0.1	mg/kg	6.2	11	11	11
Copper	0.1	mg/kg	26	20	38	12
Lead	0.1	mg/kg	8.0	24	13	20
Mercury	0.01	mg/kg	0.14	0.18	0.15	0.48
Nickel	0.1	mg/kg	2.5	4.4	6.4	7.2
Zinc	5	mg/kg	16	38	23	9.5
% Moisture						
	1	%	25	24	24	38
Polycyclic Aromatic Hydrocarbons (NZ MfE)						
Acenaphthene	0.03	mg/kg	-	< 0.03	-	-
Acenaphthylene	0.03	mg/kg	-	< 0.03	-	-
Anthracene	0.03	mg/kg	-	< 0.03	-	-
Benz(a)anthracene	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03	-	-
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04	-	-
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.08	-	-
Benzo(b&j)fluoranthene ^{N07}	0.03	mg/kg	-	< 0.03	-	-
Benzo(g,h,i)perylene	0.03	mg/kg	-	< 0.03	-	-
Benzo(k)fluoranthene	0.03	mg/kg	-	< 0.03	-	-
Chrysene	0.03	mg/kg	-	< 0.03	-	-
Dibenz(a,h)anthracene	0.03	mg/kg	-	< 0.03	-	-
Fluoranthene	0.03	mg/kg	-	< 0.03	-	-
Fluorene	0.03	mg/kg	-	< 0.03	-	-
Indeno(1,2,3-cd)pyrene	0.03	mg/kg	-	< 0.03	-	-
Naphthalene	0.1	mg/kg	-	< 0.1	-	-
Phenanthrene	0.03	mg/kg	-	< 0.03	-	-
Pyrene	0.03	mg/kg	-	< 0.03	-	-
p-Terphenyl-d14 (surr.)	1	%	-	81	-	-
2-Fluorobiphenyl (surr.)	1	%	-	INT	-	-

Client Sample ID			HA02 0.0-0.2M Soil K21-Ap45650 Not Provided ¹²	HA08 0-0.3M Soil K21-Ap45656 Not Provided ¹²	HA09 0.0-0.2M Soil K21-Ap45657 Not Provided ¹²
Sample Matrix					
Eurofins Sample No.					
Date Sampled					
Test/Reference	LOR	Unit			
Organochlorine Pesticides (NZ MfE)					
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dibutylchloroendate (surr.)	1	%	83	96	87
Tetrachloro-m-xylene (surr.)	1	%	85	92	85
Metals M8 (NZ MfE)					
Arsenic	0.1	mg/kg	6.5	11	11
Cadmium	0.01	mg/kg	0.58	1.1	0.77
Chromium	0.1	mg/kg	9.2	21	19
Copper	0.1	mg/kg	130	100	43
Lead	0.1	mg/kg	12	20	25
Mercury	0.01	mg/kg	0.07	0.26	0.23
Nickel	0.1	mg/kg	2.8	8.1	11
Zinc	5	mg/kg	66	67	74
% Moisture	1	%	32	36	32
Polycyclic Aromatic Hydrocarbons (NZ MfE)					
Acenaphthene	0.03	mg/kg	-	< 0.03	< 0.03
Acenaphthylene	0.03	mg/kg	-	< 0.03	< 0.03
Anthracene	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(a)anthracene	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(a)pyrene	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(a)pyrene TEQ (lower bound)*	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(a)pyrene TEQ (medium bound)*	0.03	mg/kg	-	0.04	0.04
Benzo(a)pyrene TEQ (upper bound)*	0.03	mg/kg	-	0.08	0.08

Client Sample ID			HA02 0.0-0.2M Soil	HA08 0-0.3M Soil	HA09 0.0-0.2M Soil
Sample Matrix			K21-Ap45650	K21-Ap45656	K21-Ap45657
Eurofins Sample No.			Not Provided ¹²	Not Provided ¹²	Not Provided ¹²
Date Sampled					
Test/Reference	LOR	Unit			
Polycyclic Aromatic Hydrocarbons (NZ MfE)					
Benzo(b&j)fluoranthene ^{N07}	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(g,h,i)perylene	0.03	mg/kg	-	< 0.03	< 0.03
Benzo(k)fluoranthene	0.03	mg/kg	-	< 0.03	< 0.03
Chrysene	0.03	mg/kg	-	< 0.03	< 0.03
Dibenz(a,h)anthracene	0.03	mg/kg	-	< 0.03	< 0.03
Fluoranthene	0.03	mg/kg	-	< 0.03	< 0.03
Fluorene	0.03	mg/kg	-	< 0.03	< 0.03
Indeno(1.2.3-cd)pyrene	0.03	mg/kg	-	< 0.03	< 0.03
Naphthalene	0.1	mg/kg	-	< 0.1	< 0.1
Phenanthrene	0.03	mg/kg	-	< 0.03	< 0.03
Pyrene	0.03	mg/kg	-	< 0.03	< 0.03
p-Terphenyl-d14 (surr.)	1	%	-	93	75
2-Fluorobiphenyl (surr.)	1	%	-	73	INT

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides (NZ MfE) - Method: LTM-ORG-2220 OCP & PCB in Soil and Water by GCMSMS	Auckland	Apr 27, 2021	14 Days
Metals M8 (NZ MfE) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	Apr 27, 2021	6 Months
Polycyclic Aromatic Hydrocarbons (NZ MfE) - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS	Auckland	Apr 27, 2021	14 Days
% Moisture - Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry	Auckland	Apr 27, 2021	14 Days

New Zealand

Auckland
35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

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

Australia

Melbourne
6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

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

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

Perth
46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

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

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name:	ENGEO Ltd	Order No.:		Received:	Apr 23, 2021 3:30 PM
Address:	6 Antares Place Rosedale Auckland New Zealand 0632	Report #:	790274	Due:	Apr 30, 2021
Project Name:	BRIGHAM CREEK	Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18614.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						HOLD	Moisture Set	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID					
1	HA03 0.0-0.2M	Not Provided		Soil	K21-Ap45636		X	X	X	
2	HA07 0.3M	Not Provided		Soil	K21-Ap45637	X				
3	HA06 0.0-0.2M	Not Provided		Soil	K21-Ap45638		X	X	X	
4	HA06 0.2M	Not Provided		Soil	K21-Ap45639	X				
5	HA08 0.3-0.8M	Not Provided		Soil	K21-Ap45640		X		X	X
6	HA05 0.0-0.2M	Not Provided		Soil	K21-Ap45641		X	X	X	
7	HA04 0.0-0.2M	Not Provided		Soil	K21-Ap45642		X	X	X	
8	HA10 0.0-0.2M	Not Provided		Soil	K21-Ap45643		X	X	X	X
9	HA10 0.3-0.4M	Not Provided		Soil	K21-Ap45644	X				
10	HA01 0.0-0.4	Not Provided		Soil	K21-Ap45645		X	X	X	
11	HA06 0.5M	Not Provided		Soil	K21-Ap45646	X				
12	HA04 0.4M	Not Provided		Soil	K21-Ap45647	X				

New Zealand

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

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

Australia

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

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

Brisbane

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

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle

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

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name:	ENGEO Ltd	Order No.:		Received:	Apr 23, 2021 3:30 PM
Address:	6 Antares Place Rosedale Auckland New Zealand 0632	Report #:	790274	Due:	Apr 30, 2021
Project Name:	BRIGHAM CREEK	Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18614.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						HOLD	Moisture Set	Organochlorine Pesticides (NZ M/E)	Metals M8 (NZ M/E)	Polycyclic Aromatic Hydrocarbons (NZ M/E)
Auckland Laboratory - IANZ# 1327						X	X	X	X	X
Christchurch Laboratory - IANZ# 1290										
External Laboratory										
13	HA07 0.0-0.3M	Not Provided		Soil	K21-Ap45648		X	X	X	
14	HA09 0.3M	Not Provided		Soil	K21-Ap45649	X				
15	HA02 0.0-0.2M	Not Provided		Soil	K21-Ap45650		X	X	X	
16	HA05 0.4M	Not Provided		Soil	K21-Ap45651	X				
17	HA01 0.4-0.7M	Not Provided		Soil	K21-Ap45652	X				
18	HA03 0.2M	Not Provided		Soil	K21-Ap45653	X				
19	HA02 0.5M	Not Provided		Soil	K21-Ap45654	X				
20	HA08 1.0-1.2M	Not Provided		Soil	K21-Ap45655	X				
21	HA08 0-0.3M	Not Provided		Soil	K21-Ap45656		X	X	X	X
22	HA09 0.0-0.2M	Not Provided		Soil	K21-Ap45657		X	X	X	X
Test Counts						11	11	10	11	4

Internal Quality Control Review and Glossary

General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	mg/kg	< 0.01			0.01	Pass	
2.4'-DDE	mg/kg	< 0.01			0.01	Pass	
2.4'-DDT	mg/kg	< 0.01			0.01	Pass	
4.4'-DDD	mg/kg	< 0.01			0.01	Pass	
4.4'-DDE	mg/kg	< 0.01			0.01	Pass	
4.4'-DDT	mg/kg	< 0.01			0.01	Pass	
a-BHC	mg/kg	< 0.01			0.01	Pass	
Aldrin	mg/kg	< 0.01			0.01	Pass	
b-BHC	mg/kg	< 0.01			0.01	Pass	
Chlordanes - Total	mg/kg	< 0.01			0.01	Pass	
cis-Chlordane	mg/kg	< 0.01			0.01	Pass	
d-BHC	mg/kg	< 0.01			0.01	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan sulphate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Endrin aldehyde	mg/kg	< 0.01			0.01	Pass	
Endrin ketone	mg/kg	< 0.01			0.01	Pass	
g-BHC (Lindane)	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.01			0.01	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
trans-Chlordane	mg/kg	< 0.01			0.01	Pass	
Method Blank							
Metals M8 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Mercury	mg/kg	< 0.01			0.01	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
Method Blank							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	mg/kg	< 0.03			0.03	Pass	
Acenaphthylene	mg/kg	< 0.03			0.03	Pass	
Anthracene	mg/kg	< 0.03			0.03	Pass	
Benz(a)anthracene	mg/kg	< 0.03			0.03	Pass	
Benzo(a)pyrene	mg/kg	< 0.03			0.03	Pass	
Benzo(b&j)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Benzo(g,h,i)perylene	mg/kg	< 0.03			0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03			0.03	Pass	
Chrysene	mg/kg	< 0.03			0.03	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.03			0.03	Pass	
Fluoranthene	mg/kg	< 0.03			0.03	Pass	
Fluorene	mg/kg	< 0.03			0.03	Pass	

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Indeno(1.2.3-cd)pyrene	mg/kg	< 0.03			0.03	Pass	
Naphthalene	mg/kg	< 0.1			0.1	Pass	
Phenanthrene	mg/kg	< 0.03			0.03	Pass	
Pyrene	mg/kg	< 0.03			0.03	Pass	
LCS - % Recovery							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	%	112			70-130	Pass	
2.4'-DDE	%	85			70-130	Pass	
2.4'-DDT	%	75			70-130	Pass	
4.4'-DDD	%	74			70-130	Pass	
4.4'-DDE	%	73			70-130	Pass	
4.4'-DDT	%	74			70-130	Pass	
a-BHC	%	76			70-130	Pass	
Aldrin	%	74			70-130	Pass	
b-BHC	%	71			70-130	Pass	
Chlordanes - Total	%	123			70-130	Pass	
cis-Chlordane	%	70			70-130	Pass	
d-BHC	%	73			70-130	Pass	
Dieldrin	%	71			70-130	Pass	
Endosulfan I	%	78			70-130	Pass	
Endosulfan II	%	70			70-130	Pass	
Endosulfan sulphate	%	129			70-130	Pass	
Endrin	%	83			70-130	Pass	
Endrin aldehyde	%	98			70-130	Pass	
Endrin ketone	%	107			70-130	Pass	
g-BHC (Lindane)	%	93			70-130	Pass	
Heptachlor	%	70			70-130	Pass	
Heptachlor epoxide	%	77			70-130	Pass	
Hexachlorobenzene	%	70			70-130	Pass	
Methoxychlor	%	71			70-130	Pass	
trans-Chlordane	%	73			70-130	Pass	
LCS - % Recovery							
Metals M8 (NZ MfE)							
Arsenic	%	94			80-120	Pass	
Cadmium	%	97			80-120	Pass	
Chromium	%	96			80-120	Pass	
Copper	%	97			80-120	Pass	
Lead	%	97			80-120	Pass	
Mercury	%	102			80-120	Pass	
Nickel	%	97			80-120	Pass	
Zinc	%	109			80-120	Pass	
LCS - % Recovery							
Polycyclic Aromatic Hydrocarbons (NZ MfE)							
Acenaphthene	%	117			70-130	Pass	
Acenaphthylene	%	113			70-130	Pass	
Anthracene	%	128			70-130	Pass	
Benz(a)anthracene	%	119			70-130	Pass	
Benzo(a)pyrene	%	110			70-130	Pass	
Benzo(b&i)fluoranthene	%	113			70-130	Pass	
Benzo(g,h,i)perylene	%	106			70-130	Pass	
Benzo(k)fluoranthene	%	106			70-130	Pass	
Chrysene	%	104			70-130	Pass	
Dibenz(a,h)anthracene	%	126			70-130	Pass	
Fluoranthene	%	122			70-130	Pass	

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Fluorene			%	122		70-130	Pass	
Indeno(1.2.3-cd)pyrene			%	118		70-130	Pass	
Naphthalene			%	117		70-130	Pass	
Phenanthrene			%	127		70-130	Pass	
Pyrene			%	118		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery								
Organochlorine Pesticides (NZ MfE)				Result 1				
2.4'-DDT	K21-Ap39218	NCP	%	77		70-130	Pass	
4.4'-DDD	K21-Ap39218	NCP	%	74		70-130	Pass	
4.4'-DDT	K21-Ap36063	NCP	%	93		70-130	Pass	
b-BHC	K21-Ap39015	NCP	%	70		70-130	Pass	
d-BHC	K21-Ap39218	NCP	%	88		70-130	Pass	
Dieldrin	K21-Ap39218	NCP	%	80		70-130	Pass	
Endosulfan II	K21-Ap39218	NCP	%	75		70-130	Pass	
Endrin aldehyde	K21-Ap39015	NCP	%	74		70-130	Pass	
g-BHC (Lindane)	K21-Ap36073	NCP	%	116		70-130	Pass	
Heptachlor	K21-Ap39015	NCP	%	129		70-130	Pass	
Hexachlorobenzene	K21-Ap22405	NCP	%	70		70-130	Pass	
Methoxychlor	K21-Ap36063	NCP	%	70		70-130	Pass	
Spike - % Recovery								
Organochlorine Pesticides (NZ MfE)				Result 1				
2.4'-DDD	K21-Ap45638	CP	%	102		70-130	Pass	
2.4'-DDE	K21-Ap45638	CP	%	77		70-130	Pass	
4.4'-DDE	K21-Ap45638	CP	%	72		70-130	Pass	
a-BHC	K21-Ap45638	CP	%	78		70-130	Pass	
Aldrin	K21-Ap45638	CP	%	77		70-130	Pass	
Chlordanes - Total	K21-Ap45638	CP	%	78		70-130	Pass	
cis-Chlordane	K21-Ap45638	CP	%	72		70-130	Pass	
Endosulfan I	K21-Ap45638	CP	%	71		70-130	Pass	
Endosulfan sulphate	K21-Ap45638	CP	%	70		70-130	Pass	
Endrin	K21-Ap45638	CP	%	76		70-130	Pass	
Endrin ketone	K21-Ap45638	CP	%	73		70-130	Pass	
Heptachlor epoxide	K21-Ap45638	CP	%	74		70-130	Pass	
trans-Chlordane	K21-Ap45638	CP	%	84		70-130	Pass	
Spike - % Recovery								
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1				
Acenaphthene	K21-Ap45487	NCP	%	74		70-130	Pass	
Acenaphthylene	K21-Ap45487	NCP	%	80		70-130	Pass	
Anthracene	K21-Ap45487	NCP	%	85		70-130	Pass	
Benz(a)anthracene	K21-Ap45487	NCP	%	79		70-130	Pass	
Benzo(a)pyrene	K21-Ap45487	NCP	%	95		70-130	Pass	
Benzo(b&j)fluoranthene	K21-Ap45487	NCP	%	80		70-130	Pass	
Benzo(g,h,i)perylene	K21-Ap45487	NCP	%	93		70-130	Pass	
Benzo(k)fluoranthene	K21-Ap45487	NCP	%	87		70-130	Pass	
Chrysene	K21-Ap45487	NCP	%	88		70-130	Pass	
Dibenz(a,h)anthracene	K21-Ap45487	NCP	%	73		70-130	Pass	
Fluoranthene	K21-Ap45487	NCP	%	74		70-130	Pass	
Fluorene	K21-Ap45487	NCP	%	81		70-130	Pass	
Indeno(1.2.3-cd)pyrene	K21-Ap45487	NCP	%	83		70-130	Pass	
Naphthalene	K21-Ap45487	NCP	%	82		70-130	Pass	
Phenanthrene	K21-Ap45487	NCP	%	79		70-130	Pass	
Pyrene	K21-Ap45487	NCP	%	99		70-130	Pass	
Spike - % Recovery								

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Metals M8 (NZ MfE)				Result 1					
Arsenic	K21-Ap45648	CP	%	78			75-125	Pass	
Cadmium	K21-Ap45648	CP	%	97			75-125	Pass	
Chromium	K21-Ap45648	CP	%	88			75-125	Pass	
Copper	K21-Ap45648	CP	%	86			75-125	Pass	
Lead	K21-Ap45648	CP	%	95			75-125	Pass	
Mercury	K21-Ap45648	CP	%	101			75-125	Pass	
Nickel	K21-Ap45648	CP	%	85			75-125	Pass	
Zinc	K21-Ap45648	CP	%	88			75-125	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD			
2,4'-DDD	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2,4'-DDE	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2,4'-DDT	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDD	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDE	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDT	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-BHC	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-BHC	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlordanes - Total	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
cis-Chlordane	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-BHC	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-BHC (Lindane)	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
trans-Chlordane	K21-Ap45636	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD			
Acenaphthene	K21-Ap45486	NCP	mg/kg	< 0.03	< 0.03	<1	30%	Pass	
Acenaphthylene	K21-Ap45486	NCP	mg/kg	0.12	0.14	12	30%	Pass	
Anthracene	K21-Ap45486	NCP	mg/kg	0.26	0.25	4.0	30%	Pass	
Benz(a)anthracene	K21-Ap45486	NCP	mg/kg	2.4	2.5	4.0	30%	Pass	
Benzo(a)pyrene	K21-Ap45486	NCP	mg/kg	2.9	3.1	6.0	30%	Pass	
Benzo(b&j)fluoranthene	K21-Ap45486	NCP	mg/kg	2.7	2.8	2.0	30%	Pass	
Benzo(g,h,i)perylene	K21-Ap45486	NCP	mg/kg	2.3	2.2	8.0	30%	Pass	
Benzo(k)fluoranthene	K21-Ap45486	NCP	mg/kg	2.0	2.0	<1	30%	Pass	
Chrysene	K21-Ap45486	NCP	mg/kg	2.2	2.3	4.0	30%	Pass	
Dibenz(a,h)anthracene	K21-Ap45486	NCP	mg/kg	0.67	0.56	17	30%	Pass	
Fluoranthene	K21-Ap45486	NCP	mg/kg	4.5	5.3	15	30%	Pass	
Fluorene	K21-Ap45486	NCP	mg/kg	0.04	0.04	9.0	30%	Pass	
Indeno(1,2,3-cd)pyrene	K21-Ap45486	NCP	mg/kg	2.5	1.9	26	30%	Pass	
Naphthalene	K21-Ap45486	NCP	mg/kg	< 0.1	0.1	22	30%	Pass	
Phenanthrene	K21-Ap45486	NCP	mg/kg	1.4	1.6	15	30%	Pass	
Pyrene	K21-Ap45486	NCP	mg/kg	5.4	6.2	14	30%	Pass	

Duplicate								
Metals M8 (NZ MfE)				Result 1	Result 2	RPD		
Arsenic	K21-Ap45645	CP	mg/kg	5.8	6.2	6.0	30%	Pass
Cadmium	K21-Ap45645	CP	mg/kg	0.39	0.43	10	30%	Pass
Chromium	K21-Ap45645	CP	mg/kg	11	12	9.0	30%	Pass
Copper	K21-Ap45645	CP	mg/kg	38	43	13	30%	Pass
Lead	K21-Ap45645	CP	mg/kg	13	14	8.0	30%	Pass
Mercury	K21-Ap45645	CP	mg/kg	0.15	0.16	5.0	30%	Pass
Nickel	K21-Ap45645	CP	mg/kg	6.4	7.2	12	30%	Pass
Zinc	K21-Ap45645	CP	mg/kg	23	25	7.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	K21-Ap45645	CP	%	24	25	1.0	30%	Pass

Comments
Sample Integrity

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

Qualifier Codes/Comments

Code	Description
I12	Where sampling date has not been provided, Eurofins Environment Testing is not able to determine whether analysis has been performed within recommended holding times.
N07	Please note:- These two PAH isomers closely co-elute using the most contemporary analytical methods and both the reported concentration (and the TEQ) apply specifically to the total of the two co-eluting PAHs

Authorised by:

Swati Shahaney	Analytical Services Manager
Michael Ritchie	Senior Analyst-Organic (NZN)
Shasti Ramachandran	Senior Analyst-Metal (NZN)


Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ENGEO Ltd
6 Antares Place
Rosedale
Auckland New Zealand 0632



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

Attention: Erika McDonald

Report 793195-S
 Project name
 Project ID 18614.000.001
 Received Date May 07, 2021

Client Sample ID			WOOD SP1	WOOD SP2
Sample Matrix			Soil	Soil
Eurofins Sample No.			K21-My11526	K21-My11527
Date Sampled			Apr 27, 2021	Apr 27, 2021
Test/Reference	LOR	Unit		
Heavy Metals				
Chromium	0.1	mg/kg	150	86
Copper	0.1	mg/kg	190	260
Metals M8 (NZ MfE)				
Arsenic	0.1	mg/kg	150	200
% Moisture	1	%	25	46

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Heavy Metals - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	May 10, 2021	6 Months
Metals M8 (NZ MfE) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	May 10, 2021	6 Months
% Moisture - Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry	Auckland	May 07, 2021	14 Days

New Zealand

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

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

Australia

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254 & 14271

Sydney

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

Brisbane

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

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle

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

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name:	ENGEO Ltd	Order No.:		Received:	May 7, 2021 1:00 PM
Address:	6 Antares Place Rosedale Auckland New Zealand 0632	Report #:	793195	Due:	May 14, 2021
Project Name:		Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18614.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						Arsenic	Chromium	Copper	Moisture Set
Auckland Laboratory - IANZ# 1327						X	X	X	X
Christchurch Laboratory - IANZ# 1290									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	WOOD SP1	Apr 27, 2021		Soil	K21-My11526	X	X	X	X
2	WOOD SP2	Apr 27, 2021		Soil	K21-My11527	X	X	X	X
Test Counts						2	2	2	2

Internal Quality Control Review and Glossary
General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test				Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code		
Method Blank											
Heavy Metals											
Chromium				mg/kg	< 0.1		0.1	Pass			
Copper				mg/kg	< 0.1		0.1	Pass			
Method Blank											
Metals M8 (NZ MfE)											
Arsenic				mg/kg	< 0.1		0.1	Pass			
LCS - % Recovery											
Heavy Metals											
Chromium				%	94		80-120	Pass			
Copper				%	92		80-120	Pass			
LCS - % Recovery											
Metals M8 (NZ MfE)											
Arsenic				%	103		80-120	Pass			
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code		
Spike - % Recovery											
Heavy Metals											
Copper				K21-My05850	NCP	%	90	75-125	Pass		
Spike - % Recovery											
Metals M8 (NZ MfE)											
Arsenic				K21-My05850	NCP	%	97	75-125	Pass		
Spike - % Recovery											
Heavy Metals											
Chromium				K21-My11527	CP	%	98	75-125	Pass		
Duplicate											
Heavy Metals											
Chromium				K21-My11526	CP	mg/kg	150	120	18	30%	Pass
Copper				K21-My11526	CP	mg/kg	190	180	4.0	30%	Pass
Duplicate											
Metals M8 (NZ MfE)											
Arsenic				K21-My11526	CP	mg/kg	150	140	11	30%	Pass
Duplicate											
% Moisture				K21-My11526	CP	%	25	27	7.0	30%	Pass

Comments**Sample Integrity**

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

Authorised by:

Swati Shahaney Analytical Services Manager
Shasti Ramachandran Senior Analyst-Metal (NZN)



Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.

ENGEO Ltd
6 Antares Place
Rosedale
Auckland New Zealand 0632



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

Attention: Erika McDonald

Report 808449-S
 Project name BRIGHAM CREEK RD
 Project ID 18614.000.001
 Received Date Jul 06, 2021

Client Sample ID			IL01 0.6	IL02 0.4	IL03 0.5
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			K21-JI10463	K21-JI10464	K21-JI10465
Date Sampled			Jun 29, 2021	Jun 29, 2021	Jun 29, 2021
Test/Reference	LOR	Unit			
Organochlorine Pesticides (NZ MfE)					
2.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
2.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDE	0.01	mg/kg	< 0.01	< 0.01	< 0.01
4.4'-DDT	0.01	mg/kg	< 0.01	< 0.01	< 0.01
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
a-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
b-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Chlordanes - Total	0.01	mg/kg	< 0.01	0.01	< 0.01
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	< 0.01
d-BHC	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	< 0.01
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	< 0.1
trans-Chlordane	0.01	mg/kg	< 0.01	0.02	< 0.01
Dibutylchloroendate (surr.)	1	%	139	120	110
Tetrachloro-m-xylene (surr.)	1	%	111	92	114
Metals M8 (NZ MfE)					
Arsenic	0.1	mg/kg	1.5	9.3	5.2
Cadmium	0.01	mg/kg	< 0.01	0.44	0.14
Chromium	0.1	mg/kg	4.6	14	12
Copper	0.1	mg/kg	5.7	18	14
Lead	0.1	mg/kg	5.1	19	14

Client Sample ID			IL01 0.6	IL02 0.4	IL03 0.5
Sample Matrix			Soil	Soil	Soil
Eurofins Sample No.			K21-JI10463	K21-JI10464	K21-JI10465
Date Sampled			Jun 29, 2021	Jun 29, 2021	Jun 29, 2021
Test/Reference	LOR	Unit			
Metals M8 (NZ MfE)					
Mercury	0.01	mg/kg	0.07	0.28	0.20
Nickel	0.1	mg/kg	1.3	6.8	6.3
Zinc	5	mg/kg	< 5	35	26
% Moisture	1	%	19	36	33

Sample History

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

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

Description	Testing Site	Extracted	Holding Time
Organochlorine Pesticides (NZ MfE) - Method: LTM-ORG-2220 OCP & PCB in Soil and Water by GCMSMS	Auckland	Jul 07, 2021	14 Days
Metals M8 (NZ MfE) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	Jul 07, 2021	6 Months
% Moisture - Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry	Auckland	Jul 07, 2021	14 Days

New Zealand

Auckland

35 O'Rorke Road
Penrose, Auckland 1061
Phone : +64 9 526 45 51
IANZ # 1327

Christchurch

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

Australia

Melbourne

6 Monterey Road
Dandenong South VIC 3175
Phone : +61 3 8564 5000
NATA # 1261
Site # 1254

Sydney

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

Brisbane

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

Perth

46-48 Banksia Road
Welshpool WA 6106
Phone : +61 8 9251 9600
NATA # 1261
Site # 23736

Newcastle

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

NZBN: 9429046024954 web: www.eurofins.com.au email: EnviroSales@eurofins.com

Company Name:	ENGE0 Ltd	Order No.:		Received:	Jul 6, 2021 4:00 PM
Address:	6 Antares Place Rosedale Auckland New Zealand 0632	Report #:	808449	Due:	Jul 13, 2021
Project Name:	BRIGHAM CREEK RD	Phone:	0011 64 9 9722 205	Priority:	5 Day
Project ID:	18614.000.001	Fax:		Contact Name:	Erika McDonald

Eurofins Analytical Services Manager : Swati Shahaney

Sample Detail						HOLD	Moisture Set	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)
Auckland Laboratory - IANZ# 1327						X	X	X	X
Christchurch Laboratory - IANZ# 1290									
External Laboratory									
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID				
1	IL01 0.6	Jun 29, 2021		Soil	K21-JI10463		X	X	X
2	IL02 0.4	Jun 29, 2021		Soil	K21-JI10464		X	X	X
3	IL03 0.5	Jun 29, 2021		Soil	K21-JI10465		X	X	X
4	IL01 0.1	Jun 29, 2021		Soil	K21-JI10466	X			
5	IL01 0.3	Jun 29, 2021		Soil	K21-JI10467	X			
6	IL01 0.45	Jun 29, 2021		Soil	K21-JI10468	X			
7	IL01 0.8	Jun 29, 2021		Soil	K21-JI10469	X			
8	IL02 0.8	Jun 29, 2021		Soil	K21-JI10470	X			
9	IL02 1.0	Jun 29, 2021		Soil	K21-JI10471	X			
10	IL03 1.0	Jun 29, 2021		Soil	K21-JI10472	X			
Test Counts						7	3	3	3

Internal Quality Control Review and Glossary
General

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

Holding Times

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

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

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

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

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

****NOTE:** pH duplicates are reported as a range NOT as RPD

Units

mg/kg: milligrams per kilogram

mg/L: milligrams per litre

ug/L: micrograms per litre

ppm: Parts per million

ppb: Parts per billion

%: Percentage

org/100mL: Organisms per 100 millilitres

NTU: Nephelometric Turbidity Units

MPN/100mL: Most Probable Number of organisms per 100 millilitres

Terms

Dry	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
LOR	Limit of Reporting.
SPIKE	Addition of the analyte to the sample and reported as percentage recovery.
RPD	Relative Percent Difference between two Duplicate pieces of analysis.
LCS	Laboratory Control Sample - reported as percent recovery.
CRM	Certified Reference Material - reported as percent recovery.
Method Blank	In the case of solid samples these are performed on laboratory certified clean sands and in the case of water samples these are performed on de-ionised water.
Surr - Surrogate	The addition of a like compound to the analyte target and reported as percentage recovery.
Duplicate	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
USEPA	United States Environmental Protection Agency
APHA	American Public Health Association
TCLP	Toxicity Characteristic Leaching Procedure
COC	Chain of Custody
SRA	Sample Receipt Advice
QSM	US Department of Defense Quality Systems Manual Version 5.3
CP	Client Parent - QC was performed on samples pertaining to this report
NCP	Non-Client Parent - QC performed on samples not pertaining to this report, QC is representative of the sequence or batch that client samples were analysed within.
TEQ	Toxic Equivalency Quotient

QC - Acceptance Criteria

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

Results <10 times the LOR : No Limit

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

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

Surrogate Recoveries: Recoveries must lie between 20-130% Phenols & 50-150% PFASs

PFAS field samples that contain surrogate recoveries in excess of the QC limit designated in QSM 5.3 where no positive PFAS results have been reported have been reviewed and no data was affected.

WA DWER (n=10): PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS, PFHxS, PFOS, 6:2 FTSA, 8:2 FTSA

QC Data General Comments

- Where a result is reported as a less than (<), higher than the nominated LOR, this is due to either matrix interference, extract dilution required due to interferences or contaminant levels within the sample, high moisture content or insufficient sample provided.
- Duplicate data shown within this report that states the word "BATCH" is a Batch Duplicate from outside of your sample batch, but within the laboratory sample batch at a 1:10 ratio. The Parent and Duplicate data shown is not data from your samples.
- Organochlorine Pesticide analysis - where reporting LCS data, Toxaphene & Chlordane are not added to the LCS.
- Organochlorine Pesticide analysis - where reporting Spike data, Toxaphene is not added to the Spike.
- Total Recoverable Hydrocarbons - where reporting Spike & LCS data, a single spike of commercial Hydrocarbon products in the range of C12-C30 is added and it's Total Recovery is reported in the C10-C14 cell of the Report.
- pH and Free Chlorine analysed in the laboratory - Analysis on this test must begin within 30 minutes of sampling. Therefore laboratory analysis is unlikely to be completed within holding time. Analysis will begin as soon as possible after sample receipt.
- Recovery Data (Spikes & Surrogates) - where chromatographic interference does not allow the determination of Recovery the term "INT" appears against that analyte.
- Polychlorinated Biphenyls are spiked only using Aroclor 1260 in Matrix Spikes and LCS.
- For Matrix Spikes and LCS results a dash " - " in the report means that the specific analyte was not added to the QC sample.
- Duplicate RPDs are calculated from raw analytical data thus it is possible to have two sets of data.

Quality Control Results

Test	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Method Blank							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	mg/kg	< 0.01			0.01	Pass	
2.4'-DDE	mg/kg	< 0.01			0.01	Pass	
2.4'-DDT	mg/kg	< 0.01			0.01	Pass	
4.4'-DDD	mg/kg	< 0.01			0.01	Pass	
4.4'-DDE	mg/kg	< 0.01			0.01	Pass	
4.4'-DDT	mg/kg	< 0.01			0.01	Pass	
a-BHC	mg/kg	< 0.01			0.01	Pass	
Aldrin	mg/kg	< 0.01			0.01	Pass	
b-BHC	mg/kg	< 0.01			0.01	Pass	
Chlordanes - Total	mg/kg	< 0.01			0.01	Pass	
cis-Chlordane	mg/kg	< 0.01			0.01	Pass	
d-BHC	mg/kg	< 0.01			0.01	Pass	
Dieldrin	mg/kg	< 0.01			0.01	Pass	
Endosulfan I	mg/kg	< 0.01			0.01	Pass	
Endosulfan II	mg/kg	< 0.01			0.01	Pass	
Endosulfan sulphate	mg/kg	< 0.01			0.01	Pass	
Endrin	mg/kg	< 0.01			0.01	Pass	
Endrin aldehyde	mg/kg	< 0.01			0.01	Pass	
Endrin ketone	mg/kg	< 0.01			0.01	Pass	
g-BHC (Lindane)	mg/kg	< 0.01			0.01	Pass	
Heptachlor	mg/kg	< 0.01			0.01	Pass	
Heptachlor epoxide	mg/kg	< 0.01			0.01	Pass	
Hexachlorobenzene	mg/kg	< 0.01			0.01	Pass	
Methoxychlor	mg/kg	< 0.01			0.01	Pass	
Toxaphene	mg/kg	< 0.1			0.1	Pass	
trans-Chlordane	mg/kg	< 0.01			0.01	Pass	
Method Blank							
Metals M8 (NZ MfE)							
Arsenic	mg/kg	< 0.1			0.1	Pass	
Cadmium	mg/kg	< 0.01			0.01	Pass	
Chromium	mg/kg	< 0.1			0.1	Pass	
Copper	mg/kg	< 0.1			0.1	Pass	
Lead	mg/kg	< 0.1			0.1	Pass	
Mercury	mg/kg	< 0.01			0.01	Pass	
Nickel	mg/kg	< 0.1			0.1	Pass	
Zinc	mg/kg	< 5			5	Pass	
LCS - % Recovery							
Organochlorine Pesticides (NZ MfE)							
2.4'-DDD	%	94			70-130	Pass	
2.4'-DDE	%	117			70-130	Pass	
2.4'-DDT	%	70			70-130	Pass	
4.4'-DDD	%	113			70-130	Pass	
4.4'-DDE	%	99			70-130	Pass	
4.4'-DDT	%	71			70-130	Pass	
a-BHC	%	96			70-130	Pass	
Aldrin	%	84			70-130	Pass	
b-BHC	%	78			70-130	Pass	
Chlordanes - Total	%	124			70-130	Pass	
cis-Chlordane	%	130			70-130	Pass	
d-BHC	%	82			70-130	Pass	

Test	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code		
Dieldrin	%	106	70-130	Pass			
Endosulfan I	%	75	70-130	Pass			
Endosulfan II	%	98	70-130	Pass			
Endosulfan sulphate	%	71	70-130	Pass			
Endrin	%	114	70-130	Pass			
Endrin aldehyde	%	91	70-130	Pass			
Endrin ketone	%	88	70-130	Pass			
g-BHC (Lindane)	%	90	70-130	Pass			
Heptachlor	%	71	70-130	Pass			
Heptachlor epoxide	%	76	70-130	Pass			
Hexachlorobenzene	%	90	70-130	Pass			
Methoxychlor	%	77	70-130	Pass			
trans-Chlordane	%	118	70-130	Pass			
LCS - % Recovery							
Metals M8 (NZ MfE)							
Arsenic	%	102	80-120	Pass			
Cadmium	%	104	80-120	Pass			
Chromium	%	100	80-120	Pass			
Copper	%	104	80-120	Pass			
Lead	%	104	80-120	Pass			
Mercury	%	100	80-120	Pass			
Nickel	%	98	80-120	Pass			
Zinc	%	109	80-120	Pass			
Test	Lab Sample ID	QA Source	Units	Result 1	Acceptance Limits	Pass Limits	Qualifying Code
Spike - % Recovery							
Organochlorine Pesticides (NZ MfE)							
				Result 1			
2,4'-DDE	K21-JI10543	NCP	%	100	70-130	Pass	
4,4'-DDE	K21-JI10543	NCP	%	109	70-130	Pass	
Aldrin	K21-JI10543	NCP	%	107	70-130	Pass	
Chlordanes - Total	K21-JI10543	NCP	%	128	70-130	Pass	
Dieldrin	K21-JI10543	NCP	%	120	70-130	Pass	
Endosulfan I	K21-JI10543	NCP	%	84	70-130	Pass	
Endrin	K21-JI10543	NCP	%	112	70-130	Pass	
Heptachlor epoxide	K21-JI10543	NCP	%	97	70-130	Pass	
Spike - % Recovery							
Organochlorine Pesticides (NZ MfE)							
				Result 1			
2,4'-DDD	K21-JI10464	CP	%	120	70-130	Pass	
2,4'-DDT	K21-JI10464	CP	%	79	70-130	Pass	
4,4'-DDD	K21-JI10464	CP	%	73	70-130	Pass	
4,4'-DDT	K21-JI10464	CP	%	76	70-130	Pass	
a-BHC	K21-JI10464	CP	%	127	70-130	Pass	
b-BHC	K21-JI10464	CP	%	105	70-130	Pass	
cis-Chlordane	K21-JI10464	CP	%	115	70-130	Pass	
d-BHC	K21-JI10464	CP	%	112	70-130	Pass	
Endosulfan II	K21-JI10464	CP	%	93	70-130	Pass	
Endosulfan sulphate	K21-JI10464	CP	%	96	70-130	Pass	
Endrin aldehyde	K21-JI10464	CP	%	89	70-130	Pass	
Endrin ketone	K21-JI10464	CP	%	96	70-130	Pass	
g-BHC (Lindane)	K21-JI10464	CP	%	101	70-130	Pass	
Heptachlor	K21-JI10464	CP	%	104	70-130	Pass	
Hexachlorobenzene	K21-JI10464	CP	%	120	70-130	Pass	
Methoxychlor	K21-JI10464	CP	%	75	70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1	Result 2	RPD	Acceptance Limits	Pass Limits	Qualifying Code
Duplicate									
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD			
2.4'-DDD	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDE	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2.4'-DDT	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDD	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDE	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4.4'-DDT	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-BHC	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-BHC	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlordanes - Total	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
cis-Chlordane	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-BHC	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-BHC (Lindane)	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
trans-Chlordane	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Duplicate									
Metals M8 (NZ MfE)				Result 1	Result 2	RPD			
Arsenic	K21-JI10463	CP	mg/kg	1.5	1.5	2.0	30%	Pass	
Cadmium	K21-JI10463	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chromium	K21-JI10463	CP	mg/kg	4.6	4.8	5.0	30%	Pass	
Copper	K21-JI10463	CP	mg/kg	5.7	5.5	2.0	30%	Pass	
Lead	K21-JI10463	CP	mg/kg	5.1	4.8	5.0	30%	Pass	
Mercury	K21-JI10463	CP	mg/kg	0.07	0.06	15	30%	Pass	
Nickel	K21-JI10463	CP	mg/kg	1.3	1.4	3.0	30%	Pass	
Zinc	K21-JI10463	CP	mg/kg	< 5	< 5	<1	30%	Pass	
Duplicate									
				Result 1	Result 2	RPD			
% Moisture	K21-JI10463	CP	%	19	20	5.0	30%	Pass	

Comments
Sample Integrity

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

Authorised by:

Swati Shahaney	Analytical Services Manager
Michael Ritchie	Senior Analyst-Organic (NZN)
Shasti Ramachandran	Senior Analyst-Metal (NZN)



Michael Ritchie
Head of Semi Volatiles (Key Technical Personnel)

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

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

Measurement uncertainty of test data is available on request or please [click here](#).

Eurofins shall not be liable for loss, cost, damages or expenses incurred by the client, or any other person or company, resulting from the use of any information or interpretation given in this report. In no case shall Eurofins be liable for consequential damages including, but not limited to, lost profits, damages for failure to meet deadlines and lost production arising from this report. This document shall not be reproduced except in full and relates only to the items tested. Unless indicated otherwise, the tests were performed on the samples as received.