



**KA-WAIMANAWA PARTNERSHIP LTD & STEPPING TOWARDS FAR LIMITED**  
**SOIL CONTAMINATION PRELIMINARY SITE INVESTIGATION FOR**  
**THE PROPOSED WARKWORTH SOUTH PLAN CHANGE (AREA WEST OF**  
**STATE HIGHWAY 1)**

Project Reference: 18707 – Rev.A  
16 December 2022

---

**LDE LTD**

AUCKLAND | GISBORNE | NAPIER | TAURANGA | WARKWORTH | WHANGANUI | WHANGAREI

[www.lde.co.nz](http://www.lde.co.nz)

## TABLE OF CONTENTS

Introduction.....	4
Site Details & Setting.....	5
Site Identification and Zoning .....	5
Site Description and Current/Past Land Use.....	6
Proposed Plan Change.....	6
Geology .....	7
Hydrology.....	7
Preliminary Site Investigation .....	8
Historic Aerial Imagery.....	9
1966 Photograph .....	9
1970 Photograph .....	10
1982 Photograph .....	11
1992 Photograph .....	12
1999 Photograph .....	13
2011 Photograph .....	14
2020 Photograph .....	15
Anecdotal information.....	15
3rd Party Report Review.....	16
Site Walkover Assessment.....	17
LOT 3 DP 155544:.....	17
LOT 6 DP 155544:.....	21
LOT 2 DP 344489:.....	25
LOT 3 DP 539629:.....	27
LOT 6 DP353748 (Oyster processing facility): .....	30
LOT 2 DP539629:.....	33
Conceptual Site Model .....	35
Hazardous Substances and Potential Contaminants of Concern.....	35
Potential Receptors .....	35
Exposure Pathways.....	35
PSI Conclusions .....	37
Recommendations.....	37
Report Limitations.....	38
Appendix A .....	39
Development Plan .....	39
Appendix B .....	40
Soil and Rock DSI .....	40
Appendix C.....	41
Land Contamination Assessment Report.....	41
Appendix D.....	42
Riley PSI and PSI/DSI reports.....	42

Appendices:

Appendix A: Master Plan  
Appendix B: Soil and Rock DSI  
Appendix C: Land Contamination Assessment Report  
Appendix D: Riley PSI and PSI/DSI Reports

## EXECUTIVE SUMMARY

A contamination preliminary site investigation (PSI) has been conducted for the Warkworth plan change area (south of state highway 1).

The objectives of the assessment were to identify any potential sources of contamination from past and present land use activities with the plan change area, to determine the contamination status of soils at the site, and to subsequently assess compliance with the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health, as well as under Chapter E30 of the Auckland Unitary Plan (AUP).

Evidence from the PSI indicates historical horticulture (vineyard) and agriculture (ex-dairy) use at the site including handling and application of sprays and other hazardous materials, waste disposal to land in the form of pruning waste incineration, landfilling, bulk storage of treated timbers, motor vehicle workshops, and possible boat maintenance activities, therefore we consider that **HAIL A1**: *'Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application'*, **HAIL A10**: *'Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds'*, **HAIL G5**: *'Waste disposal to land (excluding where biosolids have been used as soil conditioners)'*, **HAL G3**: *'Landfill sites'*, **HAIL A18**: *'Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside'*, **HAIL F4**: *'Motor vehicle workshops'*, **HAIL F5**: *'Port activities including dry docks or marine vessel maintenance facilities'*, **HAIL H**: *'Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment'*, **HAIL I**: *'Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment'*, are more likely than not to have occurred at the site.

Accordingly, to determine the contamination status of soils at the site and to subsequently assess compliance with the NES and AUP, a full DSI (Detailed Site Investigation) including soil testing within the HAIL areas, may be required to support any future resource consent applications for the proposed development.

## INTRODUCTION

Land Development & Engineering (LDE) Ltd has been engaged by KA-Waimanawa Partnership Ltd. to undertake a soil contamination Preliminary Site Investigation (PSI) for the Warkworth plan change area (south of state highway 1).

The PSI identifies if there were any historical or current activities that could have caused soil to become contaminated. This is useful in identifying potential risks associated with future use of the property. The PSI will also identify if the National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NES) applies to the site, the permitted activity status under Chapter E30 of the AUP, and whether the investigation would need to accompany any future consent applications for later development under the NES.

This investigation has been carried out in general accordance with the *Contaminated Land Management Guidelines No.1- Reporting on Contaminated Sites in New Zealand* (revised 2021) and *Contaminated Land Management Guidelines No.5: Site Investigation and Analysis of Soils* (revised 2021).

The PSI investigation included a review of available historic aerial photographs showing the site, site-specific records, interviews with past and present land-users, and a walkover/inspection of the site.

The objectives of the investigation were to:

- Identify any potential sources of contamination from past and present land use activities at the site which are listed on the Ministry for the Environment's (MfE) Hazardous Activities and Industries List (HAIL) (MfE, 2011),
- Assess applicability with the NES for the development of the site.

## SITE DETAILS & SETTING

### Site Identification and Zoning

The site is approximately 5km to the south of Warkworth township and north-east of the future Puhoi-Warkworth motorway (Figure 1). Comprising or a total of 14 of lots (Figure 1 and Table 1) with a total area of approximately 64.2ha zoned Future Urban.

Table 1. Property lots and approximate sizes

Property Description	Property Area (Ha)	Address
Lot 1 DP 539629	5.0112	11 State Highway 1, Warkworth
Lot 2 DP 539629	5.0128	1723 State Highway 1 Warkworth
Lot 3 DP 539629	16.3450	40 Valerie Close, Warkworth
Lot 4 DP 539629	2.0237	36 Valerie Close Warkworth
Lot 3 DP 155544	8.0000	46 Valerie Close Warkworth
Lot 6 DP 155544	5.6000	123 Valerie Close Warkworth
Lot 2 DP 451512	2.0277	30 Valerie Close Warkworth
Lot 6 DP 353748	0.8367	8 Valerie Close Warkworth

Lot 5 DP 353748	0.1407	8 Valerie Close Warkworth
Lot 4 DP 353748	0.0998	8 Valerie Close Warkworth
Lot 5 DP 155544	7.0000	83 Valerie Close Warkworth
Lot 1 DP 344489	6.54000	127 Valerie Close Warkworth
Lot 2 DP 344489	1.0006	125 Valerie Close Warkworth
Lot 3 DP 344489	0.2030	N/A

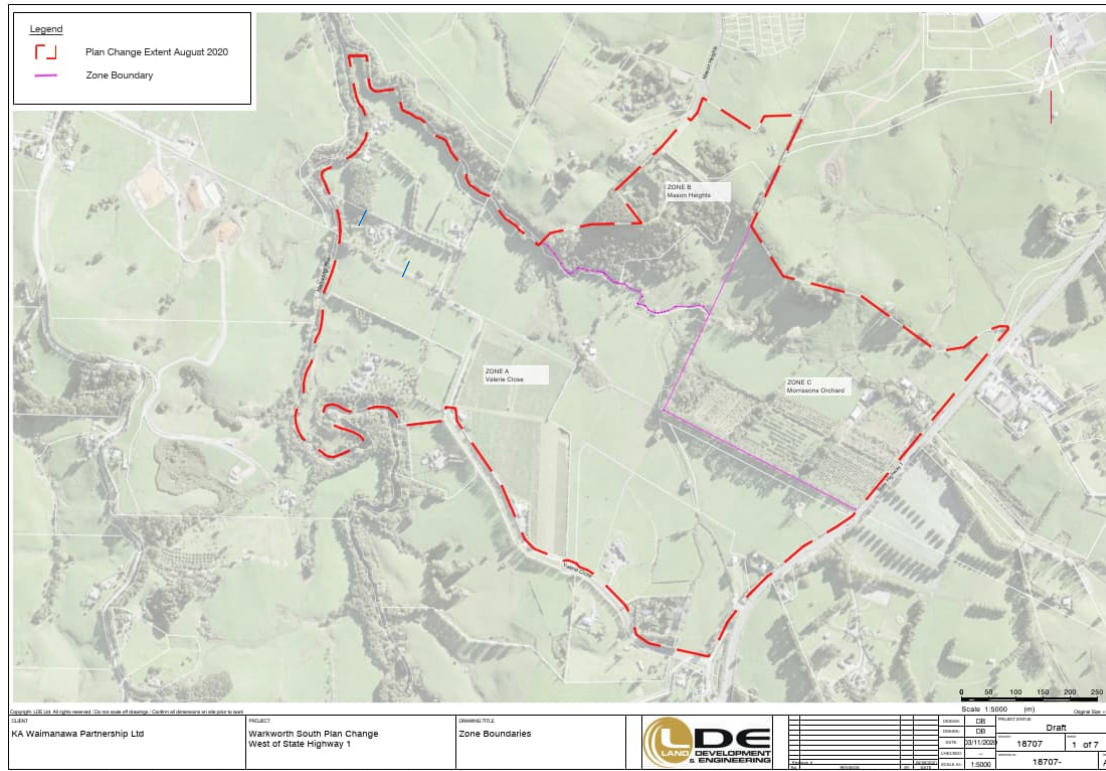


Figure 1: Annotated location map showing the plan change area (red) including zone C and B which do not for part of this investigation. Source: Supplied by client.

## Site Description and Current/Past Land Use

The site is generally flat to sloping topography, and comprises of a mix of lifestyle /residential and rural productive land including horticulture/agriculture land uses, a vineyard and winery (now disused) along the southern boundary of Lot 3 DP 155544, with the remaining lots predominately pasture, lifestyle blocks, hobby orchards, residential dwellings and associated sheds etc. The majority of the site was previously a dairy farm.

## Proposed Plan Change

The area is subjected to a possible plan change seeking to change the future urban zone to a mix have a predominantly Rural - Mixed Rural Zone with a small area of Residential - Large Lot zones. Morrissons Heritage Orchard will remain a rural zoning designation.

### 5.3 Zoning Concept Plan

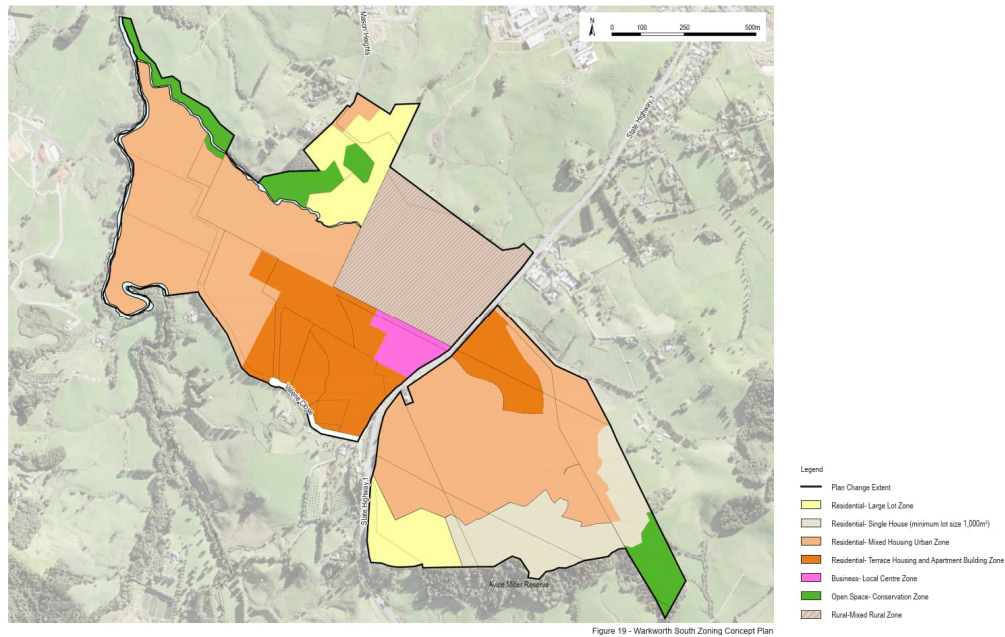


Figure 19 - Warkworth South Zoning Concept Plan

DRAFT

Waimanawa Plan Change, Warkworth | Interplan | Reset Urban Design 21

Figure 2: Draft plan view of proposed development (note south of SH1 excluded from this investigation). Source: supplied by client.

## Geology

The New Zealand Geology Web Map by GNS<sup>1</sup> science identifies the site as being underlain by 'Alluvium of the Tauranga Group, overlying Pakiri Formation' described as 'Interbedded, graded sandstone and siltstone or mudstone, massive mudstone and sandstone; local intercalated volcanic grit, breccia and conglomerate, and minor bioclastic limestone.'

## Hydrology

According to the Auckland Council GIS Viewer<sup>2</sup>, two main watercourses are located adjacent to the site including the Mahurangi River (right branch) along the western boundary and an unnamed tributary of the Mahurangi along the northern boundary. A stream channel is draining through the central portion of the site in a north-west direction into the Mahurangi tributary along with several overland flow paths and smaller watercourses located across the site (Figure 3).

<sup>1</sup>GNS Science New Zealand Geology Web Map: <http://data.gns.cri.nz/geology/>. Retrieved November 2020.

<sup>2</sup> Auckland Council GIS Viewer <https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html>. Retrieved November 2020.

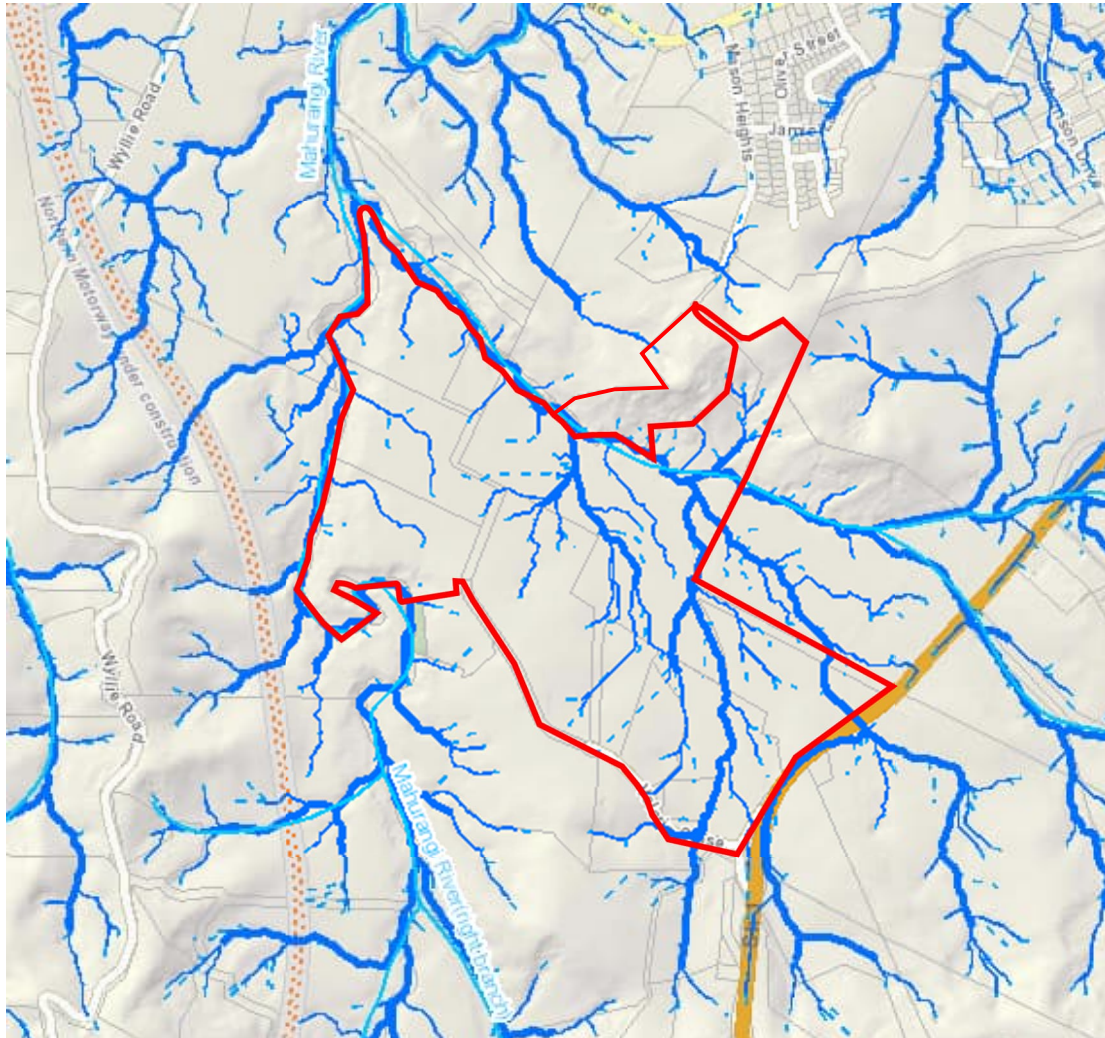


Figure 3: Catchments and Hydrology (annotated image). Approximate area of site investigation shown in red. Source: Auckland GEOMAPS<sup>2</sup>

## PRELIMINARY SITE INVESTIGATION

A PSI was undertaken to identify potential past or present HAIL activities, or potential contaminants at the site.

The following information was reviewed to establish the history of the site:

- Historical aerial photographs
- Anecdotal information from current and previous landowner(s)
- Review of LDE Geotechnical Investigation
- Previous PSI and PSI/DSI reports
- Site walkover



## Historic Aerial Imagery

Aerial images from 1966 to 2020 have been analysed as part of this investigation.

### 1966 Photograph

There is a neighbouring orchard at the eastern boundary (Figure 4). There is also a farmhouse on the southern boundary close to the Valerie close road with a large private garden, and possibly a backyard orchard. Soil disturbance (possible ploughing) is also evident on the north-western boundary of Lot 6 DP 155544 (Figure 1) in addition to some cropping or soil disturbance in the centre of the site. There is a spray shed in Lot 3 DP 15544. There is a building from late 1940s in Lot 2 DP 539629.

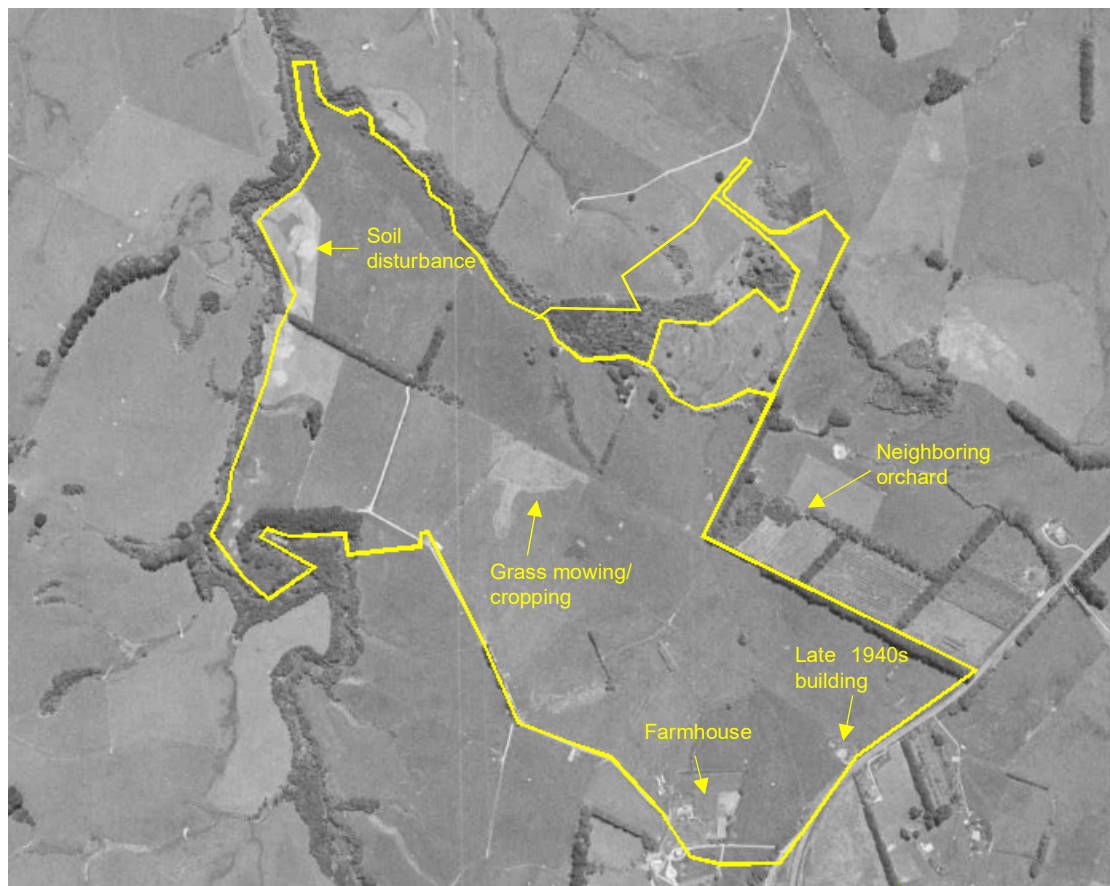


Figure 4: Photograph 1966. Sourced from Retrolenz.nz and licensed by LINZ. Approximate area of site investigation shown in yellow.

## 1970 Photograph

The aerial image of the whole site was not available. However, according to the previous PSI reports from Riley Consultants, during 1970s, a building (possibly a shed) was constructed on the northern boundary, west of the neighbouring orchard trees. A stockyard was also built in the north-eastern corner of the site next to SH1 along with a stock race on the southern side of the neighbouring orchard. Otherwise, the site remains relatively unchanged.



Figure 5: Photograph 1970. Sourced from Retrolenz.nz and licensed by LINZ. Approximate area of site investigation shown in yellow.



Figure 6: Photograph 1970. Sourced from Retrolenz.nz and licensed by LINZ. Approximate area of site investigation shown in yellow.

## 1982 Photograph

The site remains unchanged.

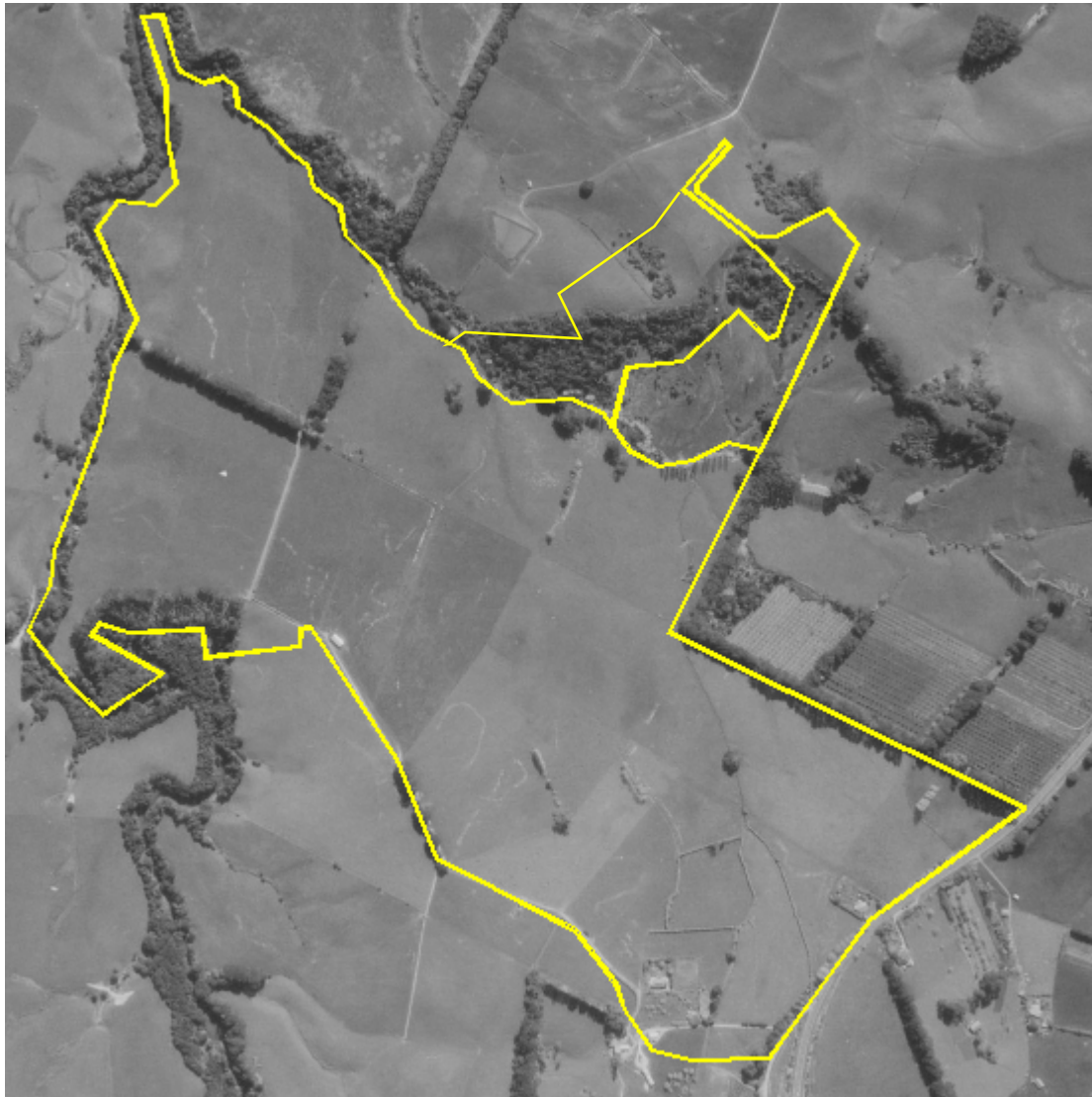


Figure 7: Photograph 1982. Sourced from Retrolenz.nz and licensed by LINZ. Approximate area of site investigation shown in yellow.

## 1992 Photograph

The line of trees on the northern boundary of existing Lot 6 DP 155544 has been removed and a new driveway and building were constructed on the south of the site. Otherwise, site remains relatively unchanged.

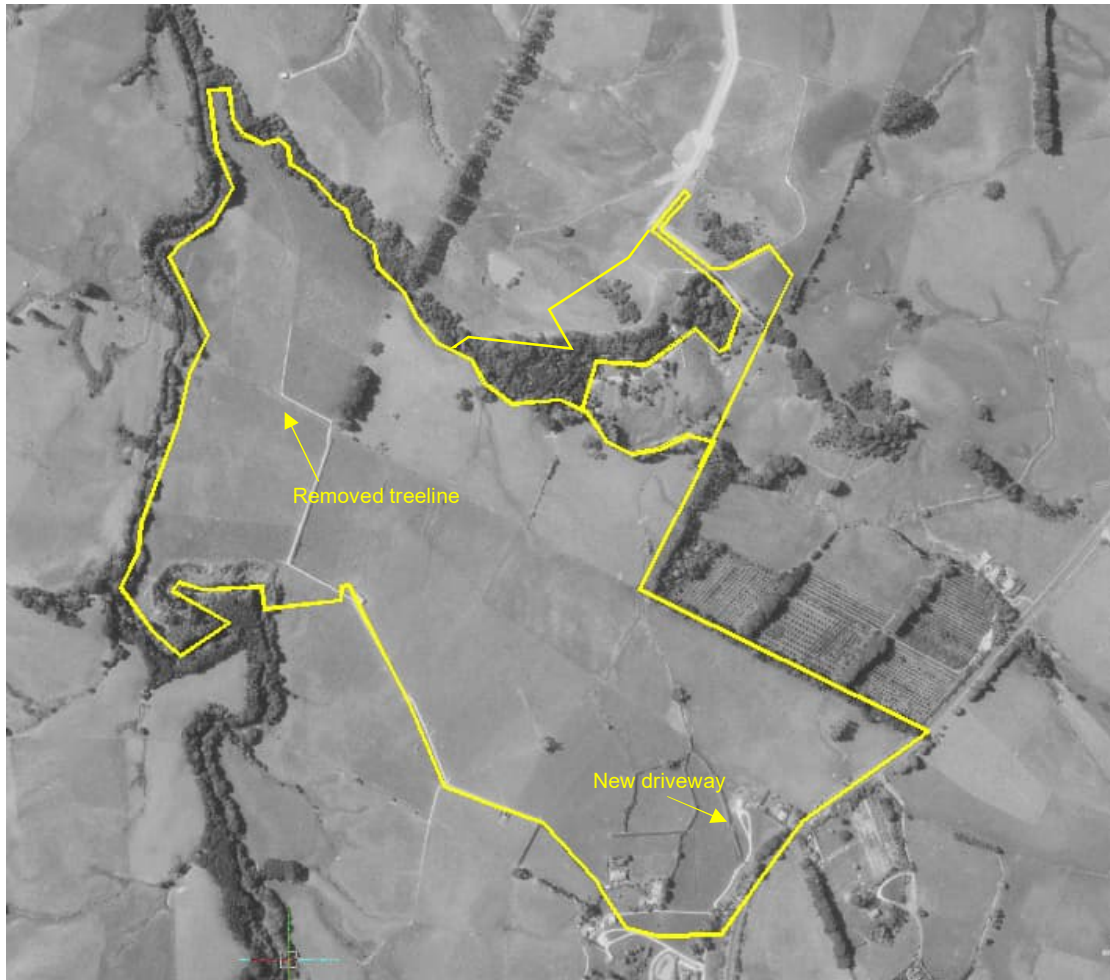


Figure 8. Photograph 1992. Sourced from Retrolenz.nz and licensed by LINZ. Approximate area of site investigation shown in yellow.

## 1999 Photograph

There is soil disturbance evident in Lot 6 DP 155544 and a vineyard established in Lot 3 DP 155544. A new driveway and building have been constructed in existing Lot 5 DP 155544.



Figure 9: Photograph 1999. Sourced from Riley Consultants report (December 2017). Approximate area of site investigation shown in yellow.

## 2011 Photograph

A vineyard including a winemaking/restaurant building and associated shed is evident along the south-west boundary of the site (Lot 3 DP 155544). There is more construction of small residential sized buildings and a small shed along the driveway of existing Lot 6 DP 155544 and Lot 2 DP 344489 (Figure 10). Soil disturbance is evident in existing Lot 3 DP 539629. A new building was also constructed on the north-east boundary of existing Lot 1 DP 539629.

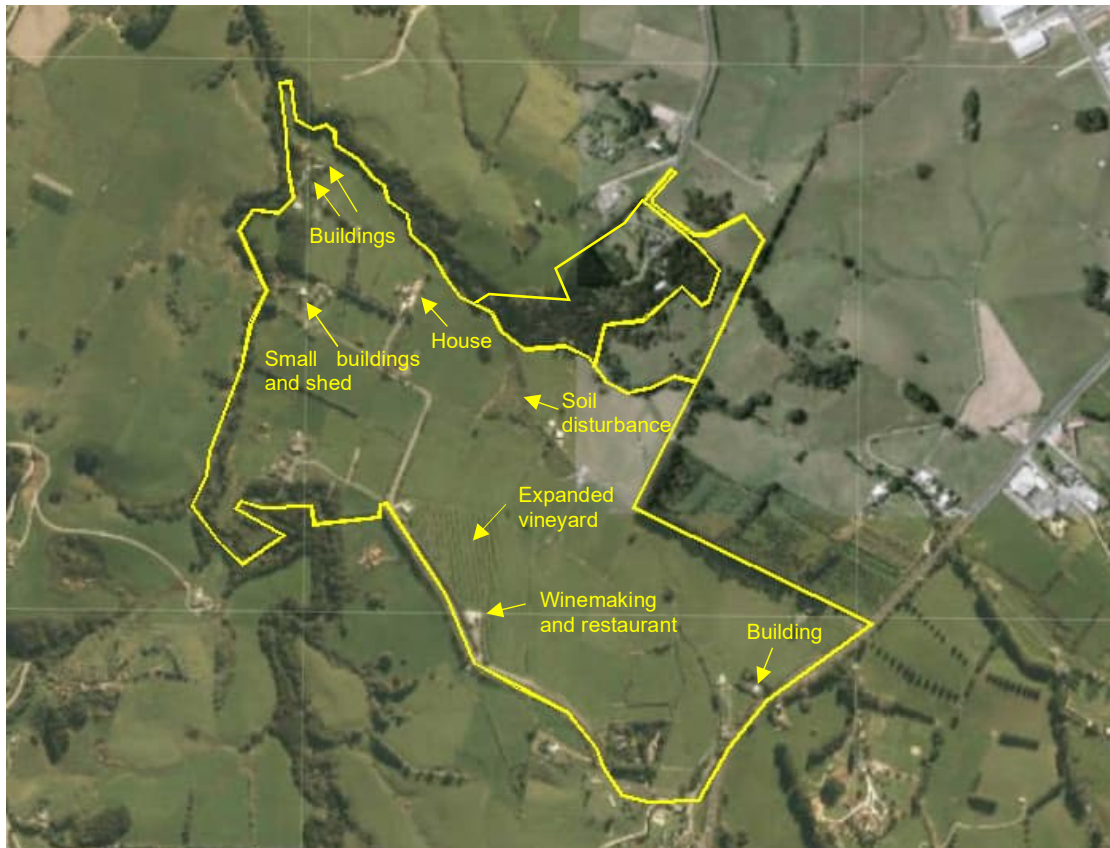


Figure 10: Photograph dated 9 December 2011. Sourced from Auckland Unitary Plan (annotated image). Approximate area of site investigation shown in yellow.

## 2020 Photograph

A number of houses and dwellings (possibly shed) were built in the existing Lot 1 DP 344489, Lot 5 DP 155544, Lot 3 DP 539629 and Lot 2 DP 451512.



Figure 11: Photograph 2020. Source Google Earth (annotated image). Approximate area of site investigation shown in yellow.

## Anecdotal information

An interview with a landowner Bill Endean, discussed the following in respect to the former Ransom Vineyard site and his former landholdings: The property was previously grazed for beef and dairy. Scrap metal (from implements) was disposed to landfill. Fuel and sprays were removed from the property. There was a small spray shed which was emptied, and contents disposed of. The small shed is now relocated and re-purposed as a garden shed to service Bill's wife's flower garden (the shed is located at Lot 3 DP 155544).

An interview with a previous landowner Robin Ransom who established the winery and vineyard, discussed the following: Approximately half of the existing vineyard was planted in 1993, and the remainder over the following years. The first crop for winemaking was harvested in 1996. There was no bulk fuel storage on the site. They had diesel fuel for the tractor in a 20-litre fuel can. The spray shed (located at Lot 3 DP 155544), was constructed with a bunded concrete floor to prevent any spilled spray from leaking out of the shed. Spray mixing and filling of the sprayer was undertaken adjacent to and immediately to the north of the water tanks

located on the northern side of the existing barn. There was no waste spray disposal because they never mixed more spray than they used.

The last fully commercial use of the site was as part of a dairy farm which ceased a number of years before they purchased the block in 1993. There may have been a few beef cattle grazing on the land from time to time after it ceased being a dairy farm. There had been orcharding in the area. According to Robin, there was no building destroyed by fire, no glass houses, and no imported fill to the property.

### **3rd Party Report Review**

A review of a DSI completed by Soil and Rock (Jan 2020) for a central portion of the site, shows soils meet both the NES SCS as well as the AUP permitted activity criteria. The investigation did not consider HAIL's other than grazing land.

A land contamination assessment report was also provided by Auckland Council in June 2019. According to this report, most of the study area has historically been and continues to be utilised for pastoral farmland and rural-residential purposes, therefore livestock dips or spray race operations have been classed as a contaminating activity. Eight properties are known or suspected to have been utilised for horticultural purposes, including market gardening, orchards, green houses, and viticulture. Waste disposal to land, waste recycling and wastewater treatment, are also considered as potential HAIL activities on the site. Given the age of the farm sheds and residential and commercial buildings, it is considered that buildings containing lead-based paints and asbestos materials may be present at some of the properties where former buildings have been demolished. Burial and burning of farm waste in addition to the importation of uncertified fill, as well as possible fuel storage have also been mentioned as potential HAIL activities on the site. A motor mechanic workshop was also identified at one property on the site.

A PSI and another PSI/DSI report was provided by Riley in 2017 and 2018, respectively. According to the PSI report, a number of HAIL activities have occurred on the site including market gardening (existing Lot 6), orchard (proposed Lot 2), buildings with lead-based paint and asbestos containing materials (proposed Lot 1), timber storage and equipment shed (proposed Lot 3) and stockyards (proposed Lot 2). According to the PSI/DSI report, HAILs A1, A10 and A18 have occurred on the site. The concentration of heavy metals and OCPs tested were all less than the regional background concentration of Auckland non-volcanic soils and therefore the proposed development was considered a permitted activity under the AUP-OP.



## SITE WALKOVER ASSESSMENT

A walkover assessment was undertaken at the site on 23 November 2020 by LDE environmental scientists. Refer to Figures below.

### LOT 3 DP 155544:



Figure 12: Site, photograph of burnpads/incinerator.



Figure 13: Converted shed with a private garden which was a storage/spray shed previously during the time the site was a vineyard



Figure 14: Photo taken facing east showing existing vineyard.



Figure 15: Stored treated timber covering large areas of ground.



Figure 16: Spray storage shed. Timber construction.

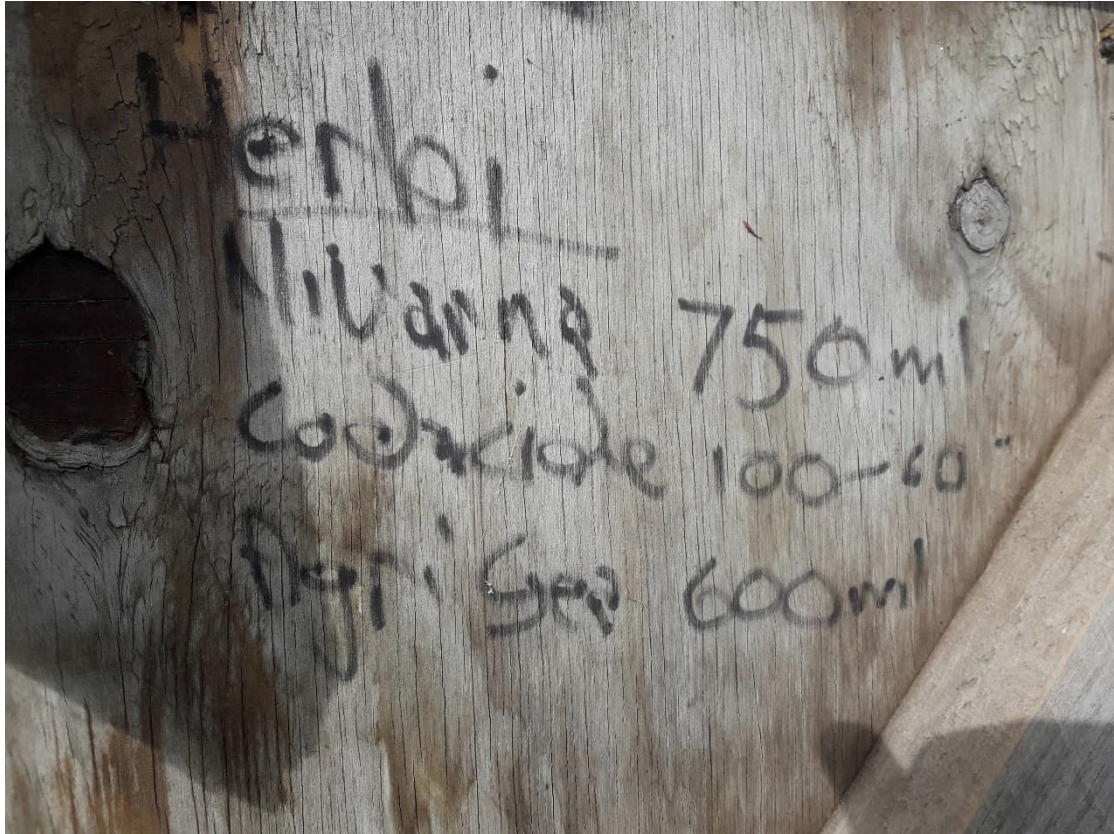


Figure 16: Notes on the spray storage.



Figure 17: Discarded drums around historic spray shed.

**LOT 6 DP 155544:**



Figure 18: Large Bumpad.



Figure 19: Soil stockpile including concrete rubble.



Figure 20: Private orchard typical of those found across the site.



Figure 21: Irrigated flat ground (possible former nursery).



Figure 22: Soil stockpile.



Figure 23: Historic shed (possible spray shed given proximity to water bore).



Figure 24: Water bore adjacent to the possible spray shed seen in previous image.



Figure 25: Covered stock yards. Treated timber construction.



**LOT 2 DP 344489:**



Figure 26: Another example of the numerous burnpads scattered across the wider site.



Figure 27: Yacht storage and possible maintenance area.



Figure 28: Storage area, unknown use.



Figure 29: Private orchard.

**LOT 3 DP 539629:**



Figure 30: Disposal/storage of soil on ground.



Figure 31: Tractor/implement storage



Figure 32: Timber storage (possibly treated).



Figure 33: Dilapidated storage shed, timber storage and other unknown items.



Figure 34: Landfill including concrete, rubble, soil, tires.



Figure 35: Private orchard.

**LOT 6 DP353748 (Oyster processing facility):**



Figure 36: Private Orchard.



Figure 37: Implement shed used for storage of spraying equipment.

Industrial processing of shellfish is noted on this lot, including the use and disposal (burning) of treated timbers onsite.



Figure 38: Bulk treated timber storage.



Figure 39: Treated timber burning as a form of disposal at the oyster processing facility.



Figure 40: Spent oyster shell disposal to ground. Unknown if landfilling elsewhere has occurred.



## LOT 2 DP539629:



Figure 41: Soil stockpile and a former nursery adjacent to it.

During the site walkover, HAIL activities typical for lifestyle blocks including burnpads, spray/implement sheds, private orchards, soil disposal and treated timber storage are evident across the wider site. Upon initial inspection, the private dwellings were not seen to contain asbestos however a more detailed inspection is expected as part of the DSI. Treated timber burning/disposal at the oyster processing facility poses a significant contamination risk to underlying soils with the potential to introduce cadmium, copper, lead, and zinc contamination. Small scale stock yards were also observed in the north-eastern corner of the site adjacent to state highway one, however there were no observations of a dip site.

A summary of all HAIL activities and their locations across the whole site are listed in Figure 42. It is noted that no HAIL activities were discovered in Lot 6 DP 150976.

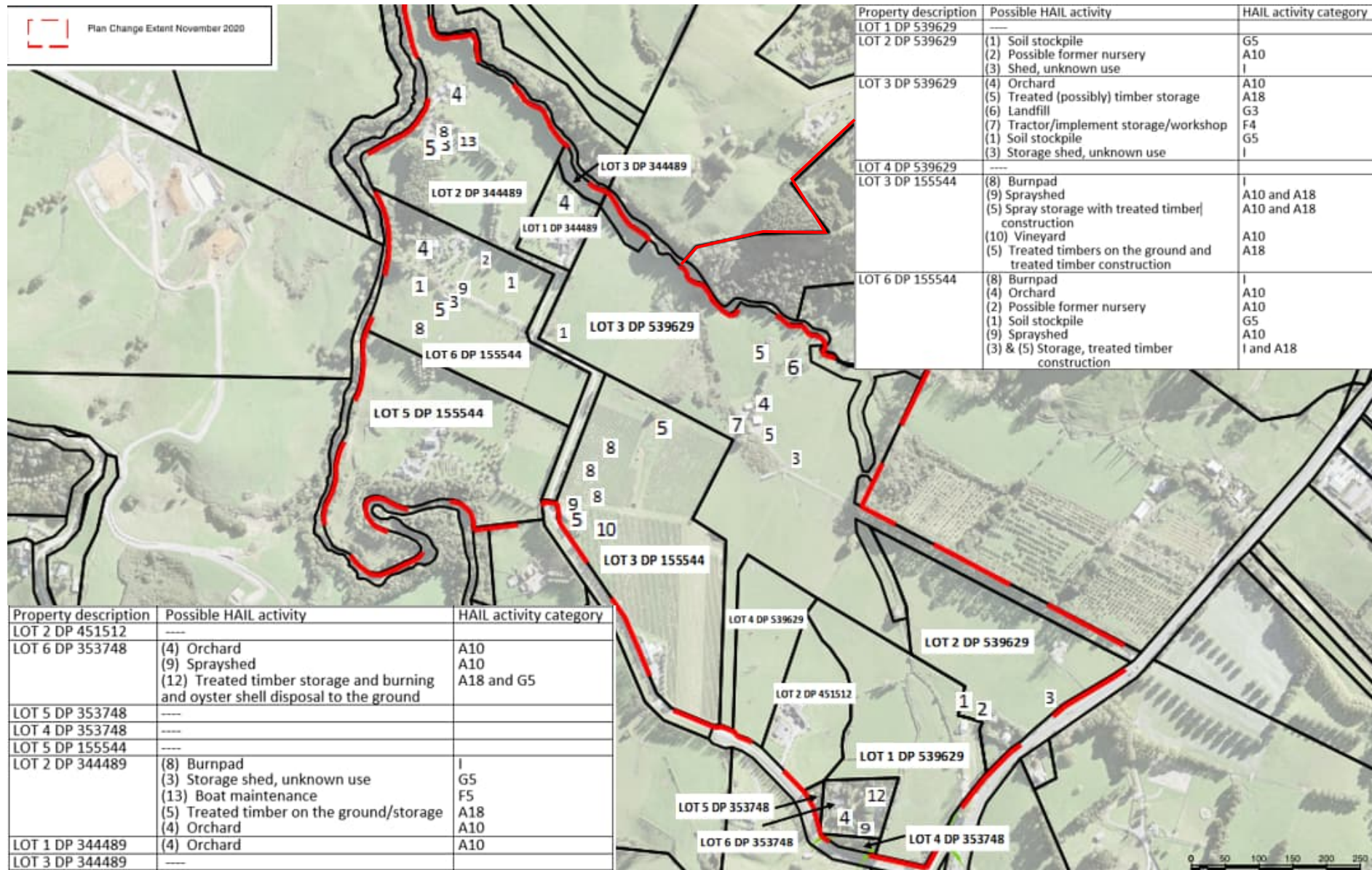


Figure 42: The location of observed HAIL activities on the site. Base map sourced from Auckland Council GEOMAPS.

## CONCEPTUAL SITE MODEL

The potential effects of the proposed activity on the site from contaminated soils are outlined in a preliminary site Conceptual Site Model (CSM) in Figure 43. The following is an analysis of potential contaminants, receptors, and pathways.

### Hazardous Substances and Potential Contaminants of Concern

Hazardous substances may potentially exist at the site because of past activities. They may include:

- Heavy metals (including arsenic, chromium, lead and copper) from treated timber storage/disposal and burnpads), heavy metals (including cadmium, copper, lead and zinc) from the oyster farm activities, and heavy metals and organochlorine pesticides (OCPs) (associated with the historical horticultural land use including spray use/storage)
- PCPs and other types of organic compounds (e.g. from spray sheds)
- Asbestos contained in waste soil disposed to land
- TBT as well as heavy metals (including copper, lead and zinc) associated with antifouling agents, storage/maintenance of yacht stored on bare ground

### Potential Receptors

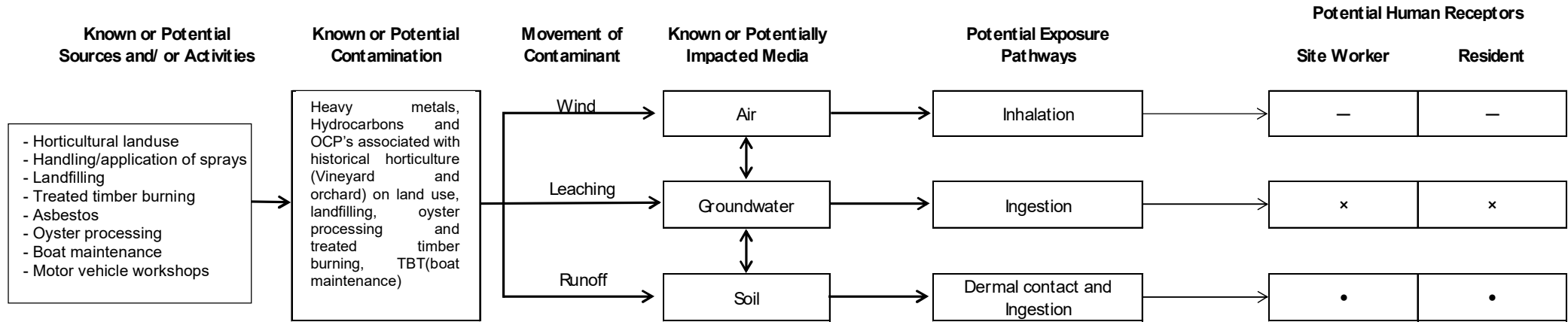
Potential receptors include:

- Current and future users of the site
- Construction workers during site development

### Exposure Pathways

A human health risk can only occur where there is a complete pathway between contaminant sources and a receptor. Building floors, paved areas and grass will largely or completely prevent contact with soil and therefore direct exposure pathways are or will be incomplete for such areas. Potential complete pathways are:

- Direct contact (dermal) with soil; e.g. whilst gardening or during any subsurface maintenance works.



**LEGEND:**

—	Pathway is not complete, no evaluation required
x	Pathway is or may be complete, but is judged to be minor or unlikely. Quantitative data collection not required.
•	Pathway is or may be complete, collect quantitative data.

Figure 43: Conceptual Site Model at the PSI stage.

## PSI CONCLUSIONS

Historical imagery, site observations and anecdotal information show that the proposed plan change area has been used primarily for dairy farming, viticulture, and grazing, and more recently, lifestyle purposes. As a result, the handling and application of sprays and other hazardous materials has more than likely taken place. There has also been waste disposal to land in the form of pruning waste incineration and landfilling, as well as the bulk storage of treated timbers on bare ground, motor vehicle workshops and possible boat maintenance activities; therefore we consider that **HAIL A1**: *'Agrichemicals including commercial premises used by spray contractors for filling, storing or washing out tanks for agrichemical application'*, **HAIL A10**: *'Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses or spray sheds'*, **HAIL G5**: *'Waste disposal to land (excluding where biosolids have been used as soil conditioners)'*, **HAL G3**: *'Landfill sites'*, **HAIL A18**: *'Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling, or bulk storage of treated timber outside'*, **HAIL F4**: *'Motor vehicle workshops'*, **HAIL F5**: *'Port activities including dry docks or marine vessel maintenance facilities'*, **HAIL H**: *'Any land that has been subject to the migration of hazardous substances from adjacent land in sufficient quantity that it could be a risk to human health or the environment'*, and **HAIL I**: *'Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment'*, are more likely than not to have occurred at the site.

LDE considers that the NES applies under Regulation 5(5) and 5(6) due to the proposed change in landuse and proposed subdivision of the site. As HAIL A1, A10, G5, G3, A18, F4, F5, H and I have been identified to have possibly occurred, or is occurring on the site, a Detailed Site Investigation (including specific site sampling) was therefore required to establish any actual human health risks associated with future land use at the site. While a number of HAILs have been identified as possibly occurring or have occurred on the site, the viability of the future urban development is not expected to be adversely affected.

## RECOMMENDATIONS

Based on the findings of the PSI, further investigation will be required (including soil testing) to establish if contamination is present at the site in concentrations exceeding the soils contaminant standards applicable to the various land use scenarios proposed for the site (including residential and recreational), and to determine the type of consent(s) that will be required for the proposed subdivision.

## REPORT LIMITATIONS

This investigation presents a preliminary site investigation of the potential for ground contamination, prepared exclusively for KA-Waimanawa Partnership Ltd. with respect to the particular brief given to us.

Information, opinions and recommendations contained in it cannot be used for any other purpose or by any other entity without our review and written consent. LDE accepts no liability or responsibility whatsoever for or in respect of any use or reliance upon this report by any third party.

Opinions given in this report are based on a review of existing data, evidence gathered during a site walkover, anecdotal information and specific soil sampling at discrete locations. There is still some possibility that contaminating activities have taken place or contamination at the site is in excess of that described in this report and we should be contacted immediately if the conditions are suspected to differ from that described.

For and on behalf of LDE Ltd

Report prepared by:



Maddie Zadeh  
*Environmental Scientist.*

Report reviewed by:

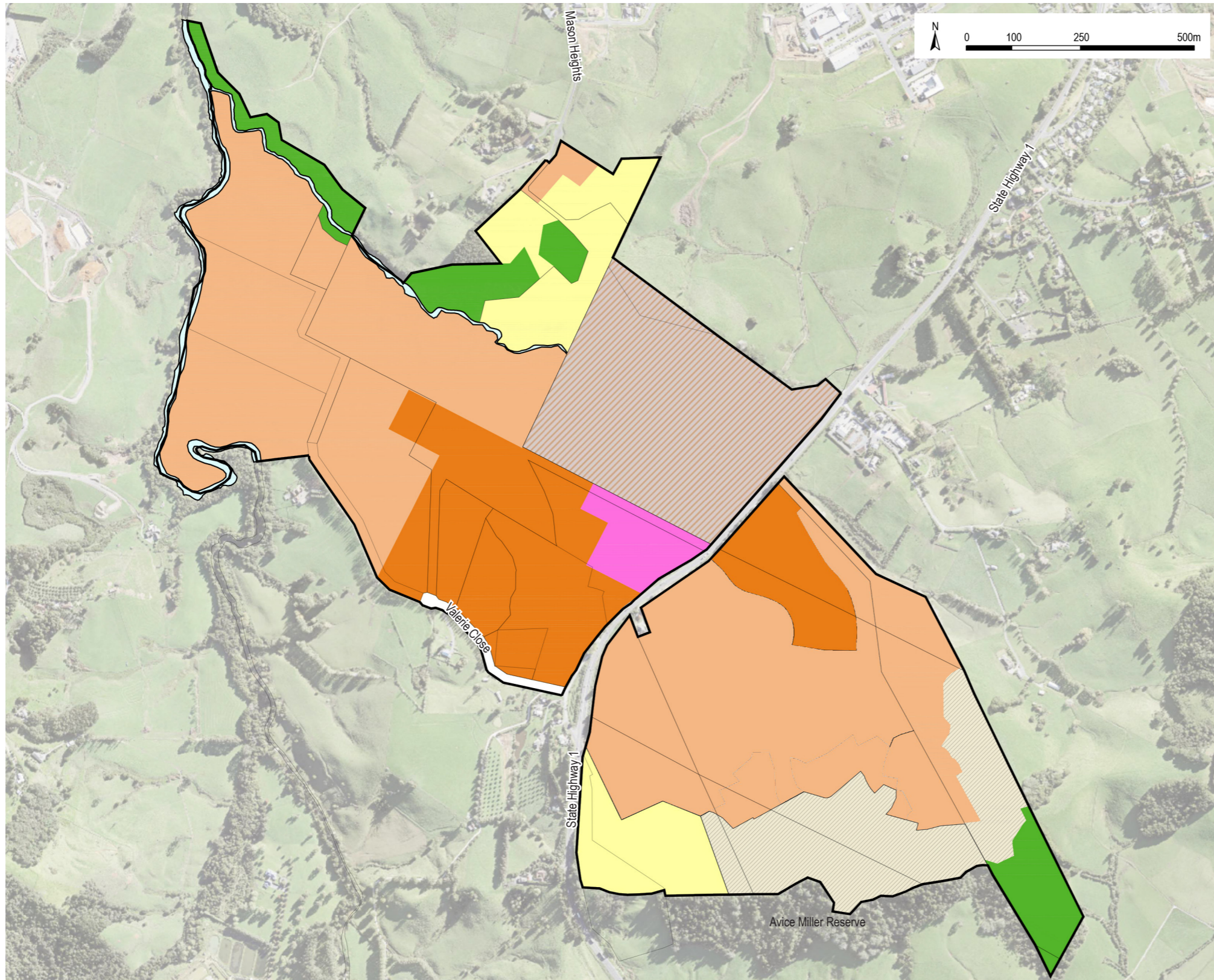


Jeff Davenport  
*Senior Environmental Scientist (SQEP)*

## **APPENDIX A**

### **MASTER PLAN**

### 5.3 Zoning Concept Plan



- Legend
- Plan Change Extent
  - Residential- Large Lot Zone
  - Residential- Single House (minimum lot size 1,000m<sup>2</sup>)
  - Residential- Mixed Housing Urban Zone
  - Residential- Terrace Housing and Apartment Building Zone
  - Business- Local Centre Zone
  - Open Space- Conservation Zone
  - Rural-Mixed Rural Zone








Figure 19 - Warkworth South Zoning Concept Plan



## 5.4 Indicative Masterplan



### Key Features

-  Local Centre
-  Public Transport Interchange (Indicative)
-  Morrison Heritage Orchard
-  Recreational Park
-  Stream Corridor
-  Bush Reserve
-  Stormwater Pond (indicative)

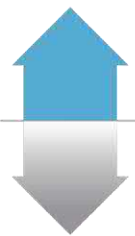
### Residential

-  Terrace Housing & Apartment Buildings
-  Mixed Housing Urban
-  Single House
-  Large Lot
-  Plan Change Boundary

Figure 20 - Warkworth South Indicative Masterplan

## **APPENDIX B**

### **SOIL AND ROCK DSI**



**Soil&Rock Consultants**  
*For well-grounded solutions*

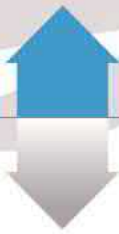
**30** YEARS OF  
SOIL&ROCK  
since 1987



Detailed Site Investigation (Contamination Assessment)  
Potential School Site – 1711 State Highway 1, Warkworth

Job No. 19595 | 23 January 2020





## DETAILED SITE INVESTIGATION (CONTAMINATION ASSESSMENT)

### Potential School Site – 1711 State Highway 1, Warkworth

<b>Job Number:</b>	19595
<b>Name of Project:</b>	Potential School Site – 1711 State Highway 1, Warkworth
<b>Client:</b>	Ministry of Education
<b>Document Version:</b>	A
<b>Printed:</b>	23 January 2020
<b>Author:</b>	<b>Garry Cepe</b> Senior Environmental Engineer (BEng - Civil)
<b>Reviewer:</b>	<b>Jordan Vaughn</b> Senior Environmental Scientist (MSc - Geology)
<b>Authoriser:</b>	<b>Zeljko Viljevac</b> Senior Hydrogeologist / Engineering Geologist (MSc - Geology)

#### Distribution List

Version	Quantity	Issued to	Date
A	PDF	Ministry of Education c/- WSP Opus Ltd.	23 January 2020
A	PDF	Soil & Rock Consultants (file copy)	23 January 2020

#### COPYRIGHT:

The information presented in this document is the property of Soil & Rock Consultants. Use or copying of this document in whole or in part without the previous permission of Soil & Rock Consultants imply a breach of copyright.

## Executive Summary

Soil & Rock Consultants (S&RC) was engaged by the Ministry of Education (MoE) (the 'Client'), to carry out a Detailed Site Investigation (DSI) for a potential school site at 1711 State Highway 1, Warkworth.

This report was prepared in accordance with the requirements of a DSI, as described under the National Environmental Standard (NES) Soil regulations, the Ministry for the Environment's (MfE) Contaminated Land Management Guidelines and Auckland Council (AC) requirements. The investigation and reporting have been prepared, reviewed and authorised by Suitably Qualified and Experienced Practitioners (SQEPs), as required under the NES Soil regulations.

The proposed site is largely utilised as farmland (pastoral use) to date. The western section of the proposed site is part of a current horticultural land (since 1993). Four pre-built residential units (prefabs) have been relocated within the central section of the property sometime in 2018. The existing Right-of-Way (ROW) access to the east-northeast extending from State Highway 1 (SH1) (potentially reworked as part of the proposed development) is covered with granular material (gravel) approximately 0.3m above farm ground level.

The purpose of this investigation is to supplement S&RC's previous investigation (Preliminary Site Investigation [PSI]) and ascertain the presence and concentrations of identified Contaminants of Concern (CoC) associated with the previous site use and activities.

Based on findings of this investigation:

- CoC concentrations in all samples analysed complied with MfE NES and Petroleum Hydrocarbon Guidelines (PHG) Human Health and Auckland Unitary Plan (AUP) Environmental Discharge Soil Acceptance Criteria (SAC). As such, soil at the site is not considered a Human Health or an Environmental risk;
- Heavy Metals concentrations were reported above Background Levels in some soil samples. As such, soil in these areas would not be considered cleanfill. Any soils transported offsite shall be disposed of to a facility with suitable acceptance criteria and further assessment in relation to soil disposal may be necessary during site works;
- A Site Management Plan (SMP) has been prepared concurrently with this report, outlining general management controls and address any further contamination discovered during earthworks and development;
- During future site earthworks, any further visual/olfactory evidence of contamination discovered within the site shall be segregated and analysed prior to disposal.

## TABLE OF CONTENTS

Executive Summary .....	i
1.0 Introduction .....	1
1.1 Proposed Development.....	1
1.2 Scope and Brief.....	1
1.3 Limitations .....	1
2.0 Site Description and Setting .....	2
2.1 Site Information .....	2
2.2 Site Condition and Environment Setting .....	3
3.0 Rules and Guidelines .....	4
3.1 Auckland Unitary Plan .....	4
3.2 Ministry for the Environment .....	4
3.3 New Zealand Guidelines for Assessing and Managing Asbestos in Soil .....	4
4.0 Summary of S&RC's Investigations .....	5
4.1 Preliminary Site Investigation .....	5
4.2 Geotechnical Investigation .....	5
5.0 Field Investigation .....	6
5.1 Methodology.....	6
5.2 Sampling Protocol .....	7
6.0 Analytical Results.....	8
6.1 Results Summary.....	8
7.0 Discussions.....	12
7.1 Updated Conceptual Site Model .....	12
7.2 Potential Resource Consent Requirements .....	13
8.0 Conclusions .....	13

### **Attachments:**

- Appendix A: Proposed Land Acquisition Plan
- Appendix B: Laboratory Analyses Report
- Appendix C: Sampling Location Plan

## 1.0 Introduction

Soil & Rock Consultants (S&RC) was engaged by James Puketapu of the Ministry of Education (MoE) (the 'Client'), to carry out an Environmental Site Assessment (ESA) for the site at 1711 State Highway 1, Warkworth.

This report is in accordance with the requirements of a Detailed Site Investigation (DSI), as described under the National Environmental Standard (NES<sup>1</sup>) Soil regulations, the Ministry for the Environment's (MfE) Contaminated Land Management Guidelines and Auckland Council (AC) requirements. The investigation and reporting have been prepared, reviewed and authorised by Suitably Qualified and Experienced Practitioners (SQEPs), as required under the NES Soil regulations.

### 1.1 Proposed Development

Preliminary information including a land acquisition plan (Ref. Dwg. No. 05025-261B, 'Proposed Land Acquisition Plan – Warkworth South Primary School', August 2019) (attached in Appendix A) prepared by Parallax Surveyors was forwarded to S&RC, indicating a proposed school development. No further details and/or development drawings have had received by us at the time of writing this report.

### 1.2 Scope and Brief

This investigation covers a DSI, as outlined in S&RC's fee proposal dated 26 September 2019. This report supplements the findings of S&RC's 2019 Preliminary Site Investigation (PSI) (S&RC Ref. 19595, *Preliminary Site Investigation [Contamination Assessment] – Potential School Site – 1711 State Highway 1, Warkworth*, 11 November 2019) and the objective is to ascertain the presence and concentrations of potential Contaminants of Concern (CoC) attributed to the previous/current site use. In summary, the investigation scope comprised:

- A brief overview of the previous investigation findings and recommendations;
- Collection of soil samples across the site and laboratory analyses for potential CoC;
- Provide a quantitative assessment of the sampling results and provide recommendations on any potential adverse effects in relation to the proposed development and the ongoing (or future) site use;
- Preparation of a DSI report (this report) and a corresponding Site Management Plan (SMP).

### 1.3 Limitations

This report has been prepared by Soil & Rock Consultants for the sole benefit of our client, the Ministry of Education (MoE), with respect to the proposed site at 1711 State Highway 1, Warkworth, and the particular brief given to us. This report may be used by Auckland Council or their appointed Consultants if required and may be relied upon when considering a Resource Consent application in association with the proposed development. The data and/or opinions contained in this report may not be used in other context or for any other purpose without our prior review and agreement. Any additional future development may require further work.

---

<sup>1</sup> Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011.

## 2.0 Site Description and Setting

### 2.1 Site Information

The site being considered for school site development covers a portion of four adjoining land parcels described in Table 1 and shown in Figure 1.

**Table 1: Site Information**

Item	Description		
<b>Location</b>	Multiple (portions of) lots to the west of SH1 and north of Valerie Close		
<b>Development Areas</b>	Not Identified (no information provided)		
<b>Site Coverage (Individual Land Parcel)</b>	<b>Address</b>	<b>Legal Description</b>	<b>Proposed Site Coverage</b>
	1711 State Highway 1	Lot 3 DP 451512	Freehold Land 4.1820 Ha
	46 Valerie Close	Lot 3 DP 155544	
	Lot 4 DP 451512, Valerie Close	Lot 4 DP 451512	Right of Way 1.3980 Ha
	Lot 1 DP 451512, Valerie Close	Lot 1 DP 451512	
<b>Zoning</b>	Residential – Future Urban (Auckland Unitary Plan Operative in part [AUP], notified 15 November 2016)		
<b>Site Area (Coverage)</b>	5.58 Ha		
<b>Territorial Authority</b>	Auckland Council		



**Figure 1: Proposed Site Extent**



## 2.2 Site Condition and Environment Setting

Existing site features including S&RC's observations during the 2019 PSI walkover are described in Table 2.

**Table 2: Environmental Setting**

	Source	Description
Topography	NZ Topo Map, S&RC Visit 31.10.19	The southern driveway/gravelled access (from Valerie Close) is of gently rolling terrain while the northern part of the site is near level. The general area slopes down to the north.
Local Setting	Auckland Unitary Plan (AUP) Geomaps, S&RC Visit 31.10.2019	The proposed site is accessible to the south from Valerie Close via a gravelled access driveway, and to the north-east from State Highway 1 (SH1Z) via an existing Right-of-Way (ROW) gravelled access.  Site is situated generally at the central section of the properties described in Table 1. The site and surrounding areas to the north, southeast and south are existing lifestyle blocks and paddocks (pastoral land). Existing horticulture areas (vineyards/orchards) are observed within adjacent properties to the west (46 Valerie Close) and east/north-east (PT ALLOT 64 PSH OF MAHURANGI DP 25881).
Regional Geology	GNS Science Geology Web Map (1:250K Geology)	The site is underlain by two geological units, Pakiri Formation of the Waitemata Group and Alluvium and Colluvium of the Tauranga Group.
Site Lithology	2019 Geotechnical Investigation, S&RC	refer to Section 4.2 of this report for details
Groundwater		
Nearby Surface Water	NZ Topo Map, AUP Geomaps	<ul style="list-style-type: none"> <li>Mahurangi River (Right Branch) – situated approximately 350m west and 200m north of the site.</li> <li>Unnamed tributaries (streams) adjacent to the northern and north-eastern boundaries (running parallel the gravelled ROW from SH1) of the site, flowing north-northwest towards Mahurangi River.</li> </ul>
Built Development	S&RC Site Walkover 31.10.2019	Four (4) residential units within central section .
AUP Management Areas	AUP Geomaps	<ul style="list-style-type: none"> <li>Site is within a High Use Stream / Aquifer Management Area .</li> <li>No identified 'Natural Heritage Areas' (e.g. natural landscape areas) within 500m radius the site.</li> <li>No areas identified of Historic Heritage or Special Character.</li> <li>No areas identified of significance to Mana Whenua.</li> </ul>

### 3.0 Rules and Guidelines

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

- AUP – Auckland Unitary Plan Operative in part Permitted Activity Criteria (PAC) for Environmental Discharge;
- MfE NES and Petroleum Hydrocarbon Guidelines (PHG) – National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health and Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand;
- BRANZ – Building Research Association New Zealand's Guidelines for Assessing and Managing Asbestos in Soil.

#### 3.1 Auckland Unitary Plan

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

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

#### 3.2 Ministry for the Environment

Since 1999, the MfE has issued several sets of guideline documents and resources for the investigation and reporting of contaminated land within New Zealand. These documents are aimed to provide national consistency in the reporting of contaminated site information and are widely reference by various Territorial Authorities (TA).

These documents and resources include:

- NES for Assessing and Managing Contaminants in Soil to Protect Human Health;
- Contaminated Land Management Guidelines (no. 1 – 5);
- Guidelines for Assessing and Managing Petroleum Hydrocarbon Contaminated Sites in New Zealand.

Copies of the above guideline documents are available at [www.mfe.govt.nz](http://www.mfe.govt.nz).

#### 3.3 New Zealand Guidelines for Assessing and Managing Asbestos in Soil

In 2017, the Building Research Association of New Zealand (BRANZ) published the *New Zealand Guidelines for Assessing and Managing Asbestos in Soil* (BRANZ, 2017). The guidelines provide direction around identifying, assessing and managing Asbestos in soil in New Zealand.

## 4.0 Summary of S&RC's Investigations

### 4.1 Preliminary Site Investigation

S&RC's 2019 PSI (Desktop Study) comprised a historical review of the property. Identified areas of potential concern as part of the PSI (based on historical use and activities) within the property would include:

- Areas subject to horticulture use, primarily within the western section of the site, forming part of 46 Valerie Close;
- Areas potentially affected by horticulture use which includes existing farm drains, ditches and lower sections of the site (potentially affected by overland flows) acting as preferential pathways for contamination;
- The area of the existing transformer box in relation to potential (previous) oil leaks.

The proposed ROW expansion to the northeast of the site is unlikely to have been affected by the northern horticulture activities, as buffered by the existing shelterbelts and the stream.

### 4.2 Geotechnical Investigation

S&RC prepared a Geotechnical Investigation (S&RC Ref. 19583, *Geotechnical Factual Report, Proposed School Development – 1711 State Highway 1, Warkworth*, 22 January 2020) concurrently with this investigation.

Subsurface conditions encountered are described below:

- **Topsoil.** Encountered generally from surficial soils, ranging between 0.0 – 0.3m below ground level (bgl) across the site;
- **Fill (Silty Soils).** Fill was encountered within the southern part of the driveway (from Valerie Close) at 1.4m bpgl;
- **Fill (Granular).** Granular Fill was encountered within the north-eastern driveway (access road from SH1) at depths between 0.0 – 0.3 m bpgl;
- **Tauranga Group Soils (Alluvial Deposits).** Alluvial deposits were encountered underlying topsoil and fill which extended to the termination of the boreholes;
- **Groundwater.** Groundwater at varying depths was encountered at the site and is in general correlation with the site's topography:
  - Shallow groundwater (between 0.3 – 1.0m bpgl) was encountered within the north-western section of the site;
  - Groundwater was encountered between 1.0 – 1.6m bpgl within the north-eastern gravelled driveway (filled);
  - Deeper groundwater (between 0.7 – 4.5m bpgl) was encountered from the site's central section towards the southern driveway which generally lies at higher elevation.

## 5.0 Field Investigation

Field investigation as part of the DSI was carried out between 11-12 December 2019. The DSI comprised a combination of individual and composite sampling across the site.

### 5.1 Methodology

A total of 31 individual soil samples and 13 composite soil samples (comprising two to four individual subsamples each) were collected across the site and analysed for identified Contaminants of Concern (CoC). Individual and composite soil sampling was collected in accordance with the following sampling scheme:

- Individual soil samples were collected from areas identified with activities listed as potential Hazardous Activities and Industries List (HAIL) , in Overland Flow Paths (OLFP), and near ditches/drains;
- Composite samples were collected from areas potentially affected by adjacent HAIL activities.

All 31 individual soil samples were analysed for Heavy Metals, 28 individual soil samples were further analysed for Organochlorine Pesticides (OCP), three individual soil samples were further analysed for Total Petroleum Hydrocarbons and Polycyclic Aromatic Hydrocarbons (PAH) and one individual soil samples was further analysed for Polychlorinated Biphenyls (PCB). All 13 composite soil samples were analysed for Heavy Metals and OCP and two composite soil samples were further analysed for TPH, PAH and Asbestos Identification (ID).

Soil sampling was carried out in general accordance with MfE Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis of Soils (MfE, Revised 2011).

A description of soils encountered, including sample location and depths are described in Table 3 below.

**Table 3: Sampling Locations and Descriptions**

Location	Sample Description			Analyses Parameters
	Sample ID	Depth (m bpgl)	Dominant Material	
<b>Individual Soil Samples</b>				
Graveled Access	D3, D4	0.2	Fill (Silt)	Heavy Metals, PAH, TPH
OLFP (indicative), Ditches/Drains	D1, D2, D5, D11, D12, D22, D27, D29, D31,	0.0 – 0.3	Topsoil/Fill	Heavy Metals, OCP
Adjacent to existing Transformer	D30	0.0 – 0.1	Topsoil	Heavy Metals, PAH, TPH, PCB
Active Horticulture Area (at time of sampling)	D6 – D10, D13 – D17	0.0 – 0.075	Topsoil	Heavy Metals, OCP
Paddocks (Former Horticulture Area) – already cleared at the time of sampling	D18-D21, D23-D26, D28	0.0 – 0.075	Topsoil	Heavy Metals, OCP
<b>Composite Soil Samples</b>				
Paddocks	C1 – C11 (composite of four individual samples each)	0.0 – 0.075	Topsoil	Heavy Metals, OCP
Existing Soil Stockpile	C12 (composite of two individual samples)	-	Fill	Heavy Metals, OCP, PAH, TPH, Asbestos ID
Former Stockpile Footprint	C13 (composite of three individual samples)	-	Topsoil/Fill	

## 5.2 Sampling Protocol

Field sampling followed strict environmental sampling protocols to ensure reliable and representative results. Field sampling was conducted by hand augerhole drilling. Disposable nitrile gloves were used and replaced between handling of each soil samples and sampling equipment was decontaminated between soil samples to prevent potential cross-contamination.

All sample containers and preservatives, where applicable, were supplied by the subcontract laboratory and were consistent with the specifications provided in of Contaminated Land Management Guidelines No. 5 – Site Investigation and Analysis of Soils (MfE, Revised 2011). All samples were labelled with unique identifiers indicating the borehole location. Samples were couriered to the laboratory under continuous Chain of Custody (COC) documentation. Each COC form had a unique laboratory number.

## 6.0 Analytical Results

Analytical results for individual and composite soil samples are summarised in Tables 4 and 5, respectively. Full laboratory analytical reports are provided in Appendix B. The Sampling Location Plan is provided in Appendix C.

### 6.1 Results Summary

Soil analytical results reported:

#### Individual Samples (Table 4)

- All CoC concentrations (Heavy Metals and, where analysed, OCP, TPH, PAH and/or PCB) complied with the MfE NES and PHG (Human Health – Residential Use Scenario) and AUP (Environmental Discharge) Soil Acceptance Criteria (SAC);
- Heavy Metal (As, Cd and/or Cu) concentrations were above Background Levels in a few samples.

#### Composite Samples (Table 5)

- All CoC concentrations (Heavy Metals and OCP and, where analysed, TPH and PAH) complied with the MfE NES and PHG (Human Health – Residential Use Scenario) and AUP (Environmental Discharge) SAC;
- Asbestos was not detected in either of the samples analysed (C12 and C13);
- Heavy Metal (Cd) concentrations were above Background Levels in a few samples.

Table 4: Contaminant Screening in Soils (Individual Soil Samples)

Sample No.	Test Analysis Levels (mg/kg)															Auckland Council		MfE		
	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	BG Lvl <sub>1</sub>	PAC <sub>2</sub>	NES <sub>3</sub>	PHG <sub>4</sub>	
Sample Depth (m-bgl)	0.0 – 0.3	0.0 – 0.3	0.2	0.2	0.0 – 0.3	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.3	0.0 – 0.3	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075					
Heavy Metals	Arsenic (As)	< 2	12	< 2	< 2	< 2	3	3.3	< 2	< 2	3.9	3	2.5	2.2	< 2	< 2	12.0	100	20	-
	Cadmium (Cd)	< 0.4	0.6	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.6	< 0.4	< 0.4	< 0.4	0.65	7.5	3	-
	Chromium (Cr)	8.4	17	7.1	11	7.3	11	8.8	6.1	8.2	12	9.4	12	7.3	7.3	7.2	55	400	460	-
	Copper (Cu)	6.2	17	< 5	< 5	14	9	9.8	9.9	25	26	13	11	16	27	21	45	325	<10,000	-
	Lead (Pb)	5.7	7.4	< 5	< 5	< 5	< 5	9.2	< 5	6.4	12	9.4	10	7.7	7.6	5.2	65.0	250	210	-
	Mercury (Hg)	0.1	0.2	< 0.1	< 0.1	< 0.1	0.1	0.1	< 0.1	< 0.1	0.2	0.1	0.1	< 0.1	< 0.1	< 0.1	0.45	0.75	310	-
	Nickel (Ni)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5.2	6.9	< 5	< 5	< 5	35	105	600 <sup>3a</sup>	-
	Zinc (Zn)	18	40	20	18	22	20	41	17	21	39	34	33	32	17	23	180	400	7,000 <sup>3a</sup>	-
OCP	∑DDT	< 0.01	< 0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	12.0	70	-	
	Aldrin	< 0.01	< 0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-	
	Dieldrin	< 0.01	< 0.01	-	-	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-	
TPH	C7-C9	-	-	< 5	< 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	500 <sup>(m)</sup>
	C10-C14	-	-	< 10	< 10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	510 <sup>(x)</sup>
	C15-C36	-	-	< 20	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	>20,000
PAH	BaP Eq	-	-	0.04	0.04	-	-	-	-	-	-	-	-	-	-	-	20	10	-	4a
	Naphthalene	-	-	< 0.1	< 0.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	63 <sup>(v)</sup>
	Non-carc. (Pyrene)	-	-	0.04	< 0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,600 <sup>(p)</sup>

Notes Concentration / Concentration: Below / Above accepted background range (Heavy Metals) or laboratory MDL (OCP, TPH, PAH)  
**Concentration:** Values above the Soil Acceptance Criteria (SAC)

<sup>1</sup> Background Level: Auckland Unitary Plan (Non-Volcanic Soils)

<sup>2</sup> PAC – Permitted Activity Criteria (Discharge): Auckland Unitary Plan (AUP)

<sup>3</sup> MfE – NES for Assessing and Managing Contaminants in Soil to Protect Human Health (Residential 10% Produce Land Use Scenario)

<sup>3a</sup> MfE – Environmental Guideline Value (EGV) Database, Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999), Health Investigation Level (Residential Use)

<sup>4</sup> MfE – Tier 1 Soil Acceptance Criteria (Residential Use, All Pathways) for “sand” soil type (<1m depth), Petroleum Hydrocarbon Guidelines (MfE, Revised 2011),

– Limiting Pathway Criterion: (v) volatilisation, (d) dermal, (m) maintenance/excavation, (p) produce, (x) PAH surrogate

Table 4: Contaminant Screening in Soils (Discrete Soil Samples) – Continued

Sample No.	Test Analysis Levels (mg/kg)																Auckland Council		MfE		
	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30	D31	BG Lvl <sub>1</sub>	PAC <sub>2</sub>	NES <sub>3</sub>	PHG <sub>4</sub>	
Sample Depth (m-bgl)	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.3	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.3	0.0 – 0.075	0.0 – 0.3	0.0 – 0.1	0.0 – 0.3					
Heavy Metals	Arsenic (As)	< 2	< 2	< 2	8.5	13	< 2	< 2	< 2	< 2	< 2	< 2	26	< 2	< 2	< 2	2.9	12.0	100	20	-
	Cadmium (Cd)	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	0.4	< 0.4	< 0.4	< 0.4	0.5	0.5	0.4	0.4	0.8	0.7	0.65	7.5	3	-
	Chromium (Cr)	< 5	6.5	5.1	16	14	5.8	5.1	< 5	8.6	8.5	11	29	12	8.5	11	14	55	400	460	-
	Copper (Cu)	< 5	13	11	39	60	27	12	25	58	43	45	130	34	26	12	15	45	325	<10,000	-
	Lead (Pb)	< 5	10	8.4	9	5.7	7.7	< 5	< 5	8.4	7.5	9.2	5.9	9.6	7.9	8.5	15	65.0	250	210	-
	Mercury (Hg)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	0.1	0.2	0.2	< 0.1	0.2	0.2	0.1	0.2	0.45	0.75	310	-
	Nickel (Ni)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	5.2	35	105	600 <sup>3a</sup>	-
	Zinc (Zn)	< 5	67	17	64	54	98	18	22	53	31	30	70	40	22	27	30	180	400	7,000 <sup>3a</sup>	-
OCP	∑ DDT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	12.0	70	-	
	Aldrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-	
	Dieldrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-	
TPH	C7-C9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 5	-	-	-	-	500 <sup>(m)</sup>
	C10-C14	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 10	-	-	-	-	510 <sup>(x)</sup>
	C15-C36	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 20	-	-	-	-	>20,000
PAH	BaP Eq	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.04	-	-	20	10	- <sup>4a</sup>
	Naphthalene	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	-	63 <sup>(v)</sup>
	Non-carc. (Pyrene)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.03	-	-	-	-	1,600 <sup>(p)</sup>
PCB (Total)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	< 0.1	-	-	-	10 <sup>3a</sup>	-	

Notes Concentration / Concentration: Below / Above accepted background range (HM)

Concentration: Values above the Soil Acceptance Criteria (SAC)

<sup>1</sup> Background Level: Auckland Unitary Plan (Non-Volcanic Soils)

<sup>2</sup> PAC – Permitted Activity Criteria (Discharge): Auckland Unitary Plan (AUP)

<sup>3</sup> MfE – NES for Assessing and Managing Contaminants in Soil to Protect Human Health (Residential 10% Produce Land Use Scenario)

<sup>3a</sup> MfE – Environmental Guideline Value (EGV) Database, Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999), Health Investigation Level (Residential Use)

<sup>4</sup> MfE – Tier 1 Soil Acceptance Criteria (Residential Use, All Pathways) for “sand” soil type (<1m depth), Petroleum Hydrocarbon Guidelines (MfE, Revised 2011),

– Limiting Pathway Criterion: (v) volatilisation, (d) dermal, (m) maintenance/excavation, (p) produce, (x) PAH surrogate



Table 5: Contaminant Screening in Soils (Composite Soil Samples)

Sample No.		Test Analysis Levels (mg/kg)												Auckland Council		MfE		
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12					C13
Sample Depth (m-bgl)		0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	0.0 – 0.075	-	-	BG Lvl <sub>1</sub>	PAC <sub>2</sub>	NES <sub>3</sub>	PHG <sub>4</sub>
Heavy Metals	Arsenic (As)	< 2	< 2	2.3	< 2	< 2	< 2	< 2	2.6	2.5	< 2	< 2	< 2	< 2	12.0	100	20	-
	Cadmium (Cd)	0.4	0.4	0.7	< 0.4	0.6	0.8	< 0.4	0.8	0.8	0.6	0.5	0.6	0.6	0.65	7.5	3	-
	Chromium (Cr)	8	7.7	12	8.3	9.4	12	5.9	17	16	7.3	8.3	16	15	55	400	460	-
	Copper (Cu)	7.9	7.7	11	6.1	9.8	16	6.2	16	16	9	8.5	13	10	45	325	<10,000	-
	Lead (Pb)	5.3	5.8	10	5.3	7.5	9.6	< 5	11	11	7.1	5.3	8.8	9.2	65.0	250	210	-
	Mercury (Hg)	< 0.1	0.1	0.1	0.1	0.1	0.1	< 0.1	0.2	0.2	0.1	0.1	0.2	0.2	0.45	0.75	310	-
	Nickel (Ni)	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	6.7	< 5	< 5	5.7	5.2	35	105	600 <sup>3a</sup>	-
	Zinc (Zn)	25	24	40	20	25	32	26	78	35	28	20	30	34	180	400	7,000 <sup>3a</sup>	-
OCP	∑ DDT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	12.0	70	-
	Aldrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-
	Dieldrin	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	-	-	2.6	-
TPH	C7-C9	-	-	-	-	-	-	-	-	-	-	-	< 5	< 5	-	-	-	500 <sup>(m)</sup>
	C10-C14	-	-	-	-	-	-	-	-	-	-	-	< 10	< 10	-	-	-	510 <sup>(x)</sup>
	C15-C36	-	-	-	-	-	-	-	-	-	-	-	< 20	< 20	-	-	-	>20,000
PAH	BaP Eq	-	-	-	-	-	-	-	-	-	-	-	0.04	0.04	-	20	10	- <sup>4a</sup>
	Naphthalene	-	-	-	-	-	-	-	-	-	-	-	< 0.1	< 0.1	-	-	-	63 <sup>(v)</sup>
	Non-carc. (Pyrene)	-	-	-	-	-	-	-	-	-	-	-	< 0.03	< 0.03	-	-	-	1,600 <sup>(p)</sup>
Asbestos ID		-	-	-	-	-	-	-	-	-	-	-	ND	ND	-	-	-	-

Notes Concentration / Concentration: Below / Above accepted background range (HM)

D/ND Detected / Not Detected (Asbestos)

Concentration: Values above the Soil Acceptance Criteria (SAC)

<sup>1</sup> Background Level: Auckland Unitary Plan (Non-Volcanic Soils)

<sup>2</sup> PAC – Permitted Activity Criteria (Discharge): Auckland Unitary Plan (AUP)

<sup>3</sup> MfE – NES for Assessing and Managing Contaminants in Soil to Protect Human Health (Residential 10% Produce Land Use Scenario)

<sup>3a</sup> MfE – Environmental Guideline Value (EGV) Database, Guideline on the Investigation Levels for Soil and Groundwater (NEPC, 1999), Health Investigation Level (Residential Use)

<sup>4</sup> MfE – Tier 1 Soil Acceptance Criteria (Residential Use, All Pathways) for “sand” soil type (<1m depth), Petroleum Hydrocarbon Guidelines (MfE, Revised 2011),

– Limiting Pathway Criterion: (v) volatilisation, (d) dermal, (m) maintenance/excavation, (p) produce, (x) PAH surrogate

## 7.0 Discussions

In summary, all CoC concentrations were reported below the SAC (MfE NES and PHG, AUP) and would not be considered a Human Health or an Environmental risk. Heavy Metals concentrations were reported above Background Levels in some soil samples, excluding these soils from be regarded as 'clean fill'.

The proposed development area (potential school development) comprises paddocks, existing dwellings (four units) and partially as active vineyards (south-western section). Part of the vineyard extent (western/north-western section) were noted free of horticultural activities at the time of investigation. The site extent is generally overlain by surficial topsoil (0.0 – 0.3m bpgl) and underlain by alluvial deposits, apart from the location of the dwellings (observed with gravel surface).

The existing ROWs (northeast and south) are currently gravelled. No sampling was carried out within the north-eastern ROW (proposed for expansion), partially/mostly gravelled (approximately 300mm depth), and serving as access road from SH1. The area is unlikely to have been affected by the adjacent northern horticulture activities, as buffered by the existing shelterbelts and the existing stream (running parallel to the north).

### 7.1 Updated Conceptual Site Model

An updated Conceptual Site Model (CSM) has been prepared in relation to the proposed use of the site and our assessment of potential effects on human health and the environment. The CSM is presented in Table 6 below.

**Table 6: Conceptual Site Model (CSM)**

Source	Pathway	Potential Receptors	Risk Assessment
Contaminants in Soil	<u>Human Health</u> Soil Ingestion, Inhalation (Dust), Dermal Contact	<u>During Construction</u> Construction/Maintenance (C/M) Workers, Onsite/Offsite Receptors	<u>No Risk</u> - All results below the MfE NES and PHG (Human Health) SAC - Controls in place during earthworks
		<u>After Construction</u> Future Site Occupants, Future Ground Disturbance (C/M Workers)	- A Site Management Plan (SMP) has been prepared (concurrently with this report) in relation to potential contamination discovery
	<u>Environmental Discharge</u> Soil Disturbance, Contaminant Migration	<u>During Construction</u> Discharge to Environment (Groundwater, Flora/Fauna)	<u>No Risk</u> - All results below the AUP(Environmental Discharge) SAC - Controls in place during earthworks
		<u>After Construction</u> Discharge to Environment (Groundwater, Flora/Fauna)	- A SMP has been prepared (concurrently with this report) in relation to potential contamination discovery
	<u>Soil Disposal</u>	Receiving site/environment	<u>Minor Risk – Manageable</u> - Minor Background Level exceedances recorded on a few samples (generally collected from surficial soils/topsoil) - Soils (topsoil/fill) for offsite disposal to be disposed to a suitable landfill

## 7.2 Potential Resource Consent Requirements

Based on the findings of this investigation, Table 7 presents potential Resource Consent (RC) requirements for the proposed activity under the provisions of the AUP and the NES. This investigation presents factual information for the site. Matters of control and discretion, however, rest with the consenting authority (Auckland Council) based on their assessment of this report. It would be appropriate to seek clarification of Auckland Council or an Environmental Planning Specialist for further information on resource consenting requirements.

**Table 7: Current Regulations and Potential Resource Consent Requirements**

	<u>Potential Applicable Planning Rules</u>	<u>Matters of Control</u>
<b>AUP</b>	PERMITTED ACTIVITY (Chapter E30) <ul style="list-style-type: none"> <li>Concentrations of target contaminants below the Permitted Activity Criteria</li> </ul>	<ul style="list-style-type: none"> <li>Preparation of a SMP outlining management controls to be implemented during site works</li> </ul>
<b>NES</b>	CONTROLLED ACTIVITY (Rule 9) <ul style="list-style-type: none"> <li>All results are below the NES SCS<sub>sHealth</sub> Criteria (Residential Use 10% Produce Scenario)</li> </ul>	

## 8.0 Conclusions

The DSI has been carried out in accordance with the scope of work and regulations under the AUP and NES. The purpose of this investigation was to supplement S&RC's 2019 PSI and ascertain the presence and concentrations of CoC associated with the previous site use and activities. This report is in accordance with MfE's guidelines for contaminated site investigations and AC requirements.

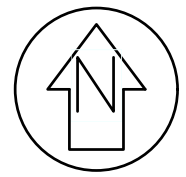
Based on the findings of this investigation:

- Sampling results carried out across the site reported all CoC at concentrations below the SAC (MfE NES and PHG, AUP) and would not be considered a Human Health or an Environmental risk;
- Areas with Heavy Metals concentrations reported above Background Levels are not considered cleanfill. Further assessment in relation to soil disposal may be necessary during site works;
- A SMP has been prepared concurrently with this report, outlining general management controls and address any further contamination discovered during earthworks and development;
- Any soils transported offsite shall be disposed of to a facility with suitable acceptance criteria;
- During future site earthworks, any further visual/olfactory evidence of contamination discovered within the site shall be segregated and analysed prior to disposal.

End of Report

# Appendix A

## Proposed Land Acquisition Plan



Land to be Acquired		
Appellation	Title	Area Required (ha)
Lot 3 DP 155544	NA92D/742	0.7130 total 0.6660 freehold 0.0470 ROW
Lot 1 DP 451512	575618	0.1160 freehold
Lot 3 DP 451512	575620	2.3180 total 1.8190 freehold 0.4990 ROW
Lot 4 DP 451512	575621	2.4330 total 1.5810 freehold 0.8520 ROW

NOTE:  
All of the above records of title are owned by Warkworth Estate Limited.

NOTES:  
1. This plan has been prepared for discussion purposes only and is not to be used for any other purpose.  
2. Aerial Photo will be subject to scale and rotation distortion.  
3. Areas and measurements are subject to survey.

**PARALLAX**  
SURVEYORS AND PLANNERS  
PO Box 266 Warkworth 0941, Ph 09 425 8700  
www.parallaxsurveyors.co.nz

Project: Warkworth Estate Ltd  
1711 State Highway 1  
Warkworth

Plan Title: Proposed Land Acquisition Plan  
(Warkworth South Primary School)

Original Scale: 1 : 2500	Original Size: A3
Date: August 2019	Drawing Number: 05025-261B

# Appendix B

## Laboratory Analyses Report

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



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, unless otherwise specified.

Accreditation No. 1327

**Attention:** Garry Cepe

**Report** 694138-S

Project name

Project ID 19595

Received Date Dec 13, 2019

Client Sample ID			D1	D2	D3	D4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24201	K19-De24202	K19-De24203	K19-De24204
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	< 5
TPH-SG C10-C14	10	mg/kg	-	-	< 10	< 10
TPH-SG C15-C36	20	mg/kg	-	-	< 20	24
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	< 35
<b>Organochlorine Pesticides (NZ MfE)</b>						
2,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	-
2,4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	-
2,4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	-	-
4,4'-DDE	0.01	mg/kg	< 0.01	< 0.01	-	-
4,4'-DDT	0.01	mg/kg	< 0.01	< 0.01	-	-
DDT + DDE + DDD (Total)*	0.01	mg/kg	< 0.01	< 0.01	-	-
a-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Aldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
b-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Chlordanes - Total	0.01	mg/kg	< 0.01	< 0.01	-	-
cis-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	-
d-BHC	0.01	mg/kg	< 0.01	< 0.01	-	-
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan I	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan II	0.01	mg/kg	< 0.01	< 0.01	-	-
Endosulfan sulphate	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin aldehyde	0.01	mg/kg	< 0.01	< 0.01	-	-
Endrin ketone	0.01	mg/kg	< 0.01	< 0.01	-	-
g-BHC (Lindane)	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor	0.01	mg/kg	< 0.01	< 0.01	-	-
Heptachlor epoxide	0.01	mg/kg	< 0.01	< 0.01	-	-
Hexachlorobenzene	0.01	mg/kg	< 0.01	< 0.01	-	-
Methoxychlor	0.01	mg/kg	< 0.01	< 0.01	-	-
Toxaphene	0.1	mg/kg	< 0.1	< 0.1	-	-
trans-Chlordane	0.01	mg/kg	< 0.01	< 0.01	-	-
Dibutylchloroendate (surr.)	1	%	70	71	-	-
Tetrachloro-m-xylene (surr.)	1	%	87	88	-	-

Client Sample ID			D1	D2	D3	D4
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24201	K19-De24202	K19-De24203	K19-De24204
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>						
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
Benz(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	-	-	0.07	0.08
Benzo(b&j)fluoranthene <sup>N07</sup>	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	-	-	0.04	< 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	-	-	0.04	< 0.03
p-Terphenyl-d14 (surr.)	1	%	-	-	80	84
2-Fluorobiphenyl (surr.)	1	%	-	-	81	82
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	12	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	0.6	< 0.4	< 0.4
Chromium	5	mg/kg	8.4	17	7.1	11
Copper	5	mg/kg	6.2	17	< 5	< 5
Lead	5	mg/kg	5.7	7.4	< 5	< 5
Mercury	0.1	mg/kg	0.1	0.2	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	18	40	20	18
% Moisture	1	%	16	20	19	16

Client Sample ID			D5	D6	D7	D8
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24205	K19-De24206	K19-De24207	K19-De24208
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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



Client Sample ID			D5 Soil	D6 Soil	D7 Soil	D8 Soil
Sample Matrix			K19-De24205	K19-De24206	K19-De24207	K19-De24208
Eurofins Sample No.			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Date Sampled						
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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
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	65	66	74
Tetrachloro-m-xylene (surr.)	1	%	103	82	86	91
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	3.0	3.3	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	7.3	11	8.8	6.1
Copper	5	mg/kg	14	9.0	9.8	9.9
Lead	5	mg/kg	< 5	< 5	9.2	< 5
Mercury	0.1	mg/kg	< 0.1	0.1	0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	22	20	41	17
% Moisture	1	%	19	18	23	18

Client Sample ID			D9 Soil	D10 Soil	D11 Soil	D12 Soil
Sample Matrix			K19-De24209	K19-De24210	K19-De24211	K19-De24212
Eurofins Sample No.			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Date Sampled						
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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

Client Sample ID			D9	D10	D11	D12
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24209	K19-De24210	K19-De24211	K19-De24212
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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
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	%	71	73	72	75
Tetrachloro-m-xylene (surr.)	1	%	86	88	86	88
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	3.9	3.0	2.5
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	0.6
Chromium	5	mg/kg	8.2	12	9.4	12
Copper	5	mg/kg	25	26	13	11
Lead	5	mg/kg	6.4	12	9.4	10
Mercury	0.1	mg/kg	< 0.1	0.2	0.1	0.1
Nickel	5	mg/kg	< 5	< 5	5.2	6.9
Zinc	5	mg/kg	21	39	34	33
% Moisture	1	%	17	25	26	34

Client Sample ID			D13	D14	D15	D16
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24213	K19-De24214	K19-De24215	K19-De24216
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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

Client Sample ID			D13	D14	D15	D16
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24213	K19-De24214	K19-De24215	K19-De24216
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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
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	%	73	76	73	72
Tetrachloro-m-xylene (surr.)	1	%	85	88	87	83
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	2.2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	7.3	7.3	7.2	< 5
Copper	5	mg/kg	16	27	21	< 5
Lead	5	mg/kg	7.7	7.6	5.2	< 5
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	32	17	23	< 5
% Moisture	1	%	18	19	15	20

Client Sample ID			D17	D18	D19	D20
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24217	K19-De24218	K19-De24219	K19-De24220
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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

Client Sample ID			D17	D18	D19	D20
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24217	K19-De24218	K19-De24219	K19-De24220
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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
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	%	76	73	87	74
Tetrachloro-m-xylene (surr.)	1	%	86	84	101	80
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	8.5	13
Cadmium	0.4	mg/kg	< 0.4	< 0.4	< 0.4	< 0.4
Chromium	5	mg/kg	6.5	5.1	16	14
Copper	5	mg/kg	13	11	39	60
Lead	5	mg/kg	10	8.4	9.0	5.7
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	67	17	64	54
% Moisture	1	%	29	15	12	16

Client Sample ID			D21	D22	D23	D24
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24221	K19-De24222	K19-De24223	K19-De24224
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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

Client Sample ID			D21	D22	D23	D24
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24221	K19-De24222	K19-De24223	K19-De24224
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
Dieldrin	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01
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	%	77	78	79	79
Tetrachloro-m-xylene (surr.)	1	%	86	86	87	86
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	< 0.4	0.4	< 0.4	< 0.4
Chromium	5	mg/kg	5.8	5.1	< 5	8.6
Copper	5	mg/kg	27	12	25	58
Lead	5	mg/kg	7.7	< 5	< 5	8.4
Mercury	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	98	18	22	53
% Moisture	1	%	21	16	17	18

Client Sample ID			D25	D26	D27	D28
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24225	K19-De24226	K19-De24227	K19-De24228
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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			D25	D26	D27	D28
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24225	K19-De24226	K19-De24227	K19-De24228
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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
Dibutylchloredate (surr.)	1	%	87	86	87	91
Tetrachloro-m-xylene (surr.)	1	%	89	87	88	92
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	26	< 2
Cadmium	0.4	mg/kg	< 0.4	0.5	0.5	0.4
Chromium	5	mg/kg	8.5	11	29	12
Copper	5	mg/kg	43	45	130	34
Lead	5	mg/kg	7.5	9.2	5.9	9.6
Mercury	0.1	mg/kg	0.2	0.2	< 0.1	0.2
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	31	30	70	40
% Moisture	1	%	26	25	24	26

Client Sample ID			D29	D30	D31	COMPOSITE C1
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24229	K19-De24230	K19-De24231	K19-De24232
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Polychlorinated Biphenyls</b>						
Aroclor-1016	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1221	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1232	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1242	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1248	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1254	0.1	mg/kg	-	< 0.1	-	-
Aroclor-1260	0.1	mg/kg	-	< 0.1	-	-
Total PCB*	0.1	mg/kg	-	< 0.1	-	-
Dibutylchloredate (surr.)	1	%	-	87	-	-
Tetrachloro-m-xylene (surr.)	1	%	-	89	-	-
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>						
TPH-SG C7-C9	5	mg/kg	-	< 5	-	-
TPH-SG C10-C14	10	mg/kg	-	< 10	-	-
TPH-SG C15-C36	20	mg/kg	-	< 20	-	-
TPH-SG C7-C36 (Total)	35	mg/kg	-	< 35	-	-

Client Sample ID			D29 Soil K19-De24229 Dec 11, 2019	D30 Soil K19-De24230 Dec 11, 2019	D31 Soil K19-De24231 Dec 11, 2019	COMPOSITE C1 Soil K19-De24232 Dec 11, 2019
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	%	85	-	88	92
Tetrachloro-m-xylene (surr.)	1	%	85	-	88	93
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>						
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 <sup>N07</sup>	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	-	-

Client Sample ID			D29 Soil K19-De24229 Dec 11, 2019	D30 Soil K19-De24230 Dec 11, 2019	D31 Soil K19-De24231 Dec 11, 2019	COMPOSITE C1 Soil K19-De24232 Dec 11, 2019
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>						
p-Terphenyl-d14 (surr.)	1	%	-	89	-	-
2-Fluorobiphenyl (surr.)	1	%	-	83	-	-
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	2.9	< 2
Cadmium	0.4	mg/kg	0.4	0.8	0.7	0.4
Chromium	5	mg/kg	8.5	11	14	8.0
Copper	5	mg/kg	26	12	15	7.9
Lead	5	mg/kg	7.9	8.5	15	5.3
Mercury	0.1	mg/kg	0.2	0.1	0.2	< 0.1
Nickel	5	mg/kg	< 5	< 5	5.2	< 5
Zinc	5	mg/kg	22	27	30	25
<b>% Moisture</b>						
	1	%	29	26	30	16

Client Sample ID			COMPOSITE C2 Soil K19-De24233 Dec 11, 2019	COMPOSITE C3 Soil K19-De24234 Dec 11, 2019	COMPOSITE C4 Soil K19-De24235 Dec 11, 2019	COMPOSITE C5 Soil K19-De24236 Dec 11, 2019
Sample Matrix						
Eurofins Sample No.						
Date Sampled						
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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
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



Client Sample ID			COMPOSITE C2	COMPOSITE C3	COMPOSITE C4	COMPOSITE C5
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24233	K19-De24234	K19-De24235	K19-De24236
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
Dibutylchloendate (surr.)	1	%	84	85	93	94
Tetrachloro-m-xylene (surr.)	1	%	86	86	92	93
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	2.3	< 2	< 2
Cadmium	0.4	mg/kg	0.4	0.7	< 0.4	0.6
Chromium	5	mg/kg	7.7	12	8.3	9.4
Copper	5	mg/kg	7.7	11	6.1	9.8
Lead	5	mg/kg	5.8	10	5.3	7.5
Mercury	0.1	mg/kg	0.1	0.1	0.1	0.1
Nickel	5	mg/kg	< 5	< 5	< 5	< 5
Zinc	5	mg/kg	24	40	20	25
<b>% Moisture</b>						
	1	%	20	30	12	21

Client Sample ID			COMPOSITE C6	COMPOSITE C7	COMPOSITE C8	COMPOSITE C9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24237	K19-De24238	K19-De24239	K19-De24240
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4.4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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
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

Client Sample ID			COMPOSITE C6	COMPOSITE C7	COMPOSITE C8	COMPOSITE C9
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24237	K19-De24238	K19-De24239	K19-De24240
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
Dibutylchlorendate (surr.)	1	%	85	78	78	96
Tetrachloro-m-xylene (surr.)	1	%	86	83	87	98
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	2.6	2.5
Cadmium	0.4	mg/kg	0.8	< 0.4	0.8	0.8
Chromium	5	mg/kg	12	5.9	17	16
Copper	5	mg/kg	16	6.2	16	16
Lead	5	mg/kg	9.6	< 5	11	11
Mercury	0.1	mg/kg	0.1	< 0.1	0.2	0.2
Nickel	5	mg/kg	< 5	< 5	6.0	6.7
Zinc	5	mg/kg	32	26	78	35
<b>% Moisture</b>						
	1	%	32	18	28	30

Client Sample ID			COMPOSITE C10	COMPOSITE C11	COMPOSITE C12	COMPOSITE C13
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24241	K19-De24242	K19-De24243	K19-De24244
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>						
TPH-SG C7-C9	5	mg/kg	-	-	< 5	< 5
TPH-SG C10-C14	10	mg/kg	-	-	< 10	< 10
TPH-SG C15-C36	20	mg/kg	-	-	< 20	< 20
TPH-SG C7-C36 (Total)	35	mg/kg	-	-	< 35	< 35
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	< 0.01	< 0.01	< 0.01
4,4'-DDD	0.01	mg/kg	< 0.01	< 0.01	< 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	< 0.01	< 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
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

Client Sample ID			COMPOSITE C10	COMPOSITE C11	COMPOSITE C12	COMPOSITE C13
Sample Matrix			Soil	Soil	Soil	Soil
Eurofins Sample No.			K19-De24241	K19-De24242	K19-De24243	K19-De24244
Date Sampled			Dec 11, 2019	Dec 11, 2019	Dec 11, 2019	Dec 11, 2019
Test/Reference	LOR	Unit				
<b>Organochlorine Pesticides (NZ MfE)</b>						
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	%	88	81	89	85
Tetrachloro-m-xylene (surr.)	1	%	89	86	93	90
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>						
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
Benz(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
Benzo(b&j)fluoranthene <sup>N07</sup>	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	%	-	-	91	88
2-Fluorobiphenyl (surr.)	1	%	-	-	92	89
<b>Metals M8 (NZ MfE)</b>						
Arsenic	2	mg/kg	< 2	< 2	< 2	< 2
Cadmium	0.4	mg/kg	0.6	0.5	0.6	0.6
Chromium	5	mg/kg	7.3	8.3	16	15
Copper	5	mg/kg	9.0	8.5	13	10
Lead	5	mg/kg	7.1	5.3	8.8	9.2
Mercury	0.1	mg/kg	0.1	0.1	0.2	0.2
Nickel	5	mg/kg	< 5	< 5	5.7	5.2
Zinc	5	mg/kg	28	20	30	34
<b>% Moisture</b>						
	1	%	22	19	27	24

<b>Client Sample ID</b>			<b>C1-1</b>	<b>C1-2</b>	<b>C1-3</b>	<b>C1-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24273</b>	<b>K19-De24274</b>	<b>K19-De24275</b>	<b>K19-De24276</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C2-1</b>	<b>C2-2</b>	<b>C2-3</b>	<b>C2-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24277</b>	<b>K19-De24278</b>	<b>K19-De24279</b>	<b>K19-De24280</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C3-1</b>	<b>C3-2</b>	<b>C3-3</b>	<b>C3-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24281</b>	<b>K19-De24282</b>	<b>K19-De24283</b>	<b>K19-De24284</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C4-1</b>	<b>C4-2</b>	<b>C4-3</b>	<b>C4-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24285</b>	<b>K19-De24286</b>	<b>K19-De24287</b>	<b>K19-De24288</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C5-1</b>	<b>C5-2</b>	<b>C5-3</b>	<b>C5-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24289</b>	<b>K19-De24290</b>	<b>K19-De24291</b>	<b>K19-De24292</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C6-1</b>	<b>C6-2</b>	<b>C6-3</b>	<b>C6-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24293</b>	<b>K19-De24294</b>	<b>K19-De24295</b>	<b>K19-De24296</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C7-1</b>	<b>C7-2</b>	<b>C7-3</b>	<b>C7-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24297</b>	<b>K19-De24298</b>	<b>K19-De24299</b>	<b>K19-De24300</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C8-1</b>	<b>C8-2</b>	<b>C8-3</b>	<b>C8-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24301</b>	<b>K19-De24302</b>	<b>K19-De24303</b>	<b>K19-De24304</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C9-1</b>	<b>C9-2</b>	<b>C9-3</b>	<b>C9-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24305</b>	<b>K19-De24306</b>	<b>K19-De24307</b>	<b>K19-De24308</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C10-1</b>	<b>C10-2</b>	<b>C10-3</b>	<b>C10-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24309</b>	<b>K19-De24310</b>	<b>K19-De24311</b>	<b>K19-De24312</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C11-1</b>	<b>C11-2</b>	<b>C11-3</b>	<b>C11-4</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24313</b>	<b>K19-De24314</b>	<b>K19-De24315</b>	<b>K19-De24316</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C12-1</b>	<b>C12-2</b>	<b>C13-1</b>	<b>C13-2</b>
<b>Sample Matrix</b>			<b>Soil</b>	<b>Soil</b>	<b>Soil</b>	<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24317</b>	<b>K19-De24318</b>	<b>K19-De24319</b>	<b>K19-De24320</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>	<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit				
HOLD						

<b>Client Sample ID</b>			<b>C13-3</b>
<b>Sample Matrix</b>			<b>Soil</b>
<b>Eurofins Sample No.</b>			<b>K19-De24321</b>
<b>Date Sampled</b>			<b>Dec 11, 2019</b>
Test/Reference	LOR	Unit	
HOLD			

**Sample History**

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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.

<b>Description</b>	<b>Testing Site</b>	<b>Extracted</b>	<b>Holding Time</b>
Polychlorinated Biphenyls - Method: LTM-ORG-2220 OCP & PCB in Soil and Water by GCMSMS	Auckland	Dec 17, 2019	14 Days
Total Petroleum Hydrocarbons (NZ MfE 1999) - Method: LTM-ORG-2010 TRH and BTEX in Soil and Water by GC FID and PT GCMS	Auckland	Dec 23, 2019	14 Days
Organochlorine Pesticides (NZ MfE) - Method: LTM-ORG-2220 OCP & PCB in Soil and Water by GCMSMS	Auckland	Dec 18, 2019	14 Days
Polycyclic Aromatic Hydrocarbons (NZ MfE) - Method: LTM-ORG-2130 PAH and Phenols in Soil and Water by GC MSMS	Auckland	Dec 23, 2019	14 Days
Metals M8 (NZ MfE) - Method: LTM-MET-3040 Metals in Waters, Soils & Sediments by ICP-MS	Auckland	Dec 18, 2019	6 Months
HOLD - Method:	Auckland	Dec 17, 2019	0 Day
% Moisture - Method: LTM-GEN-7080 Moisture Content in Soil by Gravimetry	Auckland	Dec 17, 2019	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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	D1	Dec 11, 2019		Soil	K19-De24201				X		X	X	
2	D2	Dec 11, 2019		Soil	K19-De24202				X		X	X	
3	D3	Dec 11, 2019		Soil	K19-De24203				X	X		X	X
4	D4	Dec 11, 2019		Soil	K19-De24204				X	X		X	X
5	D5	Dec 11, 2019		Soil	K19-De24205				X		X	X	
6	D6	Dec 11, 2019		Soil	K19-De24206				X		X	X	
7	D7	Dec 11, 2019		Soil	K19-De24207				X		X	X	
8	D8	Dec 11, 2019		Soil	K19-De24208				X		X	X	
9	D9	Dec 11, 2019		Soil	K19-De24209				X		X	X	
10	D10	Dec 11, 2019		Soil	K19-De24210				X		X	X	
11	D11	Dec 11, 2019		Soil	K19-De24211				X		X	X	
12	D12	Dec 11, 2019		Soil	K19-De24212				X		X	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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
13	D13	Dec 11, 2019		Soil	K19-De24213				X	X	X		
14	D14	Dec 11, 2019		Soil	K19-De24214				X	X	X		
15	D15	Dec 11, 2019		Soil	K19-De24215				X	X	X		
16	D16	Dec 11, 2019		Soil	K19-De24216				X	X	X		
17	D17	Dec 11, 2019		Soil	K19-De24217				X	X	X		
18	D18	Dec 11, 2019		Soil	K19-De24218				X	X	X		
19	D19	Dec 11, 2019		Soil	K19-De24219				X	X	X		
20	D20	Dec 11, 2019		Soil	K19-De24220				X	X	X		
21	D21	Dec 11, 2019		Soil	K19-De24221				X	X	X		
22	D22	Dec 11, 2019		Soil	K19-De24222				X	X	X		
23	D23	Dec 11, 2019		Soil	K19-De24223				X	X	X		
24	D24	Dec 11, 2019		Soil	K19-De24224				X	X	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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
25	D25	Dec 11, 2019		Soil	K19-De24225				X		X	X	
26	D26	Dec 11, 2019		Soil	K19-De24226				X		X	X	
27	D27	Dec 11, 2019		Soil	K19-De24227				X		X	X	
28	D28	Dec 11, 2019		Soil	K19-De24228				X		X	X	
29	D29	Dec 11, 2019		Soil	K19-De24229				X		X	X	
30	D30	Dec 11, 2019		Soil	K19-De24230			X	X	X		X	X
31	D31	Dec 11, 2019		Soil	K19-De24231				X		X	X	
32	COMPOSITE C1	Dec 11, 2019		Soil	K19-De24232				X		X	X	
33	COMPOSITE C2	Dec 11, 2019		Soil	K19-De24233				X		X	X	
34	COMPOSITE C3	Dec 11, 2019		Soil	K19-De24234				X		X	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**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	Organochlorine Pesticides (NZ M/E)	Metals M8 (NZ M/E)	Polycyclic Aromatic Hydrocarbons (NZ M/E)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
35	COMPOSITE C4	Dec 11, 2019		Soil	K19-De24235				X		X	X	
36	COMPOSITE C5	Dec 11, 2019		Soil	K19-De24236				X		X	X	
37	COMPOSITE C6	Dec 11, 2019		Soil	K19-De24237				X		X	X	
38	COMPOSITE C7	Dec 11, 2019		Soil	K19-De24238				X		X	X	
39	COMPOSITE C8	Dec 11, 2019		Soil	K19-De24239				X		X	X	
40	COMPOSITE C9	Dec 11, 2019		Soil	K19-De24240				X		X	X	
41	COMPOSITE C10	Dec 11, 2019		Soil	K19-De24241				X		X	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**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
42	COMPOSITE C11	Dec 11, 2019		Soil	K19-De24242				X	X	X		
43	COMPOSITE C12	Dec 11, 2019		Soil	K19-De24243	X			X	X	X	X	X
44	COMPOSITE C13	Dec 11, 2019		Soil	K19-De24244	X			X	X	X	X	X
45	C1-1	Dec 11, 2019		Soil	K19-De24273		X						
46	C1-2	Dec 11, 2019		Soil	K19-De24274		X						
47	C1-3	Dec 11, 2019		Soil	K19-De24275		X						
48	C1-4	Dec 11, 2019		Soil	K19-De24276		X						
49	C2-1	Dec 11, 2019		Soil	K19-De24277		X						
50	C2-2	Dec 11, 2019		Soil	K19-De24278		X						
51	C2-3	Dec 11, 2019		Soil	K19-De24279		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	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	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
52	C2-4	Dec 11, 2019		Soil	K19-De24280		X						
53	C3-1	Dec 11, 2019		Soil	K19-De24281		X						
54	C3-2	Dec 11, 2019		Soil	K19-De24282		X						
55	C3-3	Dec 11, 2019		Soil	K19-De24283		X						
56	C3-4	Dec 11, 2019		Soil	K19-De24284		X						
57	C4-1	Dec 11, 2019		Soil	K19-De24285		X						
58	C4-2	Dec 11, 2019		Soil	K19-De24286		X						
59	C4-3	Dec 11, 2019		Soil	K19-De24287		X						
60	C4-4	Dec 11, 2019		Soil	K19-De24288		X						
61	C5-1	Dec 11, 2019		Soil	K19-De24289		X						
62	C5-2	Dec 11, 2019		Soil	K19-De24290		X						
63	C5-3	Dec 11, 2019		Soil	K19-De24291		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	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	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
64	C5-4	Dec 11, 2019		Soil	K19-De24292		X						
65	C6-1	Dec 11, 2019		Soil	K19-De24293		X						
66	C6-2	Dec 11, 2019		Soil	K19-De24294		X						
67	C6-3	Dec 11, 2019		Soil	K19-De24295		X						
68	C6-4	Dec 11, 2019		Soil	K19-De24296		X						
69	C7-1	Dec 11, 2019		Soil	K19-De24297		X						
70	C7-2	Dec 11, 2019		Soil	K19-De24298		X						
71	C7-3	Dec 11, 2019		Soil	K19-De24299		X						
72	C7-4	Dec 11, 2019		Soil	K19-De24300		X						
73	C8-1	Dec 11, 2019		Soil	K19-De24301		X						
74	C8-2	Dec 11, 2019		Soil	K19-De24302		X						
75	C8-3	Dec 11, 2019		Soil	K19-De24303		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
76	C8-4	Dec 11, 2019		Soil	K19-De24304		X						
77	C9-1	Dec 11, 2019		Soil	K19-De24305		X						
78	C9-2	Dec 11, 2019		Soil	K19-De24306		X						
79	C9-3	Dec 11, 2019		Soil	K19-De24307		X						
80	C9-4	Dec 11, 2019		Soil	K19-De24308		X						
81	C10-1	Dec 11, 2019		Soil	K19-De24309		X						
82	C10-2	Dec 11, 2019		Soil	K19-De24310		X						
83	C10-3	Dec 11, 2019		Soil	K19-De24311		X						
84	C10-4	Dec 11, 2019		Soil	K19-De24312		X						
85	C11-1	Dec 11, 2019		Soil	K19-De24313		X						
86	C11-2	Dec 11, 2019		Soil	K19-De24314		X						
87	C11-3	Dec 11, 2019		Soil	K19-De24315		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

NZBN – 9429046024954

web : www.eurofins.com.au

e.mail : EnviroSales@eurofins.com

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
Auckland Laboratory - IANZ# 1327							X	X	X	X	X	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
88	C11-4	Dec 11, 2019		Soil	K19-De24316		X						
89	C12-1	Dec 11, 2019		Soil	K19-De24317		X						
90	C12-2	Dec 11, 2019		Soil	K19-De24318		X						
91	C13-1	Dec 11, 2019		Soil	K19-De24319		X						
92	C13-2	Dec 11, 2019		Soil	K19-De24320		X						
93	C13-3	Dec 11, 2019		Soil	K19-De24321		X						
<b>Test Counts</b>						2	49	1	44	5	41	44	5



**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**

<b>Dry</b>	Where a moisture has been determined on a solid sample the result is expressed on a dry basis.
<b>LOR</b>	Limit of Reporting.
<b>SPIKE</b>	Addition of the analyte to the sample and reported as percentage recovery.
<b>RPD</b>	Relative Percent Difference between two Duplicate pieces of analysis.
<b>LCS</b>	Laboratory Control Sample - reported as percent recovery.
<b>CRM</b>	Certified Reference Material - reported as percent recovery.
<b>Method Blank</b>	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.
<b>Surr - Surrogate</b>	The addition of a like compound to the analyte target and reported as percentage recovery.
<b>Duplicate</b>	A second piece of analysis from the same sample and reported in the same units as the result to show comparison.
<b>USEPA</b>	United States Environmental Protection Agency
<b>APHA</b>	American Public Health Association
<b>TCLP</b>	Toxicity Characteristic Leaching Procedure
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>QSM</b>	US Department of Defense Quality Systems Manual Version 5.3
<b>CP</b>	Client Parent - QC was performed on samples pertaining to this report
<b>NCP</b>	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.
<b>TEQ</b>	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
<b>Method Blank</b>							
<b>Polychlorinated Biphenyls</b>							
Aroclor-1016	mg/kg	< 0.1			0.1	Pass	
Aroclor-1221	mg/kg	< 0.1			0.1	Pass	
Aroclor-1232	mg/kg	< 0.1			0.1	Pass	
Aroclor-1242	mg/kg	< 0.1			0.1	Pass	
Aroclor-1248	mg/kg	< 0.1			0.1	Pass	
Aroclor-1254	mg/kg	< 0.1			0.1	Pass	
Aroclor-1260	mg/kg	< 0.1			0.1	Pass	
Total PCB*	mg/kg	< 0.1			0.1	Pass	
<b>Method Blank</b>							
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>							
TPH-SG C7-C9	mg/kg	< 5			5	Pass	
TPH-SG C10-C14	mg/kg	< 10			10	Pass	
TPH-SG C15-C36	mg/kg	< 20			20	Pass	
TPH-SG C7-C36 (Total)	mg/kg	< 35			35	Pass	
<b>Method Blank</b>							
<b>Organochlorine Pesticides (NZ MfE)</b>							
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	
<b>Method Blank</b>							
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>							
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	

Test	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Benzo(g,h,i)perylene	mg/kg	< 0.03		0.03	Pass	
Benzo(k)fluoranthene	mg/kg	< 0.03		0.03	Pass	
Chrysene	mg/kg	< 0.03		0.03	Pass	
Dibenz(a,h)anthracene	mg/kg	< 0.03		0.03	Pass	
Fluoranthene	mg/kg	< 0.03		0.03	Pass	
Fluorene	mg/kg	< 0.03		0.03	Pass	
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.03		0.03	Pass	
Naphthalene	mg/kg	< 0.1		0.1	Pass	
Phenanthrene	mg/kg	< 0.03		0.03	Pass	
Pyrene	mg/kg	< 0.03		0.03	Pass	
<b>Method Blank</b>						
<b>Metals M8 (NZ MfE)</b>						
Arsenic	mg/kg	< 2		2	Pass	
Cadmium	mg/kg	< 0.4		0.4	Pass	
Chromium	mg/kg	< 5		5	Pass	
Copper	mg/kg	< 5		5	Pass	
Lead	mg/kg	< 5		5	Pass	
Mercury	mg/kg	< 0.1		0.1	Pass	
Nickel	mg/kg	< 5		5	Pass	
Zinc	mg/kg	< 5		5	Pass	
<b>LCS - % Recovery</b>						
<b>Polychlorinated Biphenyls</b>						
Total PCB*	%	110		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>						
TPH-SG C7-C9	%	73		70-130	Pass	
<b>LCS - % Recovery</b>						
<b>Organochlorine Pesticides (NZ MfE)</b>						
2,4'-DDD	%	87		70-130	Pass	
2,4'-DDE	%	92		70-130	Pass	
2,4'-DDT	%	85		70-130	Pass	
4,4'-DDD	%	103		70-130	Pass	
4,4'-DDE	%	87		70-130	Pass	
4,4'-DDT	%	100		70-130	Pass	
a-BHC	%	88		70-130	Pass	
Aldrin	%	88		70-130	Pass	
b-BHC	%	84		70-130	Pass	
Chlordanes - Total	%	86		70-130	Pass	
cis-Chlordane	%	86		70-130	Pass	
d-BHC	%	78		70-130	Pass	
Dieldrin	%	90		70-130	Pass	
Endosulfan I	%	88		70-130	Pass	
Endosulfan II	%	96		70-130	Pass	
Endosulfan sulphate	%	94		70-130	Pass	
Endrin	%	105		70-130	Pass	
Endrin aldehyde	%	97		70-130	Pass	
Endrin ketone	%	96		70-130	Pass	
g-BHC (Lindane)	%	85		70-130	Pass	
Heptachlor	%	84		70-130	Pass	
Heptachlor epoxide	%	84		70-130	Pass	
Hexachlorobenzene	%	90		70-130	Pass	
Methoxychlor	%	114		70-130	Pass	
trans-Chlordane	%	86		70-130	Pass	
<b>LCS - % Recovery</b>						

Test			Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>								
Acenaphthene			%	81		70-130	Pass	
Acenaphthylene			%	84		70-130	Pass	
Anthracene			%	86		70-130	Pass	
Benz(a)anthracene			%	75		70-130	Pass	
Benzo(a)pyrene			%	71		70-130	Pass	
Benzo(b&j)fluoranthene			%	82		70-130	Pass	
Benzo(g,h,i)perylene			%	85		70-130	Pass	
Benzo(k)fluoranthene			%	76		70-130	Pass	
Chrysene			%	77		70-130	Pass	
Dibenz(a,h)anthracene			%	80		70-130	Pass	
Fluoranthene			%	85		70-130	Pass	
Fluorene			%	88		70-130	Pass	
Indeno(1,2,3-cd)pyrene			%	82		70-130	Pass	
Naphthalene			%	83		70-130	Pass	
Phenanthrene			%	84		70-130	Pass	
Pyrene			%	87		70-130	Pass	
<b>LCS - % Recovery</b>								
<b>Metals M8 (NZ MfE)</b>								
Arsenic			%	117		70-130	Pass	
Cadmium			%	109		70-130	Pass	
Chromium			%	106		70-130	Pass	
Copper			%	104		70-130	Pass	
Lead			%	110		70-130	Pass	
Mercury			%	109		70-130	Pass	
Nickel			%	106		70-130	Pass	
Zinc			%	115		70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
<b>Spike - % Recovery</b>								
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1				
4,4'-DDD	K19-De24202	CP	%	112		70-130	Pass	
4,4'-DDE	K19-De24202	CP	%	74		70-130	Pass	
4,4'-DDT	K19-De24202	CP	%	60		70-130	Fail	Q08
a-BHC	K19-De24202	CP	%	75		70-130	Pass	
Aldrin	K19-De24202	CP	%	76		70-130	Pass	
b-BHC	K19-De24202	CP	%	73		70-130	Pass	
Chlordanes - Total	K19-De24202	CP	%	76		70-130	Pass	
cis-Chlordane	K19-De24202	CP	%	76		70-130	Pass	
d-BHC	K19-De24202	CP	%	71		70-130	Pass	
Dieldrin	K19-De24202	CP	%	79		70-130	Pass	
Endosulfan I	K19-De24202	CP	%	79		70-130	Pass	
Endosulfan II	K19-De24202	CP	%	87		70-130	Pass	
Endosulfan sulphate	K19-De24202	CP	%	86		70-130	Pass	
Endrin	K19-De24202	CP	%	92		70-130	Pass	
Endrin aldehyde	K19-De24202	CP	%	87		70-130	Pass	
Endrin ketone	K19-De24202	CP	%	86		70-130	Pass	
g-BHC (Lindane)	K19-De24202	CP	%	71		70-130	Pass	
Heptachlor	K19-De24202	CP	%	63		70-130	Fail	Q08
Heptachlor epoxide	K19-De24202	CP	%	75		70-130	Pass	
Methoxychlor	K19-De24202	CP	%	82		70-130	Pass	
trans-Chlordane	K19-De24202	CP	%	75		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>				Result 1				
Acenaphthene	K19-De19227	NCP	%	91		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Acenaphthylene	K19-De19227	NCP	%	75		70-130	Pass	
Anthracene	K19-De19227	NCP	%	75		70-130	Pass	
Benz(a)anthracene	K19-De19227	NCP	%	74		70-130	Pass	
Benzo(a)pyrene	K19-De19227	NCP	%	77		70-130	Pass	
Benzo(b&j)fluoranthene	K19-De19227	NCP	%	84		70-130	Pass	
Benzo(g,h,i)perylene	K19-De19227	NCP	%	83		70-130	Pass	
Benzo(k)fluoranthene	K19-De19227	NCP	%	82		70-130	Pass	
Chrysene	K19-De19227	NCP	%	76		70-130	Pass	
Dibenz(a,h)anthracene	K19-De19227	NCP	%	71		70-130	Pass	
Fluoranthene	K19-De19227	NCP	%	76		70-130	Pass	
Fluorene	K19-De19227	NCP	%	82		70-130	Pass	
Indeno(1,2,3-cd)pyrene	K19-De19227	NCP	%	82		70-130	Pass	
Naphthalene	K19-De19227	NCP	%	78		70-130	Pass	
Phenanthrene	K19-De19227	NCP	%	81		70-130	Pass	
Pyrene	K19-De19227	NCP	%	74		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>				Result 1				
TPH-SG C7-C9	K19-De24204	CP	%	79		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Metals M8 (NZ MfE)</b>				Result 1				
Arsenic	K19-De24208	CP	%	93		70-130	Pass	
Cadmium	K19-De24208	CP	%	100		70-130	Pass	
Chromium	K19-De24208	CP	%	94		70-130	Pass	
Copper	K19-De24208	CP	%	100		70-130	Pass	
Lead	K19-De24208	CP	%	96		70-130	Pass	
Mercury	K19-De24208	CP	%	90		70-130	Pass	
Nickel	K19-De24208	CP	%	95		70-130	Pass	
Zinc	K19-De24208	CP	%	118		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1				
4,4'-DDE	K19-De24214	CP	%	78		70-130	Pass	
4,4'-DDT	K19-De24214	CP	%	8.0		70-130	Fail	Q08
a-BHC	K19-De24214	CP	%	81		70-130	Pass	
Aldrin	K19-De24214	CP	%	79		70-130	Pass	
b-BHC	K19-De24214	CP	%	73		70-130	Pass	
Chlordanes - Total	K19-De24214	CP	%	87		70-130	Pass	
cis-Chlordane	K19-De24214	CP	%	89		70-130	Pass	
d-BHC	K19-De24214	CP	%	72		70-130	Pass	
Dieldrin	K19-De24214	CP	%	82		70-130	Pass	
Endosulfan I	K19-De24214	CP	%	85		70-130	Pass	
Endosulfan II	K19-De24214	CP	%	79		70-130	Pass	
Endosulfan sulphate	K19-De24214	CP	%	84		70-130	Pass	
Endrin	K19-De24214	CP	%	83		70-130	Pass	
Endrin aldehyde	K19-De24214	CP	%	93		70-130	Pass	
Endrin ketone	K19-De24214	CP	%	75		70-130	Pass	
Heptachlor	K19-De24214	CP	%	54		70-130	Fail	Q08
Heptachlor epoxide	K19-De24214	CP	%	84		70-130	Pass	
trans-Chlordane	K19-De24214	CP	%	85		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Metals M8 (NZ MfE)</b>				Result 1				
Arsenic	K19-De24218	CP	%	91		70-130	Pass	
Cadmium	K19-De24218	CP	%	98		70-130	Pass	
Chromium	K19-De24218	CP	%	92		70-130	Pass	
Copper	K19-De24218	CP	%	96		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1		Acceptance Limits	Pass Limits	Qualifying Code
Lead	K19-De24218	CP	%	95		70-130	Pass	
Mercury	K19-De24218	CP	%	94		70-130	Pass	
Nickel	K19-De24218	CP	%	94		70-130	Pass	
Zinc	K19-De24218	CP	%	115		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1				
4.4'-DDD	K19-De24224	CP	%	115		70-130	Pass	
4.4'-DDE	K19-De24224	CP	%	72		70-130	Pass	
4.4'-DDT	K19-De24224	CP	%	27		70-130	Fail	Q08
a-BHC	K19-De24224	CP	%	73		70-130	Pass	
Aldrin	K19-De24224	CP	%	73		70-130	Pass	
Chlordanes - Total	K19-De24224	CP	%	82		70-130	Pass	
cis-Chlordane	K19-De24224	CP	%	84		70-130	Pass	
d-BHC	K19-De24224	CP	%	66		70-130	Fail	Q08
Dieldrin	K19-De24224	CP	%	75		70-130	Pass	
Endosulfan I	K19-De24224	CP	%	80		70-130	Pass	
Endosulfan II	K19-De24224	CP	%	74		70-130	Pass	
Endosulfan sulphate	K19-De24224	CP	%	78		70-130	Pass	
Endrin	K19-De24224	CP	%	80		70-130	Pass	
Endrin aldehyde	K19-De24224	CP	%	86		70-130	Pass	
Endrin ketone	K19-De24224	CP	%	77		70-130	Pass	
g-BHC (Lindane)	K19-De24224	CP	%	72		70-130	Pass	
Heptachlor	K19-De24224	CP	%	60		70-130	Fail	Q08
Heptachlor epoxide	K19-De24224	CP	%	80		70-130	Pass	
trans-Chlordane	K19-De24224	CP	%	80		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Metals M8 (NZ MfE)</b>				Result 1				
Arsenic	K19-De24228	CP	%	89		70-130	Pass	
Cadmium	K19-De24228	CP	%	95		70-130	Pass	
Chromium	K19-De24228	CP	%	88		70-130	Pass	
Copper	K19-De24228	CP	%	88		70-130	Pass	
Lead	K19-De24228	CP	%	92		70-130	Pass	
Mercury	K19-De24228	CP	%	89		70-130	Pass	
Nickel	K19-De24228	CP	%	92		70-130	Pass	
Zinc	K19-De24228	CP	%	99		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Metals M8 (NZ MfE)</b>				Result 1				
Arsenic	K19-De24232	CP	%	86		70-130	Pass	
Cadmium	K19-De24232	CP	%	93		70-130	Pass	
Chromium	K19-De24232	CP	%	86		70-130	Pass	
Copper	K19-De24232	CP	%	86		70-130	Pass	
Lead	K19-De24232	CP	%	85		70-130	Pass	
Mercury	K19-De24232	CP	%	85		70-130	Pass	
Nickel	K19-De24232	CP	%	88		70-130	Pass	
Zinc	K19-De24232	CP	%	88		70-130	Pass	
<b>Spike - % Recovery</b>								
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1				
4.4'-DDD	K19-De24235	CP	%	116		70-130	Pass	
4.4'-DDE	K19-De24235	CP	%	73		70-130	Pass	
4.4'-DDT	K19-De24235	CP	%	25		70-130	Fail	Q08
a-BHC	K19-De24235	CP	%	74		70-130	Pass	
Aldrin	K19-De24235	CP	%	76		70-130	Pass	
Chlordanes - Total	K19-De24235	CP	%	87		70-130	Pass	
cis-Chlordane	K19-De24235	CP	%	89		70-130	Pass	

Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
Dieldrin	K19-De24235	CP	%	75			70-130	Pass	
Endosulfan I	K19-De24235	CP	%	80			70-130	Pass	
Endosulfan II	K19-De24235	CP	%	76			70-130	Pass	
Endosulfan sulphate	K19-De24235	CP	%	75			70-130	Pass	
Endrin	K19-De24235	CP	%	81			70-130	Pass	
Endrin aldehyde	K19-De24235	CP	%	85			70-130	Pass	
Endrin ketone	K19-De24235	CP	%	75			70-130	Pass	
Heptachlor	K19-De24235	CP	%	63			70-130	Fail	Q08
Heptachlor epoxide	K19-De24235	CP	%	83			70-130	Pass	
trans-Chlordane	K19-De24235	CP	%	85			70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Metals M8 (NZ MfE)</b>				Result 1					
Arsenic	K19-De24242	CP	%	76			70-130	Pass	
Cadmium	K19-De24242	CP	%	89			70-130	Pass	
Chromium	K19-De24242	CP	%	79			70-130	Pass	
Copper	K19-De24242	CP	%	79			70-130	Pass	
Lead	K19-De24242	CP	%	80			70-130	Pass	
Mercury	K19-De24242	CP	%	84			70-130	Pass	
Nickel	K19-De24242	CP	%	83			70-130	Pass	
Zinc	K19-De24242	CP	%	85			70-130	Pass	
<b>Spike - % Recovery</b>									
<b>Total Petroleum Hydrocarbons (NZ MfE 1999)</b>				Result 1					
TPH-SG C7-C9	K19-De24244	CP	%	79			70-130	Pass	
Test	Lab Sample ID	QA Source	Units	Result 1			Acceptance Limits	Pass Limits	Qualifying Code
<b>Duplicate</b>									
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1	Result 2	RPD			
2,4'-DDD	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2,4'-DDE	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
2,4'-DDT	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDD	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDE	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
4,4'-DDT	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
a-BHC	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Aldrin	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
b-BHC	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Chlordanes - Total	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
cis-Chlordane	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
d-BHC	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Dieldrin	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan I	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan II	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endosulfan sulphate	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin aldehyde	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Endrin ketone	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
g-BHC (Lindane)	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Heptachlor epoxide	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Hexachlorobenzene	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
Methoxychlor	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	
trans-Chlordane	K19-De24201	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass	

Duplicate								
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD		
TPH-SG C7-C9	K19-De24203	CP	mg/kg	< 5	< 5	<1	30%	Pass
TPH-SG C10-C14	K19-De24203	CP	mg/kg	< 10	< 10	<1	30%	Pass
TPH-SG C15-C36	K19-De24203	CP	mg/kg	< 20	24	110	30%	Fail
TPH-SG C7-C36 (Total)	K19-De24203	CP	mg/kg	< 35	< 35	<1	30%	Pass
Duplicate								
Metals M8 (NZ MfE)				Result 1	Result 2	RPD		
Arsenic	K19-De24207	CP	mg/kg	3.3	3.7	11	30%	Pass
Cadmium	K19-De24207	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	K19-De24207	CP	mg/kg	8.8	9.7	11	30%	Pass
Copper	K19-De24207	CP	mg/kg	9.8	10	6.0	30%	Pass
Lead	K19-De24207	CP	mg/kg	9.2	10.0	8.0	30%	Pass
Mercury	K19-De24207	CP	mg/kg	0.1	0.1	8.0	30%	Pass
Nickel	K19-De24207	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	K19-De24207	CP	mg/kg	41	60	37	30%	Fail
								Q15
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	K19-De24207	CP	%	23	22	1.0	30%	Pass
Duplicate								
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD		
2,4'-DDD	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDE	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDT	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDD	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDE	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDT	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
a-BHC	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Aldrin	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
b-BHC	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Chlordanes - Total	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
cis-Chlordane	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
d-BHC	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Dieldrin	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan I	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan II	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan sulphate	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin aldehyde	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin ketone	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
g-BHC (Lindane)	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor epoxide	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Hexachlorobenzene	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Methoxychlor	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
trans-Chlordane	K19-De24213	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Metals M8 (NZ MfE)				Result 1	Result 2	RPD		
Arsenic	K19-De24217	CP	mg/kg	< 2	< 2	<1	30%	Pass
Cadmium	K19-De24217	CP	mg/kg	< 0.4	< 0.4	<1	30%	Pass
Chromium	K19-De24217	CP	mg/kg	6.5	6.6	2.0	30%	Pass
Copper	K19-De24217	CP	mg/kg	13	13	1.0	30%	Pass
Lead	K19-De24217	CP	mg/kg	10	9.9	2.0	30%	Pass
Mercury	K19-De24217	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	K19-De24217	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	K19-De24217	CP	mg/kg	67	72	7.0	30%	Pass



Duplicate								
				Result 1	Result 2	RPD		
% Moisture	K19-De24217	CP	%	29	29	2.0	30%	Pass
Duplicate								
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD		
2,4'-DDD	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDE	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDT	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDD	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDE	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDT	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
a-BHC	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Aldrin	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
b-BHC	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Chlordanes - Total	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
cis-Chlordane	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
d-BHC	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Dieldrin	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan I	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan II	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan sulphate	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin aldehyde	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin ketone	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
g-BHC (Lindane)	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor epoxide	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Hexachlorobenzene	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Methoxychlor	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
trans-Chlordane	K19-De24223	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Metals M8 (NZ MfE)				Result 1	Result 2	RPD		
Arsenic	K19-De24227	CP	mg/kg	26	27	5.0	30%	Pass
Cadmium	K19-De24227	CP	mg/kg	0.5	0.5	2.0	30%	Pass
Chromium	K19-De24227	CP	mg/kg	29	30	4.0	30%	Pass
Copper	K19-De24227	CP	mg/kg	130	130	1.0	30%	Pass
Lead	K19-De24227	CP	mg/kg	5.9	5.8	2.0	30%	Pass
Mercury	K19-De24227	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Nickel	K19-De24227	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	K19-De24227	CP	mg/kg	70	70	1.0	30%	Pass
Duplicate								
				Result 1	Result 2	RPD		
% Moisture	K19-De24227	CP	%	24	24	1.0	30%	Pass
Duplicate								
Polychlorinated Biphenyls				Result 1	Result 2	RPD		
Aroclor-1016	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1221	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1232	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1242	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1248	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1254	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Aroclor-1260	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Total PCB*	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass

<b>Duplicate</b>								
<b>Polycyclic Aromatic Hydrocarbons (NZ MfE)</b>				Result 1	Result 2	RPD		
Acenaphthene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Acenaphthylene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Anthracene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benz(a)anthracene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(a)pyrene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(b&j)fluoranthene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(g,h,i)perylene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(k)fluoranthene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Chrysene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Dibenz(a,h)anthracene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Fluoranthene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Fluorene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Naphthalene	K19-De24230	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Phenanthrene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Pyrene	K19-De24230	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
<b>Duplicate</b>								
<b>Organochlorine Pesticides (NZ MfE)</b>				Result 1	Result 2	RPD		
2,4'-DDD	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDE	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDT	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDD	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDE	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDT	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
a-BHC	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Aldrin	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
b-BHC	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Chlordanes - Total	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
cis-Chlordane	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
d-BHC	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Dieldrin	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan I	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan II	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan sulphate	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin aldehyde	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin ketone	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
g-BHC (Lindane)	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor epoxide	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Hexachlorobenzene	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Methoxychlor	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
trans-Chlordane	K19-De24234	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
<b>Duplicate</b>								
<b>Metals M8 (NZ MfE)</b>				Result 1	Result 2	RPD		
Arsenic	K19-De24237	CP	mg/kg	< 2	< 2	<1	30%	Pass
Cadmium	K19-De24237	CP	mg/kg	0.8	0.7	13	30%	Pass
Chromium	K19-De24237	CP	mg/kg	12	11	13	30%	Pass
Copper	K19-De24237	CP	mg/kg	16	14	17	30%	Pass
Lead	K19-De24237	CP	mg/kg	9.6	8.5	13	30%	Pass
Mercury	K19-De24237	CP	mg/kg	0.1	0.1	5.0	30%	Pass
Nickel	K19-De24237	CP	mg/kg	< 5	< 5	<1	30%	Pass
Zinc	K19-De24237	CP	mg/kg	32	32	3.0	30%	Pass

Duplicate								
				Result 1	Result 2	RPD		
% Moisture	K19-De24237	CP	%	32	31	<1	30%	Pass
Duplicate								
Total Petroleum Hydrocarbons (NZ MfE 1999)				Result 1	Result 2	RPD		
TPH-SG C7-C9	K19-De24243	CP	mg/kg	< 5	< 5	<1	30%	Pass
TPH-SG C10-C14	K19-De24243	CP	mg/kg	< 10	< 10	<1	30%	Pass
TPH-SG C15-C36	K19-De24243	CP	mg/kg	< 20	< 20	<1	30%	Pass
TPH-SG C7-C36 (Total)	K19-De24243	CP	mg/kg	< 35	< 35	<1	30%	Pass
Duplicate								
Organochlorine Pesticides (NZ MfE)				Result 1	Result 2	RPD		
2,4'-DDD	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDE	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
2,4'-DDT	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDD	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDE	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
4,4'-DDT	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
a-BHC	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Aldrin	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
b-BHC	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Chlordanes - Total	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
cis-Chlordane	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
d-BHC	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Dieldrin	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan I	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan II	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endosulfan sulphate	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin aldehyde	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Endrin ketone	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
g-BHC (Lindane)	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Heptachlor epoxide	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Hexachlorobenzene	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Methoxychlor	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
trans-Chlordane	K19-De24244	CP	mg/kg	< 0.01	< 0.01	<1	30%	Pass
Duplicate								
Polycyclic Aromatic Hydrocarbons (NZ MfE)				Result 1	Result 2	RPD		
Acenaphthene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Acenaphthylene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Anthracene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(a)anthracene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(a)pyrene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(b&j)fluoranthene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(g,h,i)perylene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Benzo(k)fluoranthene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Chrysene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Dibenz(a,h)anthracene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Fluoranthene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Fluorene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Indeno(1,2,3-cd)pyrene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Naphthalene	K19-De24244	CP	mg/kg	< 0.1	< 0.1	<1	30%	Pass
Phenanthrene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass
Pyrene	K19-De24244	CP	mg/kg	< 0.03	< 0.03	<1	30%	Pass

**Comments**
**Sample Integrity**

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

**Qualifier Codes/Comments**

Code	Description
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
Q08	The matrix spike recovery is outside of the recommended acceptance criteria. An acceptable recovery was obtained for the laboratory control sample indicating a sample matrix interference.
Q15	The RPD reported passes Eurofins Environment Testing's QC - Acceptance Criteria as defined in the Internal Quality Control Review and Glossary page of this report.

**Authorised By**

Swati 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.



All tests reported herein have been performed in accordance with the laboratory's scope of accreditation, unless otherwise specified.  
Accreditation No. :1290

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

**Attention:** Garry Cepe  
**Report** 694138-AID  
**Project Name**  
**Project ID** 19595  
**Received Date** Dec 13, 2019  
**Date Reported** Dec 23, 2019

**Methodology:**

Asbestos Fibre Identification

Conducted in accordance with the Australian Standard AS 4964 – 2004: Method for the Qualitative Identification of Asbestos in Bulk Samples and in-house Method LTM-ASB-8020 by polarised light microscopy (PLM) and dispersion staining (DS) techniques.

*NOTE: Positive Trace Analysis results indicate the sample contains detectable respirable fibres.*

Unknown Mineral Fibres

Mineral fibres of unknown type, as determined by PLM with DS, may require another analytical technique, such as Electron Microscopy, to confirm unequivocal identity.

*NOTE: While Actinolite, Anthophyllite and Tremolite asbestos may be detected by PLM with DS, due to variability in the optical properties of these materials, AS4964 requires that these are reported as UMF unless confirmed by an independent technique.*

Subsampling Soil Samples

The whole sample submitted is first dried and then passed through a 10mm sieve followed by a 2mm sieve. All fibrous matter greater than 10mm, greater than 2mm as well as the material passing through the 2mm sieve are retained and analysed for the presence of asbestos. If the sub 2mm fraction is greater than approximately 30 to 60g then a sub-sampling routine based on ISO 3082:2009(E) is employed.

*NOTE: Depending on the nature and size of the soil sample, the sub-2 mm residue material may need to be sub-sampled for trace analysis, in accordance with AS 4964-2004.*

Bonded asbestos-containing material (ACM)

The material is first examined and any fibres isolated for identification by PLM and DS. Where required, interfering matrices may be removed by disintegration using a range of heat, chemical or physical treatments, possibly in combination. The resultant material is then further examined in accordance with AS 4964 - 2004.

*NOTE: Even after disintegration it may be difficult to detect the presence of asbestos in some asbestos-containing bulk materials using PLM and DS. This is due to the low grade or small length or diameter of the asbestos fibres present in the material, or to the fact that very fine fibres have been distributed intimately throughout the materials. Vinyl/asbestos floor tiles, some asbestos-containing sealants and mastics, asbestos-containing epoxy resins and some ore samples are examples of these types of material, which are difficult to analyse.*

Limit of Reporting

The performance limitation of the AS 4964 (2004) method for non-homogeneous samples is around 0.1 g/kg (equivalent to 0.01% (w/w)). Where no asbestos is found by PLM and DS, including Trace Analysis, this is considered to be at the nominal reporting limit of 0.01% (w/w).

The NEPM screening level of 0.001% (w/w) is intended as an on-site determination, not a laboratory Limit of Reporting (LOR), per se. Examination of a large sample size (e.g. 500 mL) may improve the likelihood of detecting asbestos, particularly AF, to aid assessment against the NEPM criteria. Gravimetric determinations to this level of accuracy are outside of AS 4964 and hence IANZ Accreditation does not cover the performance of this service (non-IANZ results shown with an asterisk).

*NOTE: NATA News March 2014, p.7, states in relation to AS 4964: "This is a qualitative method with a nominal reporting limit of 0.01 % " and that currently in Australia "there is no validated method available for the quantification of asbestos". This report is consistent with the analytical procedures and reporting recommendations in the NEPM and the WA DoH.*

**Project Name**

**Project ID**

19595

**Date Sampled**

Dec 11, 2019

**Report**

694138-AID

Client Sample ID	Eurofins Sample No.	Date Sampled	Sample Description	Result
COMPOSITE C12	19-De24243	Dec 11, 2019	Approximate Sample 127g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Organic fibre detected. No respirable fibres detected.
COMPOSITE C13	19-De24244	Dec 11, 2019	Approximate Sample 204g Sample consisted of: Fine grained soil and rocks	No asbestos detected at the reporting limit of 0.01% w/w.* Synthetic mineral fibre detected. Organic fibre detected. No respirable fibres detected.

**Sample History**

Where samples are submitted/analysed over several days, the last date of extraction and analysis is reported. A recent review of our LIMS has resulted in the correction or clarification of some method identifications. Due to this, some of the method reference information on reports has changed. However, no substantive change has been made to our laboratory methods, and as such there is no change in the validity of current or previous results.

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.

<b>Description</b>	<b>Testing Site</b>	<b>Extracted</b>	<b>Holding Time</b>
Asbestos - LTM-ASB-8020	Christchurch	Dec 18, 2019	Indefinite

### 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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	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	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
1	D1	Dec 11, 2019		Soil	K19-De24201				X		X	X	
2	D2	Dec 11, 2019		Soil	K19-De24202				X		X	X	
3	D3	Dec 11, 2019		Soil	K19-De24203				X	X		X	X
4	D4	Dec 11, 2019		Soil	K19-De24204				X	X		X	X
5	D5	Dec 11, 2019		Soil	K19-De24205				X		X	X	
6	D6	Dec 11, 2019		Soil	K19-De24206				X		X	X	
7	D7	Dec 11, 2019		Soil	K19-De24207				X		X	X	
8	D8	Dec 11, 2019		Soil	K19-De24208				X		X	X	
9	D9	Dec 11, 2019		Soil	K19-De24209				X		X	X	
10	D10	Dec 11, 2019		Soil	K19-De24210				X		X	X	
11	D11	Dec 11, 2019		Soil	K19-De24211				X		X	X	
12	D12	Dec 11, 2019		Soil	K19-De24212				X		X	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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
13	D13	Dec 11, 2019		Soil	K19-De24213				X	X	X		
14	D14	Dec 11, 2019		Soil	K19-De24214				X	X	X		
15	D15	Dec 11, 2019		Soil	K19-De24215				X	X	X		
16	D16	Dec 11, 2019		Soil	K19-De24216				X	X	X		
17	D17	Dec 11, 2019		Soil	K19-De24217				X	X	X		
18	D18	Dec 11, 2019		Soil	K19-De24218				X	X	X		
19	D19	Dec 11, 2019		Soil	K19-De24219				X	X	X		
20	D20	Dec 11, 2019		Soil	K19-De24220				X	X	X		
21	D21	Dec 11, 2019		Soil	K19-De24221				X	X	X		
22	D22	Dec 11, 2019		Soil	K19-De24222				X	X	X		
23	D23	Dec 11, 2019		Soil	K19-De24223				X	X	X		
24	D24	Dec 11, 2019		Soil	K19-De24224				X	X	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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
25	D25	Dec 11, 2019		Soil	K19-De24225				X		X	X	
26	D26	Dec 11, 2019		Soil	K19-De24226				X		X	X	
27	D27	Dec 11, 2019		Soil	K19-De24227				X		X	X	
28	D28	Dec 11, 2019		Soil	K19-De24228				X		X	X	
29	D29	Dec 11, 2019		Soil	K19-De24229				X		X	X	
30	D30	Dec 11, 2019		Soil	K19-De24230			X	X	X		X	X
31	D31	Dec 11, 2019		Soil	K19-De24231				X		X	X	
32	COMPOSITE C1	Dec 11, 2019		Soil	K19-De24232				X		X	X	
33	COMPOSITE C2	Dec 11, 2019		Soil	K19-De24233				X		X	X	
34	COMPOSITE C3	Dec 11, 2019		Soil	K19-De24234				X		X	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**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	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	X	X
Christchurch Laboratory - IANZ# 1290						X							
External Laboratory													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
35	COMPOSITE C4	Dec 11, 2019		Soil	K19-De24235				X		X	X	
36	COMPOSITE C5	Dec 11, 2019		Soil	K19-De24236				X		X	X	
37	COMPOSITE C6	Dec 11, 2019		Soil	K19-De24237				X		X	X	
38	COMPOSITE C7	Dec 11, 2019		Soil	K19-De24238				X		X	X	
39	COMPOSITE C8	Dec 11, 2019		Soil	K19-De24239				X		X	X	
40	COMPOSITE C9	Dec 11, 2019		Soil	K19-De24240				X		X	X	
41	COMPOSITE C10	Dec 11, 2019		Soil	K19-De24241				X		X	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**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
42	COMPOSITE C11	Dec 11, 2019		Soil	K19-De24242				X		X	X	
43	COMPOSITE C12	Dec 11, 2019		Soil	K19-De24243	X			X	X	X	X	X
44	COMPOSITE C13	Dec 11, 2019		Soil	K19-De24244	X			X	X	X	X	X
45	C1-1	Dec 11, 2019		Soil	K19-De24273		X						
46	C1-2	Dec 11, 2019		Soil	K19-De24274		X						
47	C1-3	Dec 11, 2019		Soil	K19-De24275		X						
48	C1-4	Dec 11, 2019		Soil	K19-De24276		X						
49	C2-1	Dec 11, 2019		Soil	K19-De24277		X						
50	C2-2	Dec 11, 2019		Soil	K19-De24278		X						
51	C2-3	Dec 11, 2019		Soil	K19-De24279		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	Organochlorine Pesticides (NZ M/E)	Metals M8 (NZ M/E)	Polycyclic Aromatic Hydrocarbons (NZ M/E)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
52	C2-4	Dec 11, 2019		Soil	K19-De24280		X						
53	C3-1	Dec 11, 2019		Soil	K19-De24281		X						
54	C3-2	Dec 11, 2019		Soil	K19-De24282		X						
55	C3-3	Dec 11, 2019		Soil	K19-De24283		X						
56	C3-4	Dec 11, 2019		Soil	K19-De24284		X						
57	C4-1	Dec 11, 2019		Soil	K19-De24285		X						
58	C4-2	Dec 11, 2019		Soil	K19-De24286		X						
59	C4-3	Dec 11, 2019		Soil	K19-De24287		X						
60	C4-4	Dec 11, 2019		Soil	K19-De24288		X						
61	C5-1	Dec 11, 2019		Soil	K19-De24289		X						
62	C5-2	Dec 11, 2019		Soil	K19-De24290		X						
63	C5-3	Dec 11, 2019		Soil	K19-De24291		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ M/E 1999)	Organochlorine Pesticides (NZ M/E)	Metals M8 (NZ M/E)	Polycyclic Aromatic Hydrocarbons (NZ M/E)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
64	C5-4	Dec 11, 2019		Soil	K19-De24292		X						
65	C6-1	Dec 11, 2019		Soil	K19-De24293		X						
66	C6-2	Dec 11, 2019		Soil	K19-De24294		X						
67	C6-3	Dec 11, 2019		Soil	K19-De24295		X						
68	C6-4	Dec 11, 2019		Soil	K19-De24296		X						
69	C7-1	Dec 11, 2019		Soil	K19-De24297		X						
70	C7-2	Dec 11, 2019		Soil	K19-De24298		X						
71	C7-3	Dec 11, 2019		Soil	K19-De24299		X						
72	C7-4	Dec 11, 2019		Soil	K19-De24300		X						
73	C8-1	Dec 11, 2019		Soil	K19-De24301		X						
74	C8-2	Dec 11, 2019		Soil	K19-De24302		X						
75	C8-3	Dec 11, 2019		Soil	K19-De24303		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
76	C8-4	Dec 11, 2019		Soil	K19-De24304		X						
77	C9-1	Dec 11, 2019		Soil	K19-De24305		X						
78	C9-2	Dec 11, 2019		Soil	K19-De24306		X						
79	C9-3	Dec 11, 2019		Soil	K19-De24307		X						
80	C9-4	Dec 11, 2019		Soil	K19-De24308		X						
81	C10-1	Dec 11, 2019		Soil	K19-De24309		X						
82	C10-2	Dec 11, 2019		Soil	K19-De24310		X						
83	C10-3	Dec 11, 2019		Soil	K19-De24311		X						
84	C10-4	Dec 11, 2019		Soil	K19-De24312		X						
85	C11-1	Dec 11, 2019		Soil	K19-De24313		X						
86	C11-2	Dec 11, 2019		Soil	K19-De24314		X						
87	C11-3	Dec 11, 2019		Soil	K19-De24315		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  
Murarie QLD 4172  
Phone : +61 7 3902 4600  
NATA # 1261 Site # 20794

**Perth**  
2/91 Leach Highway  
Kewdale WA 6105  
Phone : +61 8 9251 9600  
NATA # 1261  
Site # 23736

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

**Order No.:**  
**Report #:** 694138  
**Phone:** 0011 64 9 835 1740  
**Fax:** 0011 64 9 835 1847

**Received:** Dec 13, 2019 4:00 PM  
**Due:** Dec 20, 2019  
**Priority:** 5 Day  
**Contact Name:** Garry Cepe

**Project Name:**  
**Project ID:** 19595

**Eurofins Analytical Services Manager : Swati Shahaney**

Sample Detail						Asbestos - AS4964	HOLD	Polychlorinated Biphenyls	Moisture Set	Total Petroleum Hydrocarbons (NZ MFE 1999)	Organochlorine Pesticides (NZ MFE)	Metals M8 (NZ MFE)	Polycyclic Aromatic Hydrocarbons (NZ MFE)
<b>Auckland Laboratory - IANZ# 1327</b>							X	X	X	X	X	X	X
<b>Christchurch Laboratory - IANZ# 1290</b>						X							
<b>External Laboratory</b>													
No	Sample ID	Sample Date	Sampling Time	Matrix	LAB ID								
88	C11-4	Dec 11, 2019		Soil	K19-De24316		X						
89	C12-1	Dec 11, 2019		Soil	K19-De24317		X						
90	C12-2	Dec 11, 2019		Soil	K19-De24318		X						
91	C13-1	Dec 11, 2019		Soil	K19-De24319		X						
92	C13-2	Dec 11, 2019		Soil	K19-De24320		X						
93	C13-3	Dec 11, 2019		Soil	K19-De24321		X						
<b>Test Counts</b>						2	49	1	44	5	41	44	5



**Internal Quality Control Review and Glossary**
**General**

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

**Holding Times**

Please refer to '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 Sample Receipt Advice.

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

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

**Units**

% w/w: weight for weight basis	grams per kilogram
Filter loading:	fibres/100 graticule areas
Reported Concentration:	fibres/mL
Flowrate:	L/min

**Terms**

<b>Dry</b>	Sample is dried by heating prior to analysis
<b>LOR</b>	Limit of Reporting
<b>COC</b>	Chain of Custody
<b>SRA</b>	Sample Receipt Advice
<b>ISO</b>	International Standards Organisation
<b>AS</b>	Australian Standards
<b>WA DOH</b>	Reference document for the NEPM. Government of Western Australia, Guidelines for the Assessment, Remediation and Management of Asbestos-Contaminated Sites in Western Australia (2009), including supporting document Recommended Procedures for Laboratory Analysis of Asbestos in Soil (2011)
<b>NEPM</b>	National Environment Protection (Assessment of Site Contamination) Measure, 2013 (as amended)
<b>ACM</b>	Asbestos Containing Materials. Asbestos contained within a non-asbestos matrix, typically presented in bonded and/or sound condition. For the purposes of the NEPM, ACM is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
<b>AF</b>	Asbestos Fines. Asbestos containing materials, including friable, weathered and bonded materials, able to pass a 7mm x 7mm sieve. Considered under the NEPM as equivalent to "non-bonded / friable".
<b>FA</b>	Fibrous Asbestos. Asbestos containing materials in a friable and/or severely weathered condition. For the purposes of the NEPM, FA is generally restricted to those materials that do not pass a 7mm x 7mm sieve.
<b>Friable</b>	Asbestos-containing materials of any size that may be broken or crumbled by hand pressure. For the purposes of the NEPM, this includes both AF and FA. It is outside of the laboratory's remit to assess degree of friability.
<b>Trace Analysis</b>	Analytical procedure used to detect the presence of respirable fibres in the matrix.

**Comments**
**Sample Integrity**

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

**Qualifier Codes/Comments**

Code	Description
N/A	Not applicable

**Asbestos Counter/Identifier:**

Katjana Gausel                      Senior Analyst-Asbestos (NZS)

**Authorised by:**

Irene Suresh                              Senior Analyst-Asbestos (NZS)


**Sophie Bush**
**Senior Analyst-Asbestos (Key Technical Personnel)**

Final Report – this report replaces any previously issued Report

- Indicates Not Requested

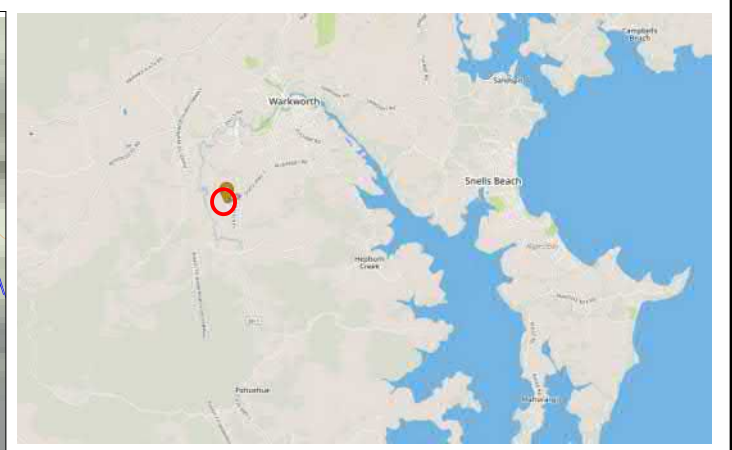
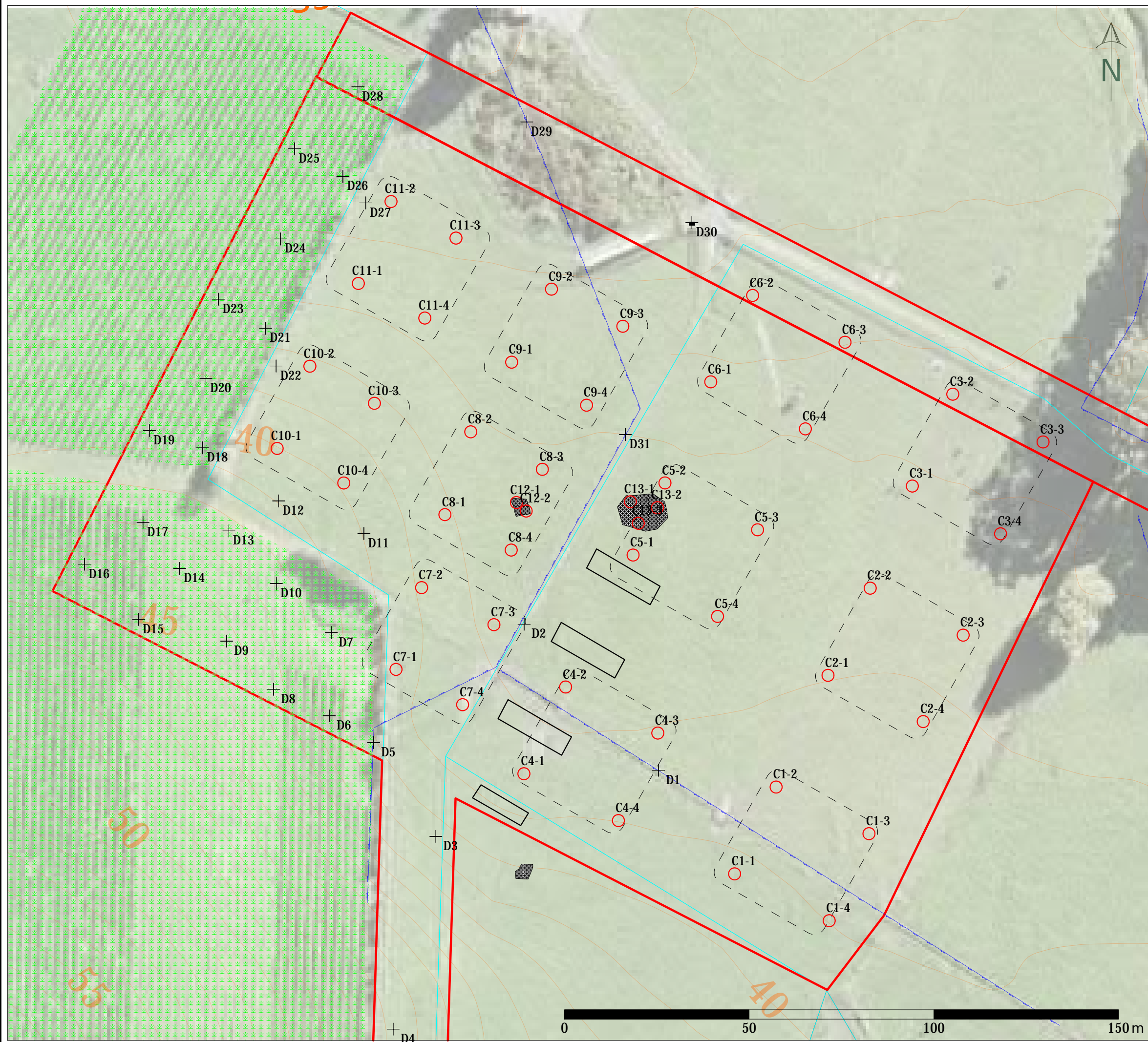
\* Indicates ISO/IEC 17025:2017 accreditation does not cover the performance of this service

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

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.


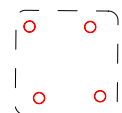

# Appendix C

## Sampling Location Plan



LOCATION MAP

1747325 E  
5968295 N

-  Site Extent
-  Composited Samples
-  Discrete (Individual) Samples

AMENDMENTS		
DATE	REV	DESCRIPTION

Notes:  
 1. Locations of features approximate only.  
 2. Boundary information on this Site plan adapted from information on Auckland GIS Service

 **Soil&Rock Consultants**  
*For well-grounded solutions*  
 Level 1, 131 Lincoln Road, PO Box 21-424 Henderson, Waitakere 0650  
 Ph 09 835 1740 Fax 09 835 1847  
 www.soilandrock.co.nz

1711 State Highway 1, Warkworth

## SAMPLING LOCATION PLAN

DRAWING NO. <b>19595/2</b>	REV: A	DATE: December 2019
SCALE: 1:1000 @ A3	DRAWN: GC	

## **APPENDIX C**

### **LAND CONTAMINATION ASSESSMENT REPORT**

# Land contamination assessment report

## Warkworth Structure Plan

June 2019



Prepared by:

Marija Jukic (Senior Specialist), Resource Consents

## Table of Contents

1	Executive Summary .....	3
2	Introduction .....	5
3	Existing environment.....	6
4	Warkworth Structure Plan .....	9
5	Conclusions.....	18

# 1 Executive Summary

A limited desktop assessment of land contamination within the Warkworth Structure Plan Future Urban Zone (FUZ) undertaken in March 2018 identified a number of potentially contaminating activities included on the Ministry for the Environment (MfE) Hazardous Activities Industries List (HAIL) as either being undertaken or more likely than not to have been undertaken in this area. Those activities were commonly associated with pastoral farmland and rural–residential use (for example, livestock dips or spray race operations, importation of unverified fill, burying and burning of farm waste), horticultural activities (market gardening, orchards, green houses and viticulture), and commercial operations (such as a motor mechanic workshop and a spare car parts business).

The desktop assessment concluded that further investigations within the FUZ are required and some remedial works and resource consents may subsequently be necessary; however, it is considered that issues arising from contamination are generally unlikely to present significant constraints to land development in the FUZ.

This report provides an assessment of the Warkworth Structure Plan in relation to the applicable objectives and principles of key planning documents that provide guidance, either directly or indirectly in relation to the management of contaminated land. These include:

- Warkworth Structure Plan Principles
- Structure Plan Guidelines (Appendix 1 of the Unitary Plan)
- National Policy Statement for Freshwater Management (2017)
- Auckland Unitary Plan (Operative in Part) Regional Policy Statement
- Auckland Plan 2050

It is recognised that the Warkworth Structure Plan facilitates the assessment and management of contaminated land through the strategic zoning of sections of land (including the provision of buffer zones between potential contaminant sources and identified sensitive receptors). The strategic zonings will be implemented into the District Plan through future plan changes and the subsequent resource consent applications will trigger the planning requirements under Section 104(1) of the *Resource Management Act 1991*.

The implementation of the Warkworth Structure Plan through future plan changes and the resource consent process will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required), prior to redevelopment. The above approach will progressively reduce the existing potential contaminant sources within the FUZ that pose a risk of adverse effects on the receiving environment and/or human health.

In addition, the Warkworth Structure Plan provides for buffer zones (esplanade reserves/strips, wide riparian areas, arterial roads) between potentially contaminated sites and sensitive receptors, which reduce the likelihood of potential contaminant discharges reaching these receptors.

Through these measures it is anticipated that adverse effects on the environment or human health associated with either historical or future contaminated land will be adequately mitigated, and the



quality of the environment improved. The Warkworth Structure Plan provides the opportunity to use the growth and development within the Future Urban Zone to protect and enhance Auckland's environment (Auckland Plan 2050, Directive 3).

Based on the assessment, the proposed Warkworth Structure Plan is considered to meet the applicable principles and objectives of the key documents noted above and is therefore supported from the perspective of contaminated land management.

## 2 Introduction

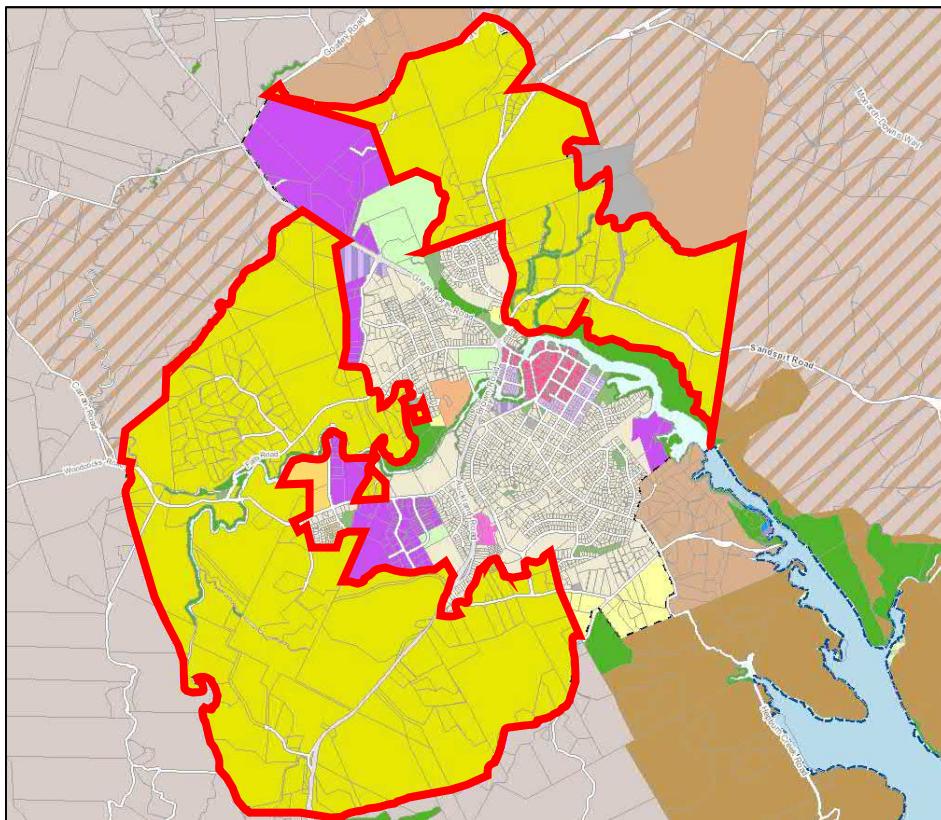
### 2.1 Purpose and scope of the report

This is one of a number of reports that have been prepared for the Warkworth Structure Plan as part of the supporting information behind the structure plan document. This report outlines the existing environment in the study area with regards to contaminated land and assesses the Warkworth Structure Plan in relation to contaminated land.

### 2.2 Study Area

The study area for the Warkworth Structure Plan is the Future Urban zone around Warkworth. It comprises around 1,000ha of land. The study area is shown outlined in red on Figure 1 below.

**Figure 1:** Warkworth structure plan study area (outlined in red)



## 3 Existing environment

### 3.1 Description of study area

A limited desktop assessment of the historical and current land uses within for the study area in relation to potentially contaminating activities, as prescribed on the Ministry for the Environment's Hazardous Activities and Industries List (HAIL), was undertaken in March 2018. The information gathered as part of this report included:

- a) A review of historical aerial photographs obtained from Auckland Council's GeoMaps GIS database and the Local Government Geospatial Alliance's historical imagery resource Retrolens, to identify any indicator of potentially contaminating land uses.
- b) A review of the Council's resource consents database to assess what consents have been granted and permitted activities undertaken within the study area that may be associated with contaminating activities.
- c) A high-level site visit of the study area (utilising public land only).

The assessment indicated that the majority of the study area has historically been and continues to be utilised for pastoral farmland and rural-residential purposes. Although these land uses are generally considered to be low risk with regards to contamination, localised occurrences may exist, resulting from the following potential sources:

- a) Livestock dips or spray race operations in pastoral farmland areas

Dipping sheep to control external parasites was a legal requirement in New Zealand from 1849 to 1993. Due to the associated use of chemicals containing arsenic and organophosphorus pesticides, and the resulting potential impact to human health and the environment, livestock dips or spray race operations are classed as a contaminating activity (HAIL Category A8).

- b) On-site wastewater disposal systems

On-site wastewater disposal systems which usually comprise septic tanks, associated pipework and disposal fields, are considered as potential HAIL activities (HAIL Categories G5 - waste disposal to land, and G6 - waste recycling or waste or wastewater treatment), due to the presence of biological contaminants, nutrients and potential heavy metals that may impact human health and the environment.

- c) Asbestos

Asbestos was a common building material in New Zealand between the 1920s and the mid-1980s, although it may have been used up until 2000. It was utilised for a range of purposes, including wall or roof cladding, insulation, soffit fittings, backing to vinyl flooring and in decorative plaster and textured ceilings.

Given the age of a number of the buildings within the study area, including residences, farm sheds and commercial buildings, it is considered that asbestos may be present at some of the properties where former site buildings have been demolished.

d) Lead-based paints

Lead-based paints were commonly used on NZ building until the early 1980s. Although lead levels in the paints were reduced over the decades (white lead was phased out in the mid-1960s, lead chromate was disused in the late 1970s, wood primers containing red lead paint were phased out in the 1980s and roof coatings containing calcium plumbate ceased being used in the 1990s), it is considered that a number of buildings within the study area are sufficiently old that surrounding soils in the immediate vicinity of these buildings may be impacted by the historical use of these paints.

e) Burial and burning of farm waste

Common waste disposal practices carried out on New Zealand farms, despite their illegality, have been the burial or burning of contaminated waste. Depending on the material burnt or buried, these activities may have resulted in impacts to both the environment and human health and can be classified as a HAIL activity under Category G5 - waste disposal to land.

f) Importation of unverified fill

The importation of unverified fill material for farm maintenance works, such as, the upkeep of tracks, backfilling areas susceptible to waterlogging and erosion, and infilling gullies, is recognised as a potential HAIL activity (Category I Any land that has been subject to the intentional or accidental release of hazardous substances in sufficient quantity that it could be a risk to human health or the environment). Contaminants commonly associated with unverified fill material include heavy metals, polycyclic aromatic hydrocarbons and asbestos, although other contaminants may also be present in the material, depending on the source of the fill.

g) Fuel storage

The storage of fuel on-site for farm vehicles and other plant (HAIL Category A17 Storage tanks or drums for fuel, chemicals or liquid waste) is commonly undertaken on rural properties.

Eight properties within the study area are known or are suspected to have been utilised for horticultural purposes, including market gardening, orchards, green houses and viticulture. Persistent bulk storage and use of pesticides (HAIL Category A10) are commonly associated with such horticultural activities. As spraying is the primary method by which pesticides are normally applied to crops, it is anticipated that contaminants are likely to be of low concentration and dispersed relatively uniformly across a property, although hotspots of higher contaminant concentrations may occur in areas such as storage sheds and at locations where the chemicals were mixed/prepared.

It was noted that properties surrounding these eight horticultural sites would require assessment for potential spray drift impacts.

Other potentially contaminating HAIL activities identified within the study area include:

- a) A golf range at a single property. The primary HAIL activities associated with golf ranges are the persistent bulk storage and use of chemicals such as pesticides (HAIL Category A10). As with horticultural land use, it is anticipated that contamination across the golf course would be of a dispersive nature, although hotspots of higher contaminant concentrations might occur in areas such as storage sheds and at locations where the chemicals were mixed/prepared.
- b) A motor mechanic workshop was identified at one property. Contaminants of concern associated with motor vehicle maintenance include hydrocarbons, solvents and heavy metals. Depending on the age and condition of the workshop infrastructure, including floors and drainage pits, waste disposal practices, and depth of groundwater beneath the site, the level of contamination could range from negligible to significant.
- c) A spare car parts business at a single property. As with the motor mechanics workshop, the level of contamination will depend on the age and condition of the workshop infrastructure, including floors and drainage pits waste disposal practices, and depth of groundwater beneath the site.
- d) Search of the Council's consent database revealed that a property had held a consent to discharge wastewater including wash down from stock holding pens, from an abattoir operation. The consent expired in 2004. Given the length of time since the assumed cessation of operations, no biological or nutrient issues are anticipated to be of concern. However, any chemicals used by the abattoir for cleaning and disinfecting purposes may potentially have impacted the site soils.

Two properties appear to be utilised as laydown/ storage areas, one for a freight company and the second for a drilling company. Whether the properties can be assessed as potential or actual HAIL sites will depend in part on the type of freight or drilling equipment/chemicals being stored, and whether vehicle/drill equipment maintenance works are carried out on these properties.

It is noted that portions of the study site abut areas currently zoned Business-Light Industry Zone under the Auckland Unitary Plan (Operative in Part) (AUP (OP)). Depending on the contamination status and activities undertaken within these areas, there may be some restrictions on future land use on immediately adjacent land.

The desktop assessment has concluded:

- HAIL activities have been identified as having or potentially having occurred within the study area; and therefore, further contamination assessment will be required to confirm the contamination status of properties across the study area.
- Although further assessments within the study area are required and some remedial works and resource consents may be required, overall it is considered that issues arising from contamination land are generally unlikely to present significant constraints to land development in the study area.

## 4 Warkworth Structure Plan

### 4.2 Overview of Warkworth Structure Plan

The Warkworth Structure Plan sets out the pattern of land uses and the supporting infrastructure networks for the Future Urban zoned land around Warkworth. In preparing the Warkworth Structure Plan, the following were considered:

- the context of the existing town in Warkworth
- the opportunities and constraints of the structure plan area as identified in 16 technical papers<sup>1</sup>
- the feedback received from various stakeholders and public engagement events<sup>2</sup>.

The structure plan is show in **Figure 2**.

Some of the key high-level features of the Warkworth Structure Plan include:

- Ecological and stormwater areas are set aside from any built urban development.
- The new residential areas across the Future Urban zone enable around 7,500 dwellings<sup>3</sup> and offer a range of living types from spacious sections around the fringe to more intensive dwellings such as town houses and apartments around the new small centres and along public transport routes.
- Warkworth's local and rural character is protected through various measures including provisions to protect the bush-clad town centre backdrop by the Mahurangi River and retaining the Morrison's Heritage Orchard as a rural feature of the town.
- New employment areas are identified, comprising land for new industry (e.g. warehousing, manufacturing, wholesalers, repair services) and land for small centres (e.g. convenience retail, local offices, restaurants/cafés). The existing Warkworth town centre by the Mahurangi River will remain as the focal point of the town.

The land uses are supported by infrastructure including:

- Prioritising active transport in Warkworth through a separated walking and cycling network providing connectivity to new and existing centres, employment areas, schools and public transport stations.
- A roading network including a potential southern interchange on Ara Tūhono – Pūhoi to Warkworth (south facing ramps only).
- A public transport network built upon the recently introduced 'New Network for Warkworth' and in the long term has a bus station/interchange in Warkworth's southern Local Centre and a Park and Ride near the potential Ara Tūhono – Pūhoi to Warkworth southern interchange.

---

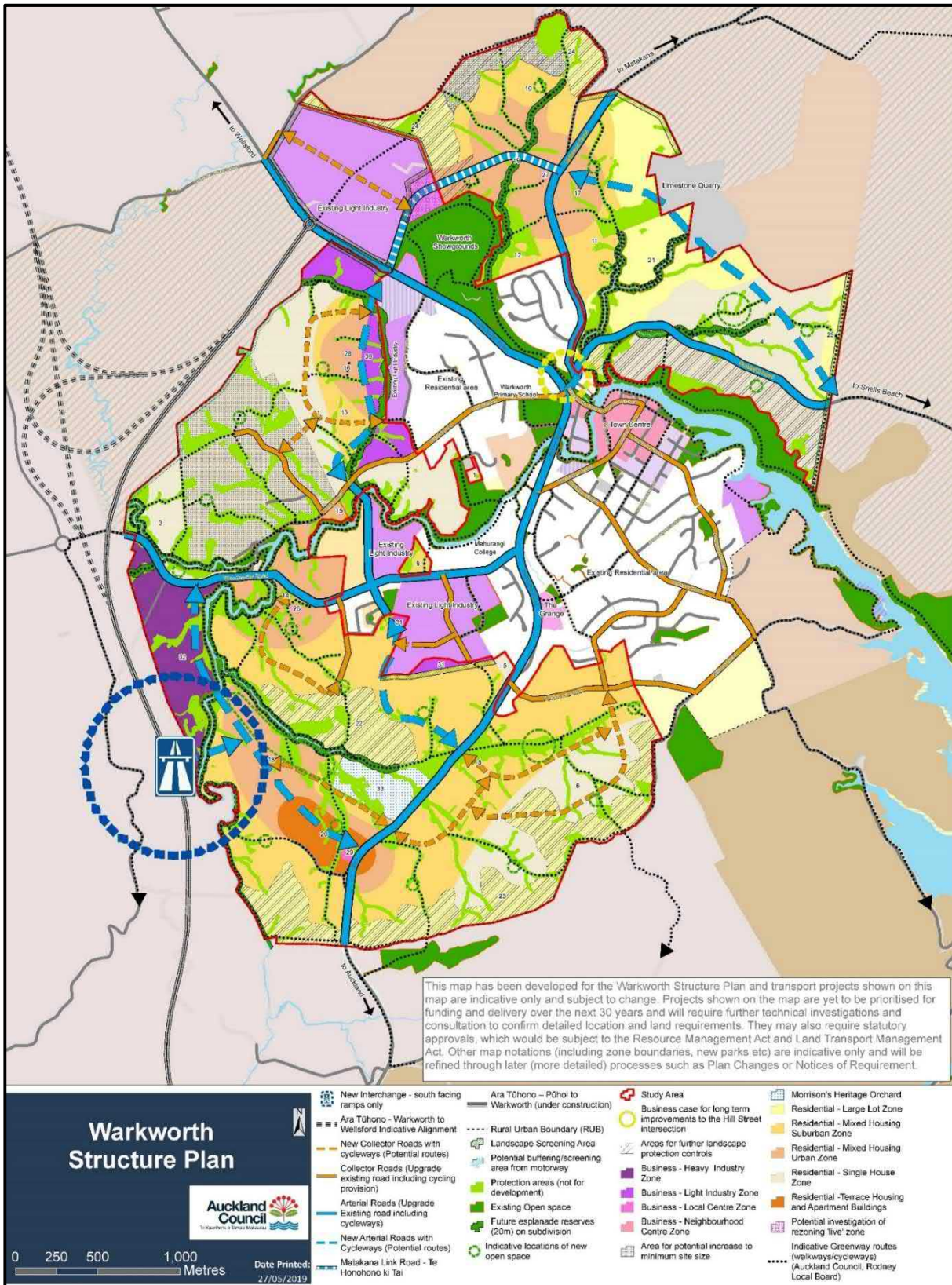
<sup>1</sup> 16 topic papers that were prepared in February 2018 as part of initial consultation on the structure plan

<sup>2</sup> This includes feedback from mana whenua, business, resident and community groups, engagement survey findings and community workshops held to generate land use ideas for the Warkworth area.

- Other infrastructure providers for utilities such as wastewater, water, power supply, telephone, broadband, community facilities, schools, and healthcare have plans underway to service the planned growth of Warkworth.

Further details on the Warkworth Structure Plan can be found in the structure plan document on the project website.

Figure 2: Warkworth Structure Plan





### 4.3 Assessment of the Warkworth Structure Plan

Section 1.3 of the Structure Plan Guidelines (Appendix 1 of the Unitary Plan) and presented in Appendix 1 of this report, states that relevant external documents should be considered when preparing structure plans. The following documents have been identified as being either directly or indirectly relevant to the issue of contaminated land, and therefore assessment of the Warkworth Structure Plan has been undertaken against the applicable aspects of these documents:

- Warkworth Structure Plan Principles
- Structure Plan Guidelines (Appendix 1 of the Unitary Plan)
- National Policy Statement for Freshwater Management (2017)
- Auckland Unitary Plan (Operative in Part) Regional Policy Statement
- Auckland Plan 2050

#### 4.3.1 Assessment and management of contaminated land under the Warkworth Structure Plan

The Warkworth Structure Plan facilitates the assessment and management of contaminated land through the strategic zoning of sections of land (including the provision of buffer zones between potential contaminant sources and identified sensitive receptors). The strategic zonings will be implemented into the District Plan through future plan changes and the subsequent resource consent applications will trigger the planning requirements under Sections 74 and 104(1) of the *Resource Management Act 1991*.

With regards to the planning requirements, any proposed future development associated with change in land use, subdivision or soil disturbance within the Warkworth Structure Plan's Future Urban Zone (FUZ) will require assessment under the *Resource Management Act 1991*. In accordance with section 104(1) of the Act, when considering an application for resource consent, a Council must, subject to Part 2 of the Act, have regard to:

- a) Any actual and potential effects on the environment of allowing the activity;
- b) Any relevant provisions of a national environmental standard, other regulations, national policy statement, a New Zealand Coastal Policy Statement, a Regional Policy Statement or Proposed Regional Policy Statement, Plan or Proposed Plan; and
- c) Any other matter a council considers relevant and reasonably necessary to determine the application.

Of the sources listed under (b) above the two key documents regarding assessment of an application in relation to contaminated land are:

- The National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health 2011 (NES Soil) regulation. The NES Soil provides a nationally consistent set of controls and soil contaminant standards to ensure a piece of land affected by contaminants in soil in such a way as to pose a risk to human health, is appropriately identified, assessed and where required, remediated and/or managed. All territorial authorities are required to give effect to and enforce the requirements of the NES Soil in accordance with their functions under the RMA relating to contaminated land.

- Section E30 of the AUP (OP) which details specific provisions to manage the environmental risks associated with contaminated land. This section addresses the effects of the discharge of contaminants from contaminated land or land containing elevated levels of contaminants into air, or into water, or onto or into land pursuant to section 15 of the *Resource Management Act 1991*. Thresholds beyond which a risk assessment process is required to determine whether the discharge will result in other than *de minimus* adverse effects, or whether it can be remediated or managed are included in the section.

If initial assessment of a development within the FUZ identifies that a HAIL activity is more likely than not to have occurred within the site boundaries, a full evaluation under the NES Soil regulations, and under section E30 of the AUP (OP) will be required at the resource consent stage. Should the assessment confirm the presence of contamination, suitable management (including remediation, if appropriate) and monitoring strategies carried out under the appropriate NES and/or contaminant discharge consents will be required to mitigate the adverse effects on the environment and human health during the works, ensure the site's suitability for the proposed future land use.

The implementation of the Warkworth Structure Plan through a Plan Change and subsequent resource consent processes will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required), prior to redevelopment. It is anticipated that the above approach will progressively reduce the existing potential contaminant sources within the FUZ that pose a risk of adverse effects on the environment and/or human health, and ultimately contribute to the restoration and enhancement of the environment.

The incorporation of strategic zoning into the Warkworth Structure Plan provides buffer zones between potentially contaminated sites and identified sensitive receptors. These include:

- The proposed use of arterial roads and wide riparian areas to separate industrial zones, where HAIL activities are more likely to be undertaken, from more sensitive land uses, such as residential zones or the Mahurangi River. This separation will reduce the likelihood and levels of potential contaminant discharges reaching sensitive receptors, and as such, will reduce the overall impact on these receptors. Additionally, the use of buffer zones may contribute to the resolution or minimisation of reverse sensitivity issues in these areas.
- Proposed future esplanade reserves/strips and protection areas which provide buffer zones between the Mahurangi River (and its tributaries), and potentially contaminated sites. As with the use of arterial roads and wide riparian areas around the industrial zones noted above, the esplanade reserve/strip will reduce the likelihood of potential contaminant discharges, such as surface water runoff from contaminated sites, reaching the river or its tributaries.

#### **4.3.2 Assessment of the plan against the Warkworth Structure Plan principles**

Planning principles have been developed for the Warkworth Structure Plan which are to be used alongside statutory objectives and policies already in the AUP (OP) to help plan the FUZ in Warkworth.

The principles and associated objectives, developed utilizing a range of sources, are listed in full in the Warkworth Structure Plan document. Although none of the principles or associated objectives refer specifically to contaminated land, several objectives target improvements to water quality through the minimisation of discharges to air and water, as follows:

- **The Mahurangi River is the jewel in Warkworth's crown**
  - *Protect the Mahurangi River from the effects of urbanisation as a matter of paramount importance in the development of the Future Urban zone*
  - *Use the development of the Future Urban zone to improve the health and quality of the Mahurangi River wherever possible*
  - *Treat all the tributaries in the Future Urban zone as being vital to the health of the Mahurangi River*
  
- **Sustainability and natural heritage**
  - *Plan to enable development of the Future Urban zone to be sustainable, including having a compact urban form, providing local employment options, enabling extensive active and public transport routes, and minimising discharges to air and water bodies*
  - *Design the Future Urban zone to be able to adapt to the effects of climate change*
  - *Protect and enhance existing bush/natural areas and create ecological corridors linking the Future Urban zone to other ecological areas*

The assessment and remediation of contaminated land within the FUZ will progressively eliminate the existing potential contaminant sources, and therefore reduce discharges to both air and the nearby water bodies that negatively impact sensitive receptors, such as the Mahurangi River and its tributaries. Where potential contaminated land remains, the use of esplanade reserves and strips along the river, and arterial roads and wide riparian areas around the industrial zones will reduce the likelihood that contaminant discharges reach the river or its tributaries, or any other sensitive receptors in the FUZ.

#### **4.3.3 Assessment of the plan against the matters identified in the Structure Plan Guidelines (Appendix 1 of the Unitary Plan)**

Section 1.4.2 (Natural Resources) of the Structure Plan Guidelines presents matters related to the identification, investigation and management of natural resources, and includes objectives that relate both directly and indirectly with contaminated land:

- 1) *The protection, maintenance and enhancement of natural resources, particularly those that have been scheduled in the Unitary Plan in relation to Mana Whenua, natural resources, and the coastal environment;*
- 2) *Demonstrate how proposed subdivision, use, and development will protect, maintain and enhance the values of the resources identified in 1.4.2(1) above;*
- 3) *Measures to manage natural hazards and contamination.*

A review of the Auckland Council's GeoMaps GIS database indicates that there are a number of natural resources, scheduled in the Unitary Plan, that occur within or in close proximity to the FUZ. Eight terrestrial Significant Ecological Areas (SEA) (SEA-T-2294, SEA-T-2367, SEA-T-2368a, SEA-T-5440, SEA-T-6442, SEA-T-6676, SEA-T-6684 and SEA-T-6985), primarily associated with the Mahurangi River and its tributaries, are identified within the FUZ, whilst a number of additional SEAs (both marine and terrestrial) are located in the immediate vicinity of the FUZ, again associated with the Mahurangi River and downstream Mahurangi Harbour.

In addition, portions of the site are located within the following Management Areas:

- Natural Stream Management Area - immediately south of Woodcock Road, and east of Wyllie Road
- High-Use Stream Management Area – Majority of the FUZ, with the exception of the north-eastern portion
- High Use Aquifer Management Area - although it is noted that there are no Quality-Sensitive Management Areas within or immediately adjacent to the FUZ.

As noted in Section 4.3.1, any proposed future development associated with change in land use, subdivision or soil disturbance within the FUZ will require assessment under the *Resource Management Act 1991*.

The implementation of the Warkworth Structure Plan through the resource consent process will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required), prior to redevelopment. The above approach will progressively reduce the existing potential contaminant sources within the FUZ that pose a risk of adverse effects on the receiving environment noted above.

In addition, the Warkworth Structure Plan provides for buffer zones (esplanade reserves/strips, wide riparian areas, arterial roads) between potentially contaminated sites and some of the natural resources identified above, which reduce the likelihood of potential contaminant discharges reaching these sensitive receptors. It is anticipated that the reduction of the contaminant discharges will contribute to the restoration and enhancement of natural resources in the vicinity of the FUZ.

Section 1.5 of the Structure Plan Guidelines discusses the specialist documents required to support the structure plan and plan changes process. Subsection 1.5 (2)(b) states that the scale and detail of the investigation and reporting required needs to be at a level appropriate to the scale of the area subject to the structure planning process and the complexity of the issues identified by the process.

A limited desktop assessment of land contamination within the FUZ has been completed, the details of which are presented in Section 3.1 of this report. The assessment concludes that although further investigations within the study area are required and some remedial works and resource consents may be required, overall it is considered that issues arising from contamination land are generally unlikely to present significant constraints to land development in the FUZ.

Based on the findings of the desktop assessment, it is considered that the investigation and reporting completed is appropriate for the scale of the area and the complexity of the contaminated land issues identified.

#### **4.3.4 Assessment of the plan against the National Policy Statement for Freshwater Management**

National policy statements are instruments issued under section 52(2) of the *Resource Management Act 1991* and state objectives and policies for matters of national significance. Although there is no specific national policy statement that deals directly with contaminated land, a number of the objectives in the National Policy Statement for Freshwater

Management (2017) (NPSFM) relate to the management of discharges of contaminants into the environment.

The NPSFM provides direction on how local authorities should carry out their responsibilities under the *Resource Management Act 1991* for managing freshwater, and guides them, in consultation with their communities, to set objectives for the state of freshwater bodies in their regions and to set limits on resource use to meet these objectives. Objectives A1 and A2 of Section A (Water quality) of the NPSFM relates most directly to the management of contaminant discharges:

- **Objective A1** relates directly to the discharge of contaminants, and states:  
*To safeguard:*
  - a) *The life-supporting capacity, ecosystem processes and indigenous species including their associated ecosystems, of fresh water; and*
  - b) *The health of people and communities, as affected by contact with fresh water;**in sustainably managing the use and development of land, and of discharges of contaminants.*
  
- **Objective A2**  
*The overall quality of fresh water within a freshwater management unit is maintained or improved while:*
  - a) *protecting the significant values of outstanding freshwater bodies;*
  - b) *protecting the significant values of wetlands; and*
  - c) *improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated.*

As previously noted, the implementation of the Warkworth Structure Plan through the resource consent process will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required), prior to redevelopment. The above approach will progressively reduce the existing potential contaminant sources within the FUZ that pose a risk of adverse effects on the Mahurangi River and its tributaries.

In addition, the Warkworth Structure Plan provides for buffer zones (esplanade reserves/strips, wide riparian areas, arterial roads) between potentially contaminated sites and some of the natural resources identified above, which reduce the likelihood of potential contaminant discharges reaching these sensitive receptors. It is anticipated that the reduction of contaminant discharges will contribute to the restoration and enhancement of freshwater bodies within the surrounds of the FUZ.

#### **4.3.5 Assessment of the plan against any relevant provisions in the Regional Policy Statement**

Chapter B of the AUP (OP) includes the Regional Policy Statement, which guides activity at a regional level and has informed lower order provisions relating to specific areas. Section B10.4 (Land-Contaminated) speaks directly to the issues of contaminated land and provides clear objectives and policies with respect to their assessment and management.

#### **B10.4.1 Objective**

- (1) *Human health and the quality of air, land and water resources are protected by the identification, management and remediation of land that is contaminated.*

#### **B10.4.2 Policies**

- (1) *Identify land that is or may be contaminated based on:*
  - (a) *Sites known to have supported contaminating land use activities in the past;*
  - (b) *Sites with a significant potential risk to human health; or*
  - (c) *Sites having significant adverse effects on the environment.*
- (2) *Land which may be contaminated due to having supported contaminating land use activities in the past but has not been investigated will be identified as being potentially contaminated.*
- (3) *Manage or remediate land that is contaminated where:*
  - (a) *The level of contamination renders the land unsuitable for its existing or proposed use; or*
  - (b) *The discharge of contaminants from the land is generating or is likely to generate significant adverse effects on the environment; or*
  - (c) *Development or subdivision of land is proposed.*

As noted in Section 4.3.1 above, any proposed future development within the FUZ will require assessment under the *Resource Management Act 1991*. If initial assessment of a development within the FUZ identifies that a HAIL activity is more likely than not to have occurred within the site boundaries, a full evaluation under the NES Soil regulations, and/or under section E30 of the AUP (OP), will be required at the resource consent stage. The process of assessment, including standards and matters of control, is clearly detailed in both documents.

The implementation of the Warkworth Structure Plan through a Plan Change and subsequent resource consent processes will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required in accordance with the objective and policies listed above), prior to its redevelopment, to ensure its suitability for its existing or proposed use.

#### **4.3.6 Assessment of the plan against any relevant provisions in the Auckland Plan 2050**

The environmental and cultural heritage outcome of the Auckland Plan 2050 (2018) states:

*“Auckland preserve, protect and care for the natural environment as our shared cultural heritage for its intrinsic value and for the benefit of present and future generations.”*

Key Directions and Focus Areas supporting this outcome include:

- *Direction 3: Use growth and development to protect and enhance Auckland’s environment.*
- *Focus Area 2: Focus on restoring environment as Auckland grows.*
- *Focus Area 4: Protect Auckland’s significant natural environments and cultural heritage from further loss.*

The implementation of the Warkworth Structure Plan through the resource consent process will facilitate the assessment and management of contaminated sites within the FUZ (including remediation if required), meeting the objectives of Direction 3 and Focus Areas 2 and 4, listed above.

In addition, the provision for buffer zones (esplanade reserves/strips, wide riparian areas, arterial roads) between potentially contaminated sites and some of the natural resources identified above, will contribute to the protection and restoration of natural resources within and in the vicinity of the FUZ, in line with the objective of Focus Area 4.

## 5 Conclusions

The proposed Warkworth Structure Plan is considered to meet the applicable principles and objectives of the documents listed in section 4.3. Therefore, it is supported from the perspective of contaminated land management. The Plan facilitates the assessment and management of contaminated land, through the assessment and management of contaminated land through the strategic zoning of sections of land (including the provision of buffer zones between potential contaminant sources and identified sensitive receptors). The strategic zonings will be implemented into the District Plan through future plan changes and the subsequent resource consent applications will trigger the planning requirements under Section 104(1) of the *Resource Management Act 1991*.

Through these measures it is anticipated that adverse effects on the environment or human health associated with either historical or future contaminated land will be adequately mitigated, and the quality of the environment improved. It is considered that the Warkworth Structure Plan provides the opportunity to “*use the growth and development within the Future Urban Zone to protect and enhance Auckland’s environment*” (Auckland Plan 2050, Directive 3).

Find out more: **phone 09 301 0101**  
or visit **[www.aucklandcouncil.govt.nz/have-your-say](http://www.aucklandcouncil.govt.nz/have-your-say)**



## **APPENDIX D**

### **RILEY PSI AND PSI/DSI REPORTS**



**PRELIMINARY SITE INVESTIGATION  
PROPOSED DEVELOPMENT  
VALERIE CLOSE, WARKWORTH**

Engineers and Geologists

## PRELIMINARY SITE INVESTIGATION PROPOSED DEVELOPMENT VALERIE CLOSE, WARKWORTH

**Report prepared for:**

Warkworth Estate Ltd

**Report prepared by:**

Joanne McClean, Engineering Geologist



.....

**Report reviewed and approved for issue by:**

Brett Black, Director, CPEng



.....

**Report reference:**

160422-G

**Date:**

1 December 2017

**Copies to:**

Mr Bill Endean

Electronic copy

Riley Consultants Ltd

1 copy

Issue:	Details:	Date:
1.0	Preliminary Site Investigation	1 December 2017

## Contents

1.0	Introduction .....	1
2.0	Proposed Development .....	1
3.0	Site Description .....	1
4.0	Geology.....	2
5.0	Preliminary Site Investigation .....	2
5.1	Aerial Photograph Search .....	2
5.2	Discussion with Farm Manager .....	3
5.3	Site Walkover.....	3
5.4	Hazardous Activities and Industries List Activities .....	4
6.0	Limitation.....	5

## Appendices

Appendix A: Historic Aerial Photographs

Appendix B: Drawings:

- Parallax Warkworth Estate Scheme Plan
- RILEY Dwg: 160422-14

# PRELIMINARY SITE INVESTIGATION PROPOSED DEVELOPMENT VALERIE CLOSE, WARKWORTH

## 1.0 Introduction

Mr Bill Endean from Warkworth Estate Ltd has commissioned Riley Consultants Ltd (RILEY) to carry out a Preliminary Site Investigation (PSI) to assess the potential implications of any residual contamination arising from previous land uses at the above site.

This report has been prepared and reviewed by suitably qualified and experienced professionals in accordance with the Resource Management: National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health Regulations 2011 (NES) and Auckland Council (Council) requirements for consent applications.

## 2.0 Proposed Development

It is proposed to place a number of temporary buildings on-site to cater for workers on the State Highway 1 (SH1) realignment project. This work is expected to be undertaken for approximately five to ten years. The temporary accommodation units are to be occupied by workers at a rate of one person per room and predominantly Monday to Friday only.

The proposed development is to occur in two clusters, designated central and eastern. The central cluster is to consist of two six bedroom principal dwellings, a six bedroom workers accommodation, and a single three bedroom minor unit. The eastern complex will consist of one principle dwelling (existing dwelling), two workers accommodations, and two minor units.

There is also a second existing principal dwelling which is already being serviced by an existing on-site wastewater system and will not be included within the proposed servicing plan.

## 3.0 Site Description

The development covers a number of properties owned by Warkworth Estates Ltd and encompasses an underlying subdivision of existing Lots 1, 3, and 4 DP 451512, and Pt Lot 1 DP 35006, into four new lots (refer to attached scheme plan prepared by Parallax Surveyors and Planners) and existing Lot 6 DP 155544. The proposed development is generally bounded by rural production land, with a vineyard in the south-western corner and an orchard on the north boundary. Access to the properties is via a slipway off SH1 or directly off Valerie Close. It is proposed to develop two worker accommodation complexes as per the proposed scheme plan. Each of these is to be serviced independently.

The subject lots are located on the western side of SH1. Valerie Close is a sealed road located to the south of the majority of areas currently proposed to be developed. The road rises up from SH1 along an elevated ridge, with views over the area to be developed before following the end of the ridge down towards an alluvial terrace and existing Lots 4 and 6. Existing Lot 1 is located on the main, north facing, gentle to moderate slope below Valerie Close. Existing Lot 3 is located on the alluvial terrace in the south-eastern portion of the site that is bounded by SH1 to the east and an access track and stream channel to the north. There is a stream channel that drains through the central portion of the lot draining to the north-west. The overall slope of the site is to the north-west draining into the Mahurangi River (right branch).

## 4.0 Geology

A separate geological assessment report has been prepared for the greater site (RILEY Ref: 160422-C).

The 1:250,000, Institute of Geological and Nuclear Sciences Map 3, Auckland, shows the site to be underlain by Alluvium of the Tauranga Group, overlying Pakiri Formation. The alluvium is predominantly silt and clay, however due to the nature of its deposition, can be highly variable. The Pakiri Formation consists of alternating, thick-bedded, volcanic rich, graded sandstone and siltstone that weather to form horizons of sands, silts, and clays. The presence of these materials was confirmed by the drilling of hand auger boreholes.

## 5.0 Preliminary Site Investigation

A PSI has been undertaken to establish and identify any potential risk of soil contamination relating to past and current activities carried out on-site, in accordance with the NES and the Auckland Unitary Plan - Operative in part (AUP-Op). Council files have not been reviewed due to our knowledge of the property and that the property has historically been used for grazing purposes. The PSI includes the following:

- A review of historical aerial photographs.
- Discussion with the farm manager.
- A site walkover inspection to identify any potential contamination risk areas and existing Hazardous Activities and Industries List (HAIL) activities.

### 5.1 Aerial Photograph Search

A review of historic aerial photographs, dated 1940 to 2016, is presented below. The aerial photographs are included in Appendix A. This review is specific to the pieces of land that are part of the development.

- 1963:** The photograph only covers the eastern portion of site. The site is part of a larger land holding, accessed from Valerie Close and SH1. The property has some stockyards west of the neighbouring orchard. There is a house on SH1 with a large rectangular garden, possibly with a backyard orchard.
- 1966:** A photograph covering all sites shows there are some ground works on the north-western boundary of existing Lot 6 DP 155544. There is some cropping or grass mowing in the centre of the property.

- 1973:** A shed or building has been constructed west of the neighbouring orchard trees on the northern boundary. A stockyard has been built in the north-eastern corner of the property next to SH1 and a stock race on the southern side of the neighbouring orchard.
- 1976:** The stockyard to the west of the orchard appears to no longer exist, likewise, the shed on the northern boundary may have been demolished.
- 1992:** No significant changes have occurred, apart from a hedge being removed on the northern boundary of existing Lot 6 DP 155544, and a dwelling and driveway added south of the dwelling near SH1.
- 1996:** A new driveway and building have been constructed in existing Lot 6 DP 155544.
- 1999:** Some ground disturbance present in existing Lot 6 DP 155544, two strips possibly for market gardening.
- 2006:** Existing Lot 6 DP 155544 has no further signs of market gardening and there has been more construction of small residential sized buildings. The new dwelling near SH1 has another small building.
- 2010:** A small shed has been constructed on the driveway of existing lot 6 DP155544. Existing Lot 4 has a new race for access from SH1, and two small buildings (i.e. house and shed) built west of the neighbouring orchard. There has been some earthwork activities possible a shed in the western corner of existing Lot 4.
- 2017:** The small building near the recently placed dwelling on SH1 has been removed.

## **5.2 Discussion with Farm Manager**

A phone discussion was made with the Farm Manager Robin Looker, who stated that the land has been owned by the present land owner for about ten years.

Before the land was subdivided into lifestyle blocks, the property was part of a dairy farm. Since then the sections of subdivided land have been used to graze cattle. The building observed on the northern portion of site in the 1973 photograph was a cowshed, now it is in dilapidated condition and used to store two small yachts. Nearby is a stockpile of concrete boulders which was part of a stream structure that had to be demolished.

## **5.3 Site Walkover**

On 14 November 2017, a site walkover inspection was undertaken to inspect the proposed building sites and any relevant contamination risk areas.

Generally, it appears farm equipment is now stored in a relatively new shed with a concrete floor situated west of the neighbour's orchard, and stockyards are situated near SH1 in the north-eastern corner of site (proposed Lot 3). It is evident the property is presently used for grazing. A stockpile of concrete and other materials was noted near the northern boundary north of the farm shed. The nearby dilapidated shed is constructed with weatherboards and corrugated iron and appears to be storing corrugated iron.

## Proposed Building Site Observations

- Existing Lot 6 DP 155544 – The proposed accommodation unit site is situated on a grassed area next to a paddock east of the principal dwelling.
- Proposed Lot 1 – Three separate accommodation units are proposed. One unit is situated on the eastern side of the existing dwelling. The existing dwelling (a timber weatherboard farm cottage) was built prior to the 1980s, although it was shifted to the site recently, it is unknown if it had lead paint and when/where it was repainted.

The other two accommodation units are positioned nearby, along the driveway. These areas are presently in grass. There is vegetation along the adjacent stream and fence line with some old building materials (clothesline, chicken netting, and cement materials) in a pile beside the vegetation.

- Proposed Lot 2 – Two accommodation units are proposed, one within the garden area for the existing dwelling (near a large vegetable box garden) and another north of the dwelling in the grassed paddock.
- Proposed Lot 3 – Two accommodation units are situated at the southern end of the new lot, in a paddock with pasture.
- Proposed Lot 4 – Three proposed accommodation units are situated in the north-western corner of the new lot, in a paddock used for grazing.

### 5.4 Hazardous Activities and Industries List Activities

Localised activities that have, or potentially have, occurred on the property include market gardening (existing Lot 6), an orchard in the farmhouse garden (proposed Lot 2), lead paint on the farmhouse and imported farm cottage (proposed Lot 1), materials stored in the farm equipment shed and timber storage (proposed Lot 3), and stockyards (proposed Lot 2), which are considered activities listed or related to the HAIL, specifically:

- (l) Land that may have been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

The investigation work for the proposed accommodation unit building areas indicates there have been no HAIL activities on the greenfield sites for one of the accommodation units in proposed Lot 2, two units in proposed Lot 3, and three units in proposed Lot 4. However, there is the potential of HAIL activities in the vicinity of the accommodation unit in existing Lot 6 DP 155544 (market gardening), accommodation unit in proposed Lot 2 (orchard and lead paint), and the accommodation units in Lot 1 (asbestos and lead paint). In order to confirm the activity status under the NES of the ground around the proposed accommodation units a Detailed Site Investigation should be carried out at these locations.



## **6.0 Limitation**

This report has been prepared solely for the benefit of Warkworth Estate Limited as our client with respect to the brief and Auckland Council in processing the consent(s). The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

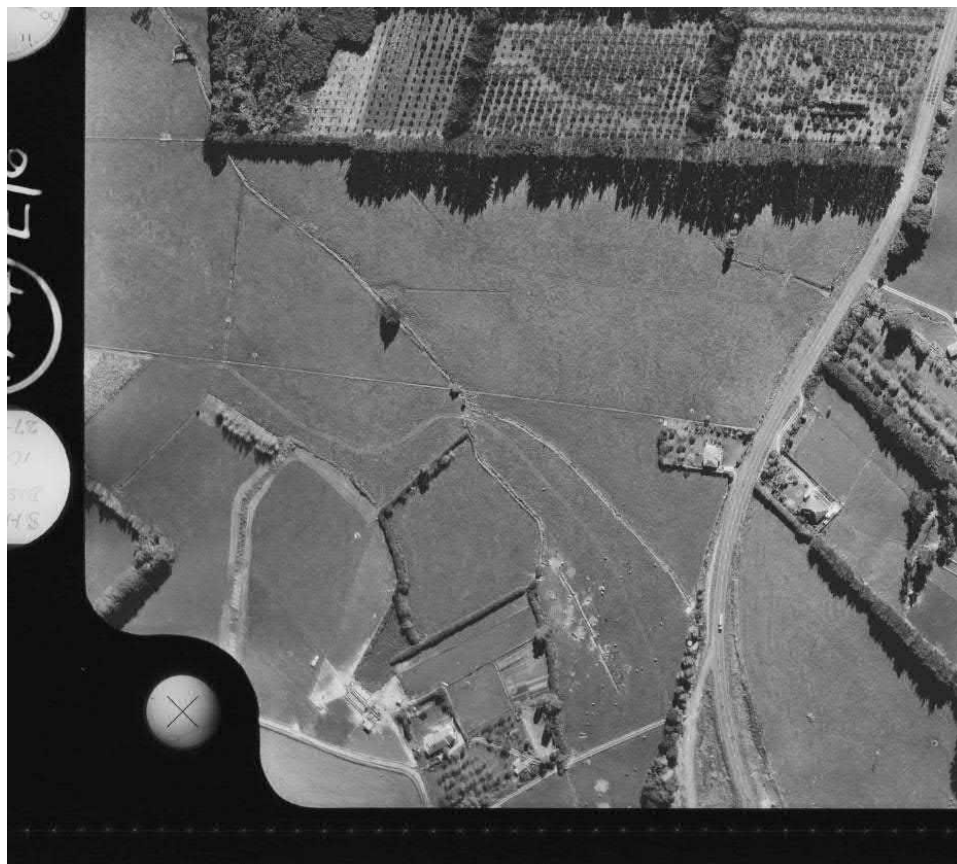
Riley Consultants Ltd has performed the services for this project in accordance with the standard agreement for consulting services and current professional standards for environmental site assessment. No guarantees are either expressed or implied.

---

***APPENDIX A***

***Historical Aerial  
Photographs***

## Photographs



1963: LINZ photograph



**1966: LINZ photograph**



**1973: LINZ photograph**



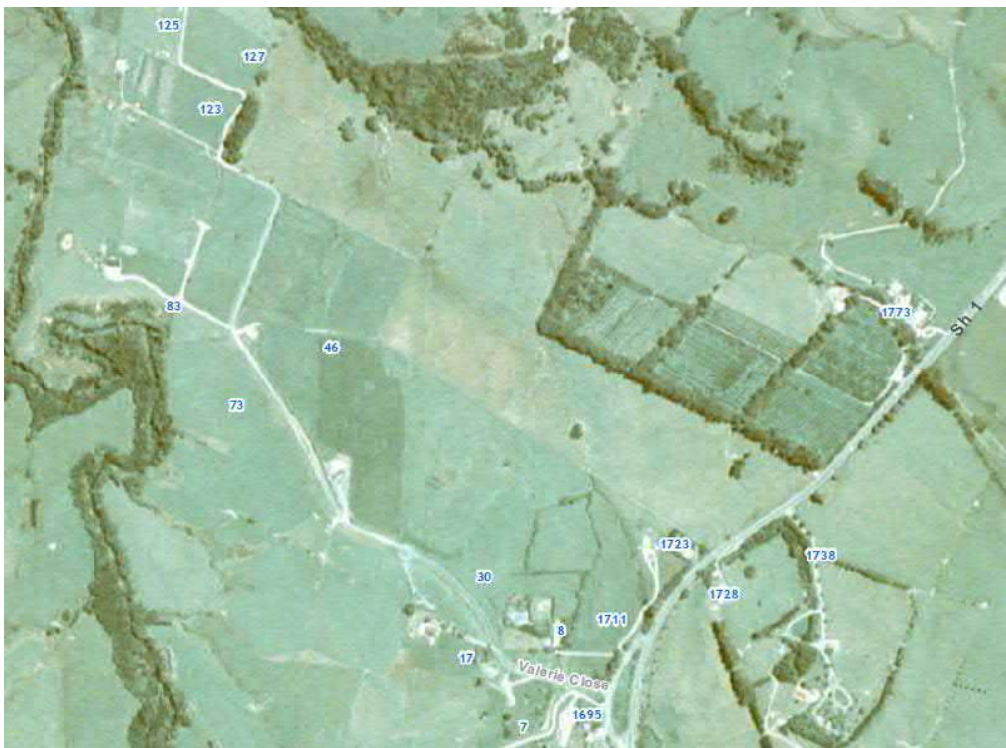
**1976: LINZ photograph**



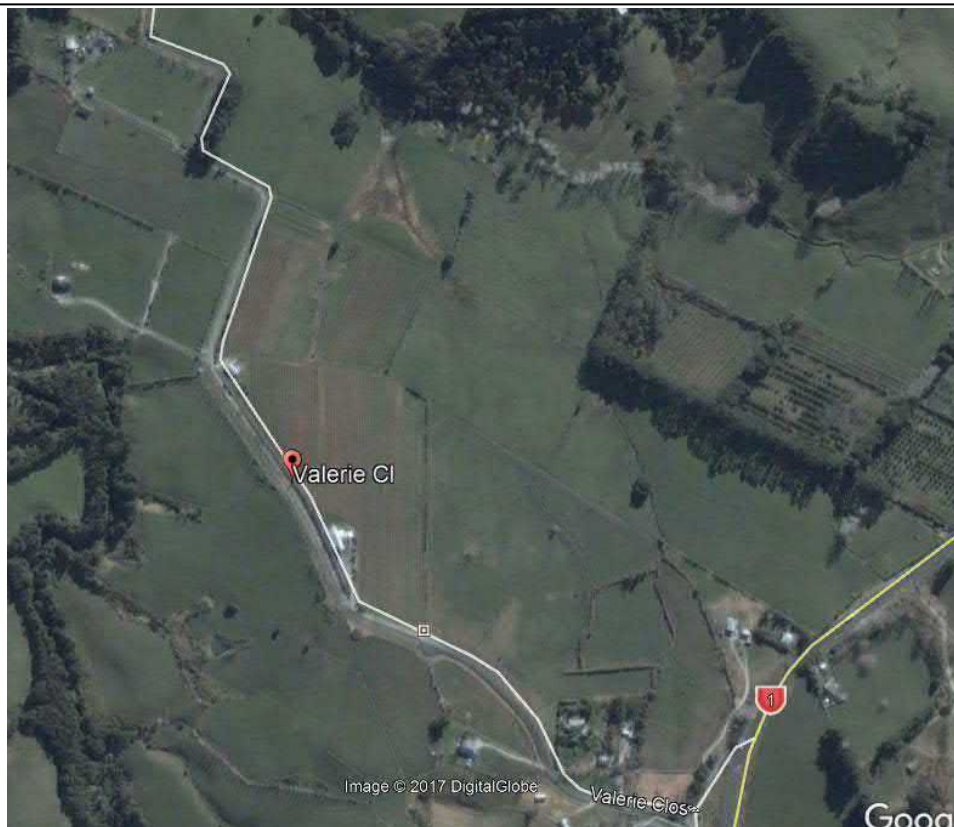
**1992: LINZ photograph**



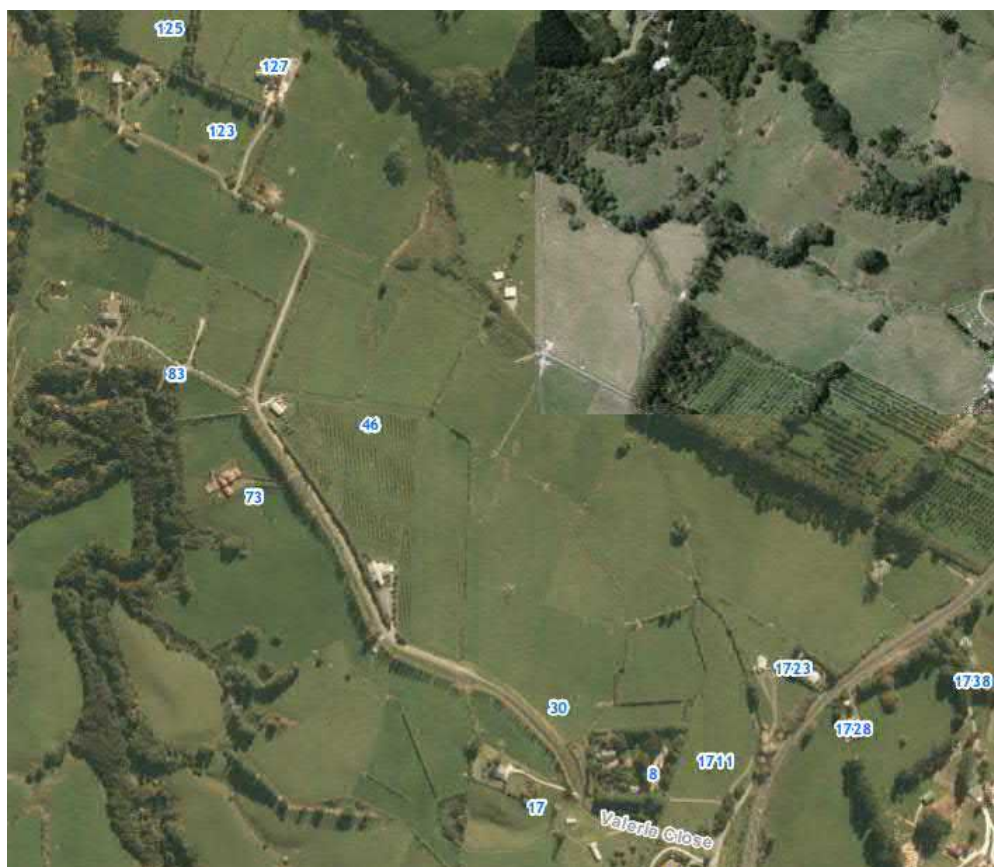
1996: LINZ photograph



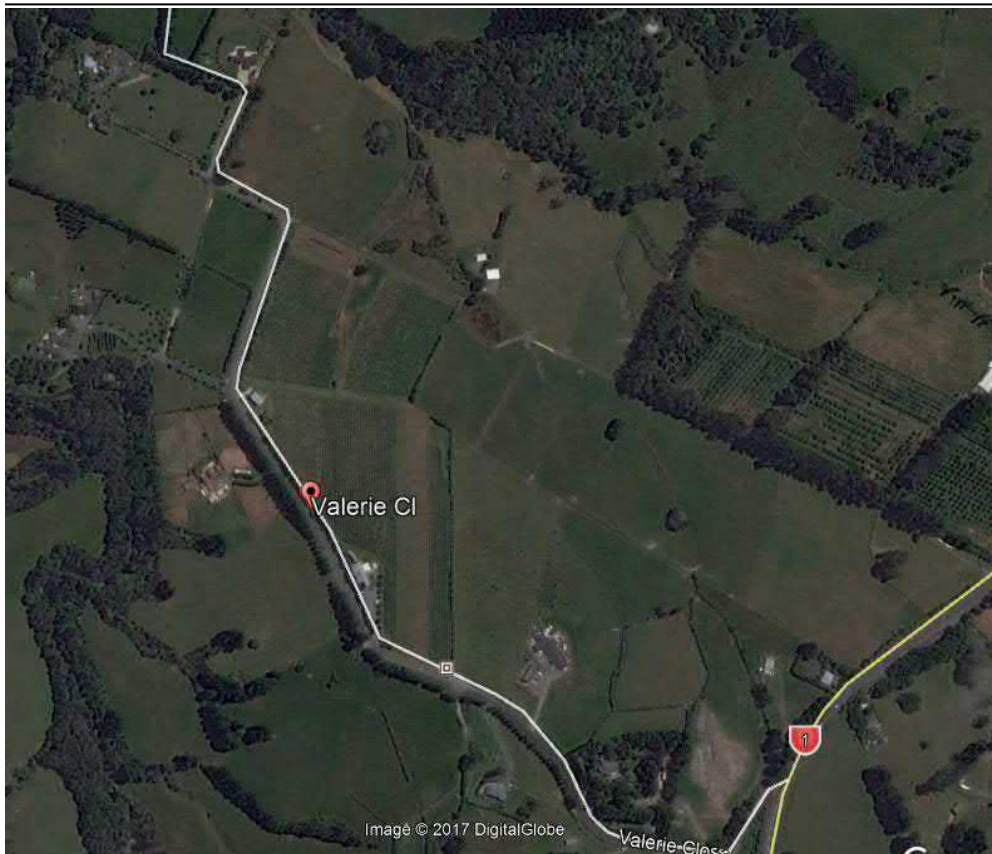
1999: Auckland Council Photograph



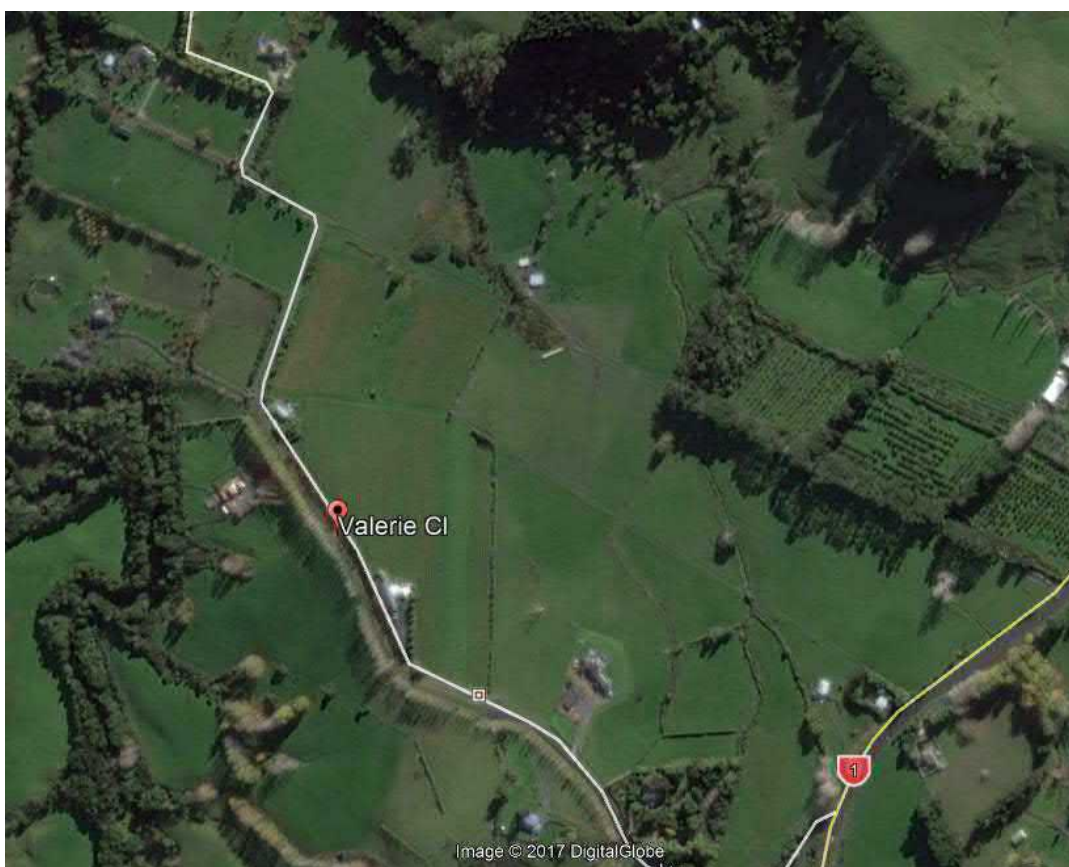
2006: Google Earth Photograph



2010: Auckland Council Photograph



2015 Google Earth Photograph



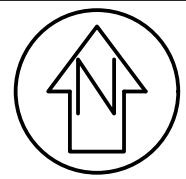
2017 Google Earth Photograph



---

## ***APPENDIX B***

### ***Drawings***



Territorial Authority: Auckland Council  
 Operative Auckland Council District Plan  
 (Rodney Section) 2011  
 Zone: General Rural (Map 55)  
 Auckland Unitary Plan (Operative in Part)  
 Zone: Future Urban  
 Overlays: Natural Stream Management  
 Areas Overlay, High-Use Stream  
 Management Areas Overlay, High-Use  
 Aquifer Management Areas Overlay

**Memorandum of Easements**

Purpose	Shown	Servient Tenement	Dominant Tenement
R.O.W	(A)	Lot 2	Lot 3
Electricity	(B)		
Telecomm and Computer Media	(G)		

**Existing Easements**

Shown	Purpose	Created By
(A) (B)	R.O.W	EI 793889.2
(A)	R.O.W	EI 9169377.3
(B)	Electricity	

**Existing Easements in Gross**

Shown	Purpose	Grantee	Created By
(B)	Electricity	Vector	EI 793889.3
(C)			

**Existing Easements to be Extinguished**

Shown	Purpose	Created By
(F) (G)	Telecomm and Computer Media	EI 9169377.3
(H)		

**Existing Covenant Area**

Area (X) is subject to a land covenant for protection of a view corridor created by EI 9169377.4.

Land District: North Auckland  
 Total Area: 28.4407 ha  
 CT: 575618, 575620, 575621 & NA12D/906

**NOTES:**

1. This plan has been prepared for consent purposes only and is not to be used for any other purpose.
2. Aerial Photo will be subject to scale and rotation distortion.
3. Areas and measurements are subject to survey.

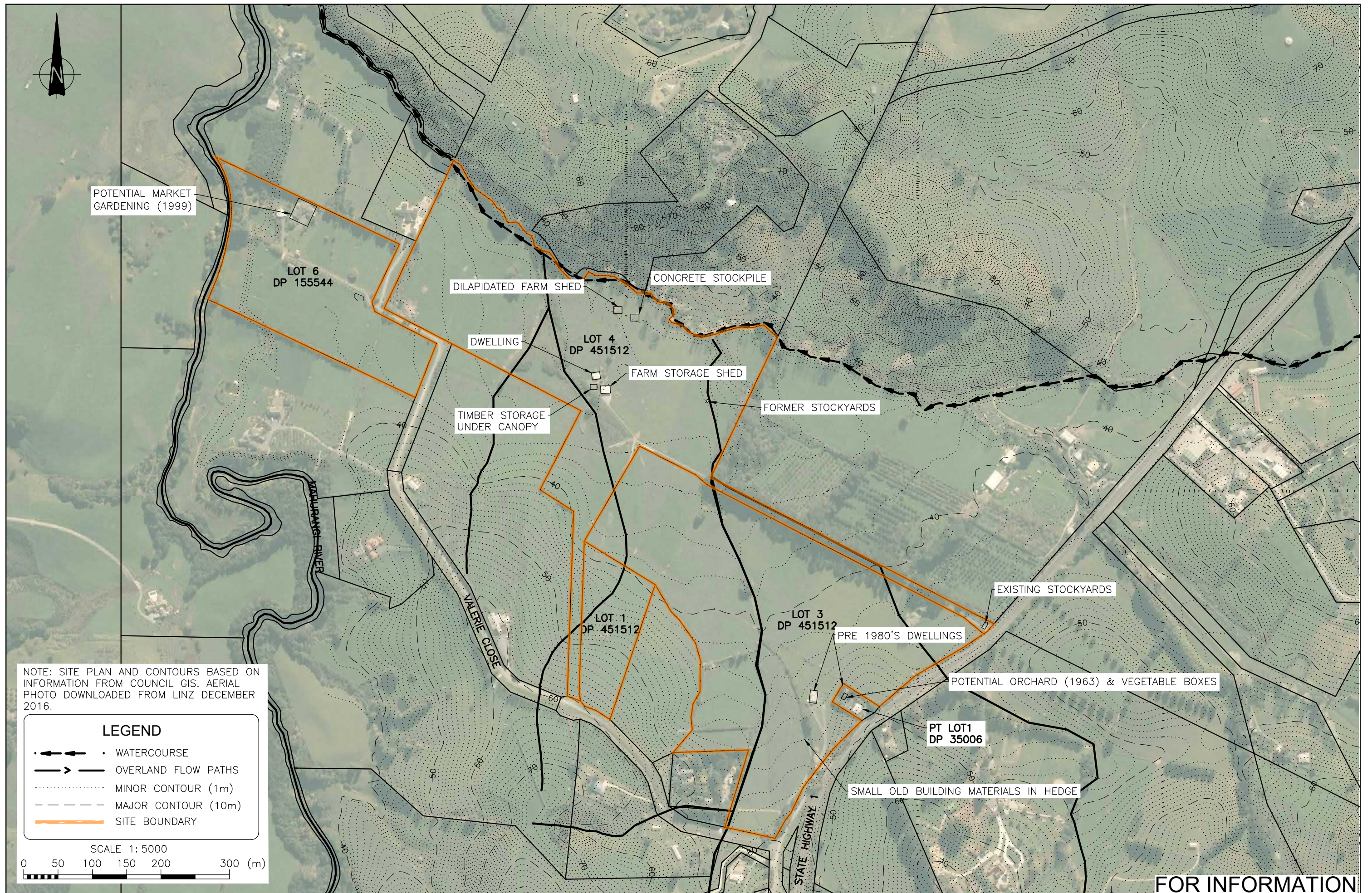


**PARALLAX**  
 SURVEYORS AND PLANNERS  
 PO Box 266 Warkworth 0941, Ph 09 425 8700  
 www.parallaxsurveyors.co.nz

Project: Warkworth Estate Ltd  
 1711 State Highway 1  
 Warkworth

Plan Title: Lots 1, 2, 3 and 4 being a proposed  
 subdivision of Lots 1, 3 and 4 DP 451512  
 and Part Lot 1 DP 35006

Original Scale: 1 : 4000	Original Size: A3
Date: October 2017	Drawing Number: 05025-202



POTENTIAL MARKET GARDENING (1999)

LOT 6  
DP 155544

DILAPIDATED FARM SHED

CONCRETE STOCKPILE

DWELLING

LOT 4  
DP 45152

FARM STORAGE SHED

FORMER STOCKYARDS

TIMBER STORAGE UNDER CANOPY

EXISTING STOCKYARDS

LOT 1  
DP 45152

LOT 3  
DP 45152

PRE 1980'S DWELLINGS

POTENTIAL ORCHARD (1963) & VEGETABLE BOXES

PT LOT 1  
DP 35006

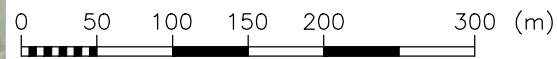
SMALL OLD BUILDING MATERIALS IN HEDGE

NOTE: SITE PLAN AND CONTOURS BASED ON INFORMATION FROM COUNCIL GIS. AERIAL PHOTO DOWNLOADED FROM LINZ DECEMBER 2016.

**LEGEND**

- WATERCOURSE
- OVERLAND FLOW PATHS
- MINOR CONTOUR (1m)
- MAJOR CONTOUR (10m)
- SITE BOUNDARY

SCALE 1:5000



**FOR INFORMATION**

DESIGN	CHECKED	APPROVED FOR ISSUE:
JM	JM	R BURDEN
DRAWN	CHECKED	DATE: 01/12/17
RL	RL	
1	FIRST ISSUE	DATE DRAWN
REV	DESCRIPTION	NOVEMBER 2016

DATE	BY
20.11.17	WY

**RILEY CONSULTANTS**  
 P.O. BOX 100 253  
 NORTH SHORE  
 AUCKLAND  
 TEL. 09-4897872  
 FAX. 09-4897873

TITLE  
**WARKWORTH ESTATE LIMITED**  
 WARKWORTH ESTATE SUBDIVISION, VALERIE CLOSE, WARKWORTH  
 CONTAMINATION SITE INVESTIGATION - SITE PLAN

CADFILE	DRAWING No.	REV.
160422-14	160422-14	1
SCALES (A3)		
1:5000		



**PRELIMINARY AND DETAILED  
SITE INVESTIGATION  
PROPOSED DEVELOPMENT  
46 VALERIE CLOSE, WARKWORTH**

Engineers and Geologists

**PRELIMINARY AND DETAILED SITE INVESTIGATION  
PROPOSED DEVELOPMENT  
46 VALERIE CLOSE, WARKWORTH**

**Report prepared for:** Warkworth Estate Ltd

**Report prepared by:** Joanne McClean, Geologist – Contaminated Land  
  
.....

**Report reviewed** Marcus Herrmann, Principal – Contaminated Land  
  
.....

**Report approved for issue by:** Rob Burden, Director  
  
.....

**Report reference:** 160422-L

**Date:** 27 November 2018

**Copies to:** Mr Bill Endean 1 electronic copy  
Riley Consultants Ltd 1 copy

Issue:	Details:	Date:
1.0	Preliminary and Detailed Site Investigation	27 November 2018

## Contents

1.0	Introduction .....	1
2.0	Proposed Development .....	1
3.0	Site Description .....	1
4.0	Geology.....	2
5.0	Preliminary Site Investigation .....	2
5.1	Historic Aerial Photograph Search .....	2
5.2	Auckland Council File Searches.....	3
5.2.1	Site Contamination Enquiries.....	3
5.2.2	Property File .....	3
5.3	Anecdotal Information .....	3
5.4	Site Walkover.....	4
5.5	Hazardous Activities and Industries List.....	4
6.0	Detailed Site Investigation .....	4
6.1	Site Observations and Soil Sampling .....	5
6.2	Environmental Laboratory Analysis.....	5
6.3	Risk Assessment .....	5
6.3.1	Background Concentrations Assessment.....	6
6.3.2	National Environmental Standard Assessment .....	6
6.3.3	Auckland Unitary Plan – Operative in Part .....	6
7.0	Limitation.....	6

## Appendices

- Appendix A: Historic Aerial Photographs
- Appendix B: Council Information Searches
- Appendix C: Table 1 Contaminant Concentrations
- Appendix D: Laboratory Certificates
- Appendix E: RILEY Dwg: 160422-7

# PRELIMINARY AND DETAILED SITE INVESTIGATION PROPOSED DEVELOPMENT 46 VALERIE CLOSE, WARKWORTH

## 1.0 Introduction

In response to a Section 92 query from Auckland Council (Council) dated 24 October 2018, Mr Bill Endean from Warkworth Estate Ltd has commissioned Riley Consultants Ltd (RILEY) to carry out a Preliminary Site Investigation (PSI) and, sequentially, a Detailed Site Investigation (DSI) to assess the potential implications of any residual contamination arising from previous land uses at the above site for land use consent application LUC60327344.

This report has been reviewed by suitably qualified and experienced practitioners in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS) and Chapter E30.6 of the Auckland Unitary Plan – Operative in Part (AUP-OP).

## 2.0 Proposed Development

It is proposed to place two temporary single worker accommodation units to cater for workers on the State Highway 1 (SH1) realignment project. The temporary six bedroom accommodation units are to be occupied by workers at a rate of one person per room and predominantly Monday to Friday only. The realignment work is expected to take five to ten years.

The proposed development is shown on RILEY Dwg:160422-7 in Appendix E. We understand the buildings will be lightweight timber-framed structures supported on shallow pile foundations. Rainwater collected from roofs will be stored on-site in tanks to supply the units, and wastewater will be piped to be disposed on-site away from the dwellings.

## 3.0 Site Description

The piece of land being developed is situated on the south-eastern corner of the property. The property at 46 Valerie Close (Lot 3, DP 155544) is approximately 8ha in area. The land is presently a vineyard, with a winery (not operating currently) and maintenance shed. The property is surrounded by rural production land to the north, west, and east. Access to the properties is via a right-of-way at the end of Valerie Close. The site is located approximately 400m west of SH1. Valerie Close extends from SH1 and ends in a right-of-way that services a number of rural production and lifestyle properties extending towards the Mahurangi River to the west.

From the site entrance for the proposed development, the property generally falls gently at less than 10° towards the north-east. There are overland flowpaths becoming watercourses on the northern and eastern boundaries below the proposed development.

## 4.0 Geology

The 1:250,000, Institute of Geological and Nuclear Sciences Map 3, Auckland, shows the site to be underlain by alluvium of the Tauranga Group, overlying Pakiri Formation. The alluvium is predominantly silt and clay, however, due to the nature of its deposition, can be highly variable. The Pakiri Formation consists of alternating thick-bedded volcanic rich graded sandstone and siltstone that weather to form horizons of sands, silts, and clays. The presence of these materials was confirmed by the drilling of hand auger boreholes.

## 5.0 Preliminary Site Investigation

A PSI has been undertaken to identify any potential risk of soil contamination relating to past and current activities carried out on-site, in accordance with the NES-CS and the AUP-OP. The PSI includes the following:

- Review of historic aerial photographs.
- Review of Council files.
- Discussion with the landowner and former vineyard owner.
- A site walkover inspection to identify potential contamination risk areas and existing Hazardous Activities and Industries List (HAIL) activities.

### 5.1 Historic Aerial Photograph Search

A review of historic aerial photographs, dated 1966 to 2016, is presented below. The aerial photographs are included in Appendix A. This review is specific to the piece of land that is proposed for development.

- 1966:** The subject site is part of a farm divided into paddocks for grazing, with a shed situated on the sites' western boundary. There appears to be some cut grass at the northern end of the site, and some fence lines are lined with silage bales. There are also trees lining the western fence line at the southern end of the site and a farm race along the sites' western boundary.
- 1973:** There are no significant changes.
- 1976:** There are no significant changes.
- 1992:** No significant changes apart from the removal of the trees along the western fence line at the southern end.
- 1996:** The eastern half of site has been planted in vines and the road has been formed along the former farm race.
- 1999:** The winery on the subject site is under construction.
- 2006:** The northern and western portions of the site have been planted for use as a vineyard.
- 2010:** It appears the vines at the northern and eastern sides of site have been removed and there is a small hedge growing on the eastern boundary.
- 2015:** The whole property, apart from the shed and building areas, have generally been planted in vines.



## **5.2 Auckland Council File Searches**

### **5.2.1 Site Contamination Enquiries**

A request was made with Council's Contamination, Air and Noise Team to identify any legacy Rodney District Council (RDC) and Auckland Regional Council (ARC) site contamination information available. Council's response to the legacy ARC contamination enquiry indicated that Council held no pollution incident files regarding spills/contamination at the property, while the response to the legacy RDC enquiry notes that the site is used for horticultural activities and that the land use activities on or adjacent to this site fall within the HAIL, published by the Ministry for the Environment.

Copies of the Council contamination enquiry responses are included in Appendix B.

### **5.2.2 Property File**

The Council property file has a Certificate of Title dated 1970, which indicates the site was part of a 77-acre property (Pt Allotment 72) owned by a Warkworth farmer, Mr Roger Langridge (for certificates refer to Appendix B).

Another Certificate of Title dated 1986 indicates that Mr Roy Cotterall subdivided some adjoining land, with the subject site remaining part of the parent property (Pt 72). Another subdivision was carried out in January 1993, which indicates the property (Lot 3) was part of a multi-lot subdivision of former property Lot 1 DP104972, A lot.441, and Pt. Allots 62, 72, and 73 Parish of Mahurangi, including the formation of the access road Valerie Close. The owners were JJ Cotterall and Cotterall Farms Limited.

The records indicate consent was granted to build Ransom Winery in 1996. Various consents were then applied for and granted, for example; consent to operate a wine bar (dated 2000).

## **5.3 Anecdotal Information**

The former vineyard owner and operator, Mr Robin Ransom, provided anecdotal information about the property's recent history. The Ransoms were founding members of an organization called Sustainable Winegrowing, which was set up by Wine NZ. This organization imposes strict guidelines on the types and amounts of sprays that are permissible in vineyards, and diaries were submitted annually to ensure they stayed within the regulations. These restrictions now apply to all export winegrowers.

According to Mr Ransom, the former vineyard operator used fungicides routinely, insecticides almost never, and herbicides reasonably regularly, up until about four years ago (2014) when they moved toward organic management and ceased using herbicides. The fungicides used were organically approved. The approved sprays were mainly sulphur-based or copper-based and were part of the Sustainable Winegrowing requirements, and quantities (organically-approved or otherwise) were strictly limited.

As a legal requirement all sprays were stored on-site in a purpose-built shed with a bunded concrete floor such that if any chemicals spilled, they would be effectively contained. The storage shed was situated beside the tractor shed.

The vineyard posts were mostly treated radiata, although there are some steel posts in the north-west corner.

## 5.4 Site Walkover

On 17 October 2018, a site walkover was undertaken to inspect the proposed building site. Generally, the property is planted in vines with a winery and shed. The proposed development is situated on ground formerly part of the vineyard. The vineyard has been recently removed from the development area and levelled. Two temporary accommodation units have been installed on timber piles with parking areas, stormwater tanks, and a wastewater system. Soil scraped from the subject site has been placed on the north-eastern side of the development within eight stockpiles, and these are intended to be utilised for re-spreading on-site. The total estimated volume of site-sourced soil in stockpiles is 200m<sup>3</sup>.

## 5.5 Hazardous Activities and Industries List

The available records, photographs, and site walkover indicate the site has been used predominantly for horticultural activity (vineyard) for approximately 23 years circa 1993, and grazing dairy cows prior.

The vineyard activity has potentially involved soil-contaminating activities within the following HAIL categories:

- HAIL category A1: Agrichemicals including commercial premises used by spray contractors for filling, storing, or washing out tanks for agrichemical application.
- HAIL category A10: Persistent pesticide bulk storage or use including sport turfs, market gardens, orchards, glass houses, or spray sheds.
- HAIL category A18: Wood treatment or preservation including the commercial use of anti-sapstain chemicals during milling or bulk storage of treated timber outside.

## 6.0 Detailed Site Investigation

Given the sites viticulture history, a DSI has been carried out to assess if the work comprises a permitted activity under the NES-CS.

Soil sampling for the DSI was carried out on 31 October 2018. Sample locations are presented on RILEY Dwg: 160422-7 (Appendix E).

Original topsoil samples were collected at the locations shown as S1 to S13, at depth range of approximately 0.1m to 0.15m. Topsoil was sampled from a depth of approximately 0.1m to 0.15m. Eight samples were collected from eight soil stockpiles, ST1 to ST8, generally placed on the eastern side of the development for re-spreading. A further four soil samples were collected to investigate potential Chromated Copper Arsenate (CCA) timber treatment leaching from a vineyard post. Two samples were collected from each location A and B at different depths (samples A\_0.1, A\_0.35, B\_0.1, and B\_0.5). Samples A and B were collected at distances of approximately 0.1m and 0.6m from the post, respectively.

Sampling equipment comprised hand tools, which were decontaminated between test positions and soil sampling.

Similar samples were mixed together by the laboratory to form six composite samples of two or three sub-samples, these are herein referred to as composite samples V1 to V6 (see Table 1; Appendix C).

## 6.1 Site Observations and Soil Sampling

Most of the property remains as a vineyard, however as mentioned, the subject site had been recently scraped to place crushed rock on the ground for parking areas and to allow for the placement of two prefabs, wastewater, and stormwater tanks. The locations of these features are shown on RILEY Dwg: 160422-7 (Appendix E). No visual or olfactory signs of soil contamination were observed during sampling.

## 6.2 Environmental Laboratory Analysis

The surface soil samples and composite samples were analysed for the following parameters:

- Heavy metals suite (As, Cd, Cr, Cu, Pb, Ni, Zn).
- Organochlorine pesticides (OCPs).

Samples V2 Composite (S6, S7, S8) and V4 Composite (S12, S13) were also analysed for organonitrogen pesticides (ONPs) and organophosphate pesticides (OPPs) see laboratory certificates Appendix D.

Samples near an existing post (samples A\_0.1, A\_0.35, B\_0.1, and B\_0.5) were analysed for arsenic, copper, and chromium.

Laboratory results for heavy metals and pesticide residues are presented in Table 1 (Appendix C).

All samples were stored in laboratory supplied containers, labelled with the location, depth, and date. Testing equipment was decontaminated between samples. The samples were then dispatched by courier to an IANZ accredited laboratory, accompanied by a completed chain of custody form. Laboratory certificates including analysis methods have been attached (refer Appendix D).

## 6.3 Risk Assessment

For the purpose of this report, a preliminary assessment of the potential contamination risk has been carried out by comparing the concentrations recorded against selected guideline values.

- **Background Concentrations:** Background Concentrations of Inorganic Elements in Soils of the Auckland Region, Auckland Regional Council Technical Publication No. 153 (TP153), October 2001: Non-volcanic soils.
- **Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES-CS):** Rural residential/lifestyle block (25% produce) and outdoor worker (unpaved) land use soil contaminant standards.
- **Auckland Unitary Plan – Operative in Part (AUP-OP), dated November 2016:** Permitted Activity Soil Acceptance Criteria; Rule E30.6.1.4 and Table E30.6.1.4.1.

### **6.3.1 Background Concentrations Assessment**

The laboratory results shown in Table 1 (Appendix C) indicate the heavy metals suite contaminant concentrations for all soil samples taken do not exceed published Auckland Region non-volcanic background concentrations. Contaminant concentrations for OCPs, ONPs, and OPPs did not exceed laboratory detection limits.

### **6.3.2 National Environmental Standard Assessment**

Laboratory results shown in Table 1 (Appendix C) indicate the contaminant concentrations do not exceed the NES-CS soil contaminant standards for rural residential/lifestyle block (25% produce) land use, nor for outdoor worker land use. Because all the measured soil contaminant concentrations are less than applicable regional background concentrations, the works are considered to be a Permitted Activity under Regulation 5(9) of the NES-CS.

### **6.3.3 Auckland Unitary Plan – Operative in Part**

All recorded concentrations of heavy metals, OCPs, ONPs, and OPPs are within the AUP-OP permitted activity soil acceptance criteria (Table 1; Appendix C). It is therefore considered that the works comprise a Permitted Activity under chapter E30.6.1 of the AUP-OP.

## **7.0 Limitation**

This report has been prepared solely for the benefit of Warkworth Estate Ltd as our client with respect to the brief and Auckland Council in assessing resource consent requirements. The reliance by other parties on the information or opinions contained in the report shall, without our prior review and agreement in writing, be at such parties' sole risk.

Recommendations and opinions in this report are based on data from limited test positions. The nature and continuity of subsoil conditions away from the test positions are inferred, and it must be appreciated that actual conditions could vary considerably from the assumed model.

During excavation and construction, the site should be examined by a suitably experienced contaminated land specialist competent to judge whether the exposed subsoils are compatible with the inferred conditions on which the report has been based. It is possible that the nature of the exposed subsoils may require further investigation and the modification of the design based upon this report.

There is no investigation thorough enough to preclude the presence of materials at the site that currently, or in the future, may be considered hazardous. Because regulatory evaluation criteria frequently change, concentrations of contaminants present and considered acceptable may, in the future, become subject to different regulatory standards that cause them to become unacceptable, requiring further remediation in order for this site to be suitable for the existing or proposed land use activities.

---

***APPENDIX A***

***Historical Aerial  
Photographs***

## Photographs



1966: LINZ photograph



1973: LINZ photograph



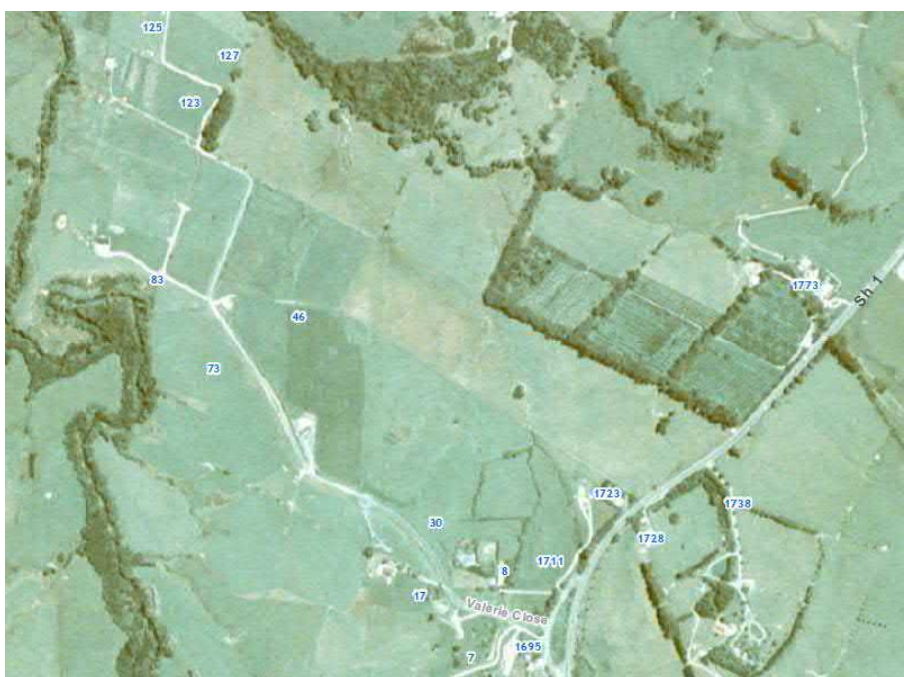
**1976: LINZ photograph**



**1992: LINZ photograph**

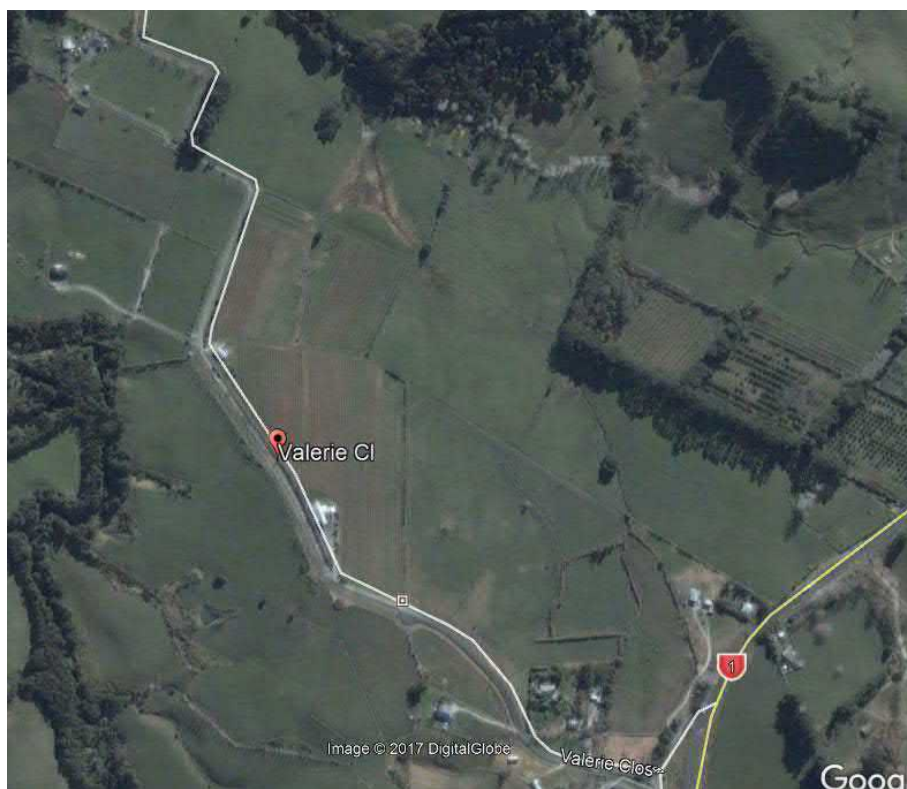


**1996: LINZ photograph**

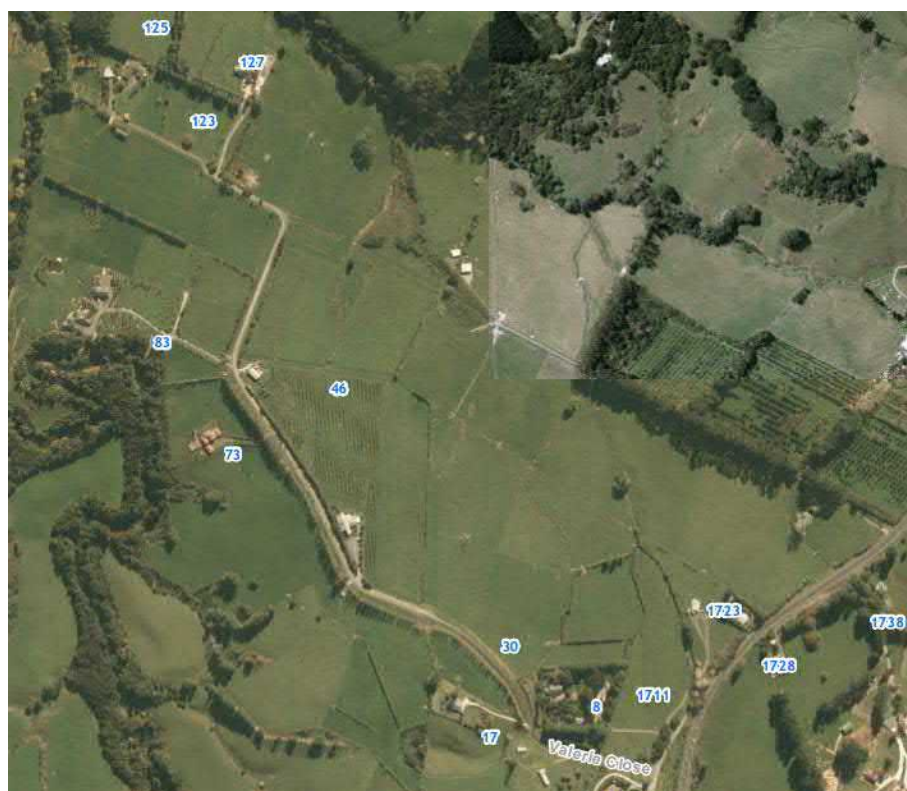


**1999: Auckland Council Photograph**

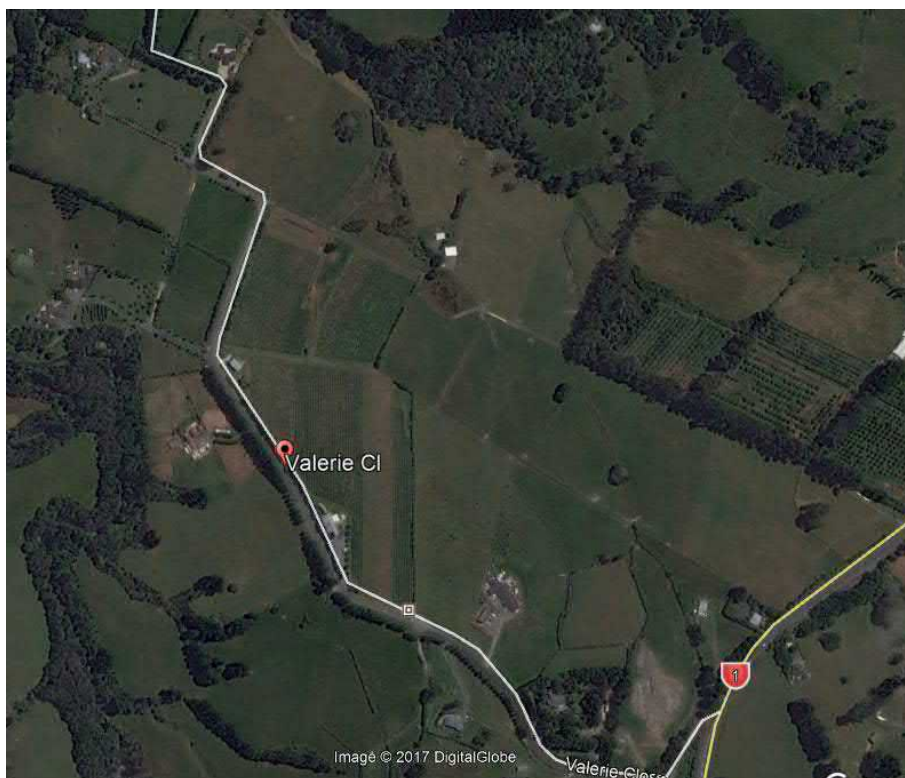




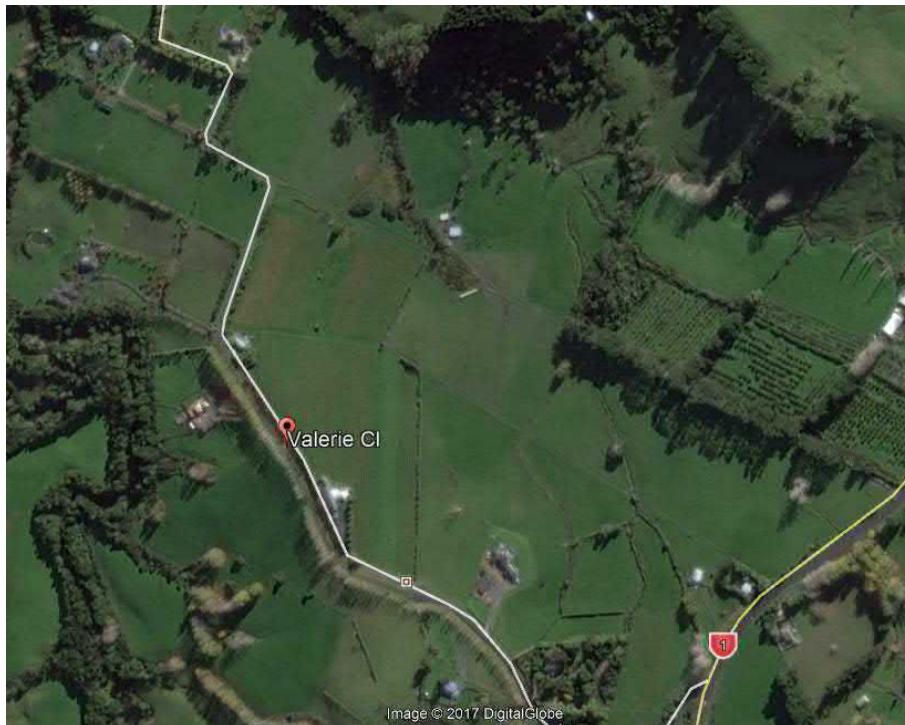
2006: Google Earth Photograph



2010: Auckland Council Photograph



**2015: Google Earth Photograph**



**2017: Google Earth Photograph**

***APPENDIX B***

***Council Information  
Searches***

25 October 2018

**Riley Consultants Limited**

PO Box 100253

North Shore

**Auckland 0745**

**Attention: Joanne McClean**

Dear Joanne

**Site Contamination Enquiry – 46 Valerie Close, Warkworth**

This letter is in response to your enquiry requesting available site contamination information for the above site. The following details are based on information available from the former Auckland Regional Council records system and information currently held by the Auckland Council Natural Resources and Specialist Input Unit. The details provided below exclude any property information held by the former district/city councils.

No pollution incident files regarding spills/contamination were found for the above site. The general catchment file and site visit file for the catchment 68 were not searched. These files contain pollution incidents where the source of pollution was not traced to a particular site, site visits where no follow-up correspondence was required and some information from archived files.

If the above site is coastal or beside a river, it is possible that historic, unconsented reclamation may have occurred. The Auckland Council Specialists Unit Coastal Team may be able to provide further information.

The records reviewed as part of this Site Contamination Enquiry search do not identify individual horticultural sites in the region. However, there is a possibility that horticultural activities may have occurred at the site. The local Auckland Council customer service centre, specific to the area of the site may be able to provide relevant information where former horticultural sites have been mapped.

If you are concerned that a historic land use (such as filling) may have caused the underlying soils to become contaminated, it is recommended that you obtain an independent environmental assessment of the site. Staff from the Auckland Council Earthworks and Contaminated Land Team can provide advice on the results of any evaluation in terms of site remediation and/or potential consent requirements.

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. No consents were identified.

The details provided are in accordance with the obligation to make information publicly available upon request. While the Auckland Council has carried out the 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.

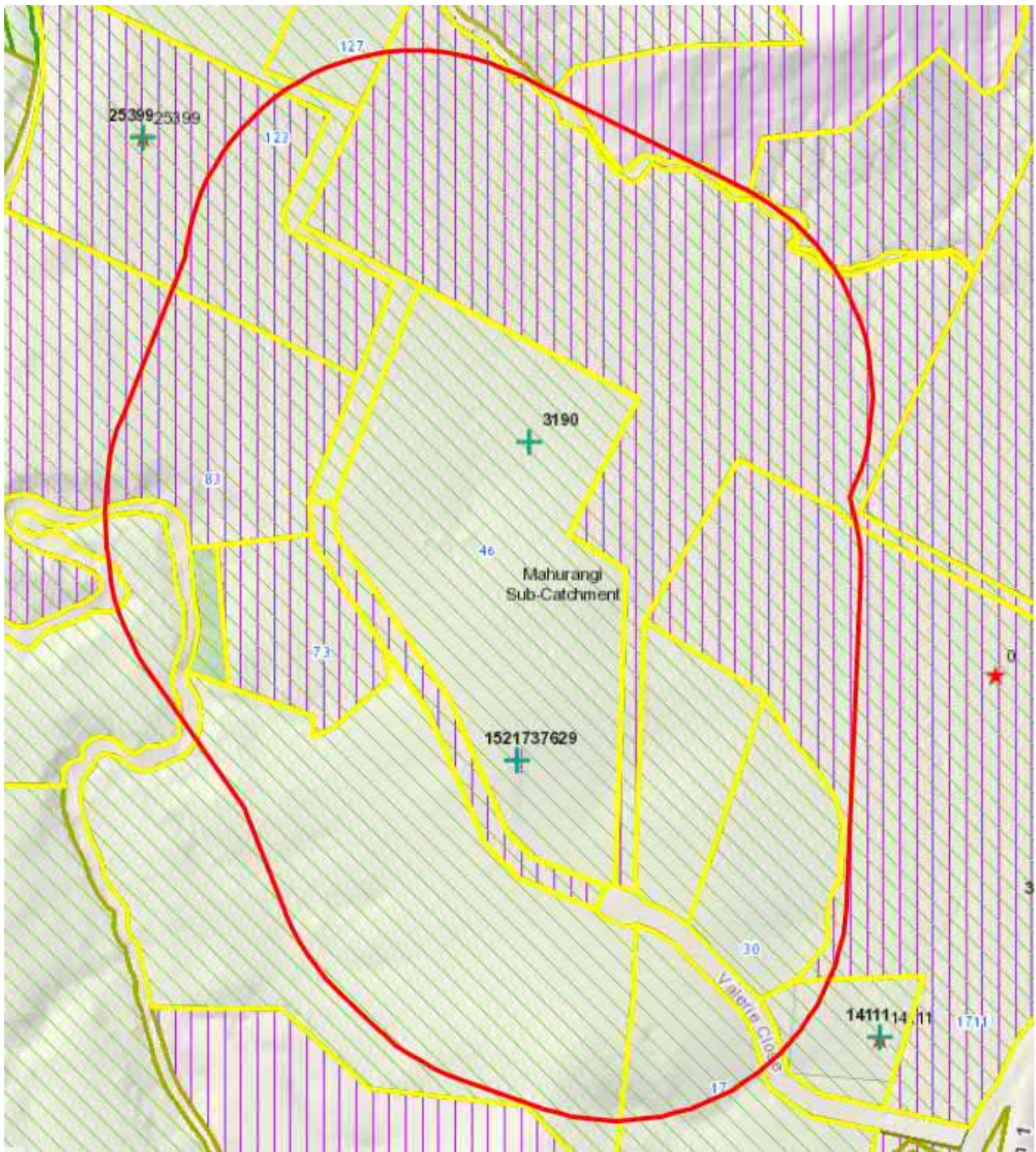
In addition, further site specific pollution incidents may be held at the area office below. It is recommended that you contact the local customer service centre of the Auckland Council, specific to the site being investigated: 50 Centreway Road, Orewa, as they also may hold files with further relevant information.

I trust that this answers your query. If you wish to discuss the matter further, please contact **Andrew Kalbarczyk** on 301 0101. Should you wish to request any of the files listed above 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 files will be available).

Please note: the Auckland Council cost recovers officer's time for all site enquiries. A basic enquiry takes approximately 1 - 2.5 hours to search the files and databases in which information is held. As such an invoice for the time involved in this enquiry will follow shortly.

Yours sincerely

pp.SR  
Jared Osman  
**Team Leader – Contaminated Air, Noise  
Specialist Unit | Resource Consents**



Transfer No.  
C. Order No. B.513711.4



REGISTER

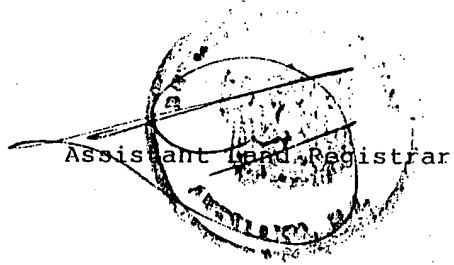
513711/1170

### CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of March one thousand nine hundred and eighty six under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND

WITNESSETH that COTTERALL FARM LIMITED at Auckland

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified in the memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon to be the several admeasurements a little more or less, that is to say: All that parcel of land containing 23.6700 hectares more or less being Lot 1 Deposited Plan 104972 and being part Allotment 73 Paris of Mahurangi



Interests at date of issue:

K115215 Compensation Certificate by the Minister of Works and Development - 9.8.1963 at 1.33 o'c

B.035070.3 Mortgage of part to MFL Mutual Fund Limited 19.2.1982 at 11.43 o'c  
B761987.1

*DISCHARGE  
8/12/1987  
63/1170  
A.L.R.*

*A.L.R.*

B.513711.5 CERTIFICATE UNDER SECTION 308 (2) LOCAL GOVERNMENT ACT 1974 (also affects CT 20B/107) - 7.3.1986 at 2.32 o'c

*A.L.R.*

1170





19/15

Land and Deeds 69

013

020B/107

No. Order No. A523811



REGISTER

LIMITED AS TO PARCELS

CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 24th day of December one thousand nine hundred and Seventy under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND

WITNESSETH that ROGER ELBERT LANGRIDGE of Warkworth farmer

is seised of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing

77 acres 39.5 perches more or less being part Allotments 72 and 73 Parish of Mahurangi.

A 625034. Applic under sec 279(3) Local Govt Act 1974 109

A 625411 Appwic under SIA LG Act  
A 625729 Appc 279 LG Act  
A 625945 Appm 279 LG Act 26/7/84  
VI Mahurangi S.D.



*John Alexander*  
Assistant Land Registrar  
16817

Interests at Date of Issue:

Mortgage 323494 to ~~Samuel~~ Hook Charles Jones 24/3/1948 at 311.12 oc. *21/11/24*

Variation of Mortgage 323494 - 30.6. 1949 at 10.40 am.

Variation of Mortgage 323494 - 8.4. 1952 at 10 oc.

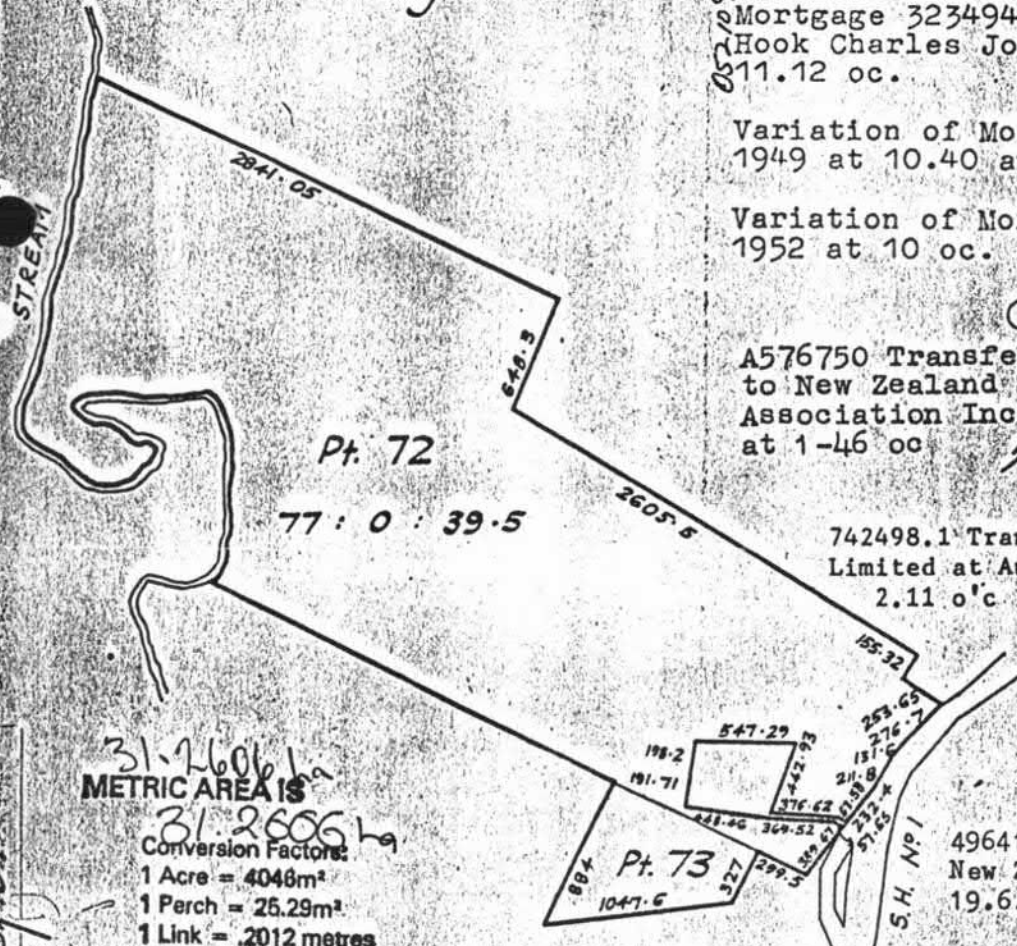
*John Alexander*  
A.L.R.

A576750 Transfer of Mortgage 323494 to New Zealand Social Credit Association Incorporated - 18.8.1971 at 1-46 oc *John Alexander*  
A.L.R.  
50111

742498.1 Transfer to Cotterall Farm Limited at Auckland - 28.3.1979 at 2.11 o'c *B. William*  
A.L.R.

496412.1 Mortgage to Roger Elbert Langridge - 19.6.1979 at 2.17 o'c

496412.2 Mortgage to Australia and New Zealand Banking Group Limited 19.6.1979 at 2.17 o'c *John Alexander*  
A.L.R.



31.2606 ha  
METRIC AREA IS  
31.2606 ha  
Conversion Factors:  
1 Acre = 4048m<sup>2</sup>  
1 Perch = 25.29m<sup>2</sup>  
1 Link = 2012 metres

Scale: 1 inch = 10 chains

20B/107

208/107

64508.11 Gazette Notice (N.Z. Gazette  
3.11.1977 p 2868) declaring State  
Highway adjoining to be a limited  
access road - 29.11.1977 at 1.47 o'c

*[Signature]*  
A.L.R.

B.131997.1 Transmission of Mortgage 496412.1  
to Gladys Margaret Langridge as executrix -  
2.12.1982 at 11.24 o'c

*[Signature]*  
A.L.R.

B.341298.10 Certificate under Section 308(2)  
Local Government Act 1974 (also Affects C.T.  
54B/529) - 19.10.1984 at 11.31 oc

*[Signature]*  
A.L.R.

B.513711.5 ~~Certificate of Compliance~~ under  
Section 308(2) Local Government Act 1974  
(also affects C.T. 57D/1170) - 7.3.1986 at  
2.32 o'c

*[Signature]*

*[Signature]*  
A.L.R.

B.570149.1 Variation of terms of Mortgage  
B.496412.1 - 18.8.1986 at 2.51 o'c

*[Signature]*  
A.L.R.

3e  
.1  
a  
it

012

Land and Deeds 69

No. 61D / 612

References

Prior C/T  
Proc 8344  
Transfer No.  
N/C Order No. B.608217.1  
STOPPED ROAD B.578453.1



CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 8th day of December one thousand nine hundred and eighty-six under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND

WITNESSETH that HER MAJESTY THE QUEEN

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 329 square metres more or less being Allotment 441 Parish of Mahurangi.

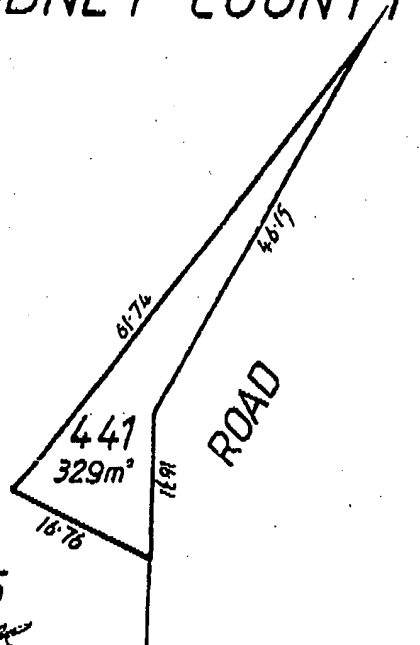
*[Signature]*  
Assistant Land Registrar

kk

B.693274.1 Transfer to John Joseph Cotterall of Auckland farmer 3.7.1987 at 11.51 o'clock

*[Signature]*  
A.L.R.

RODNEY COUNTY



61D / 612

Measurements are Metric

SO 26255

CJA *[Signature]*



771/238

Transfer of Mortgage 323494  
Auckland Social Credit Association  
dated - 18.8.1971 at 1-46 oc

*Ra. Lungerge*  
A.L.R.50111

2498.1 Transfer to Cotterall Farm Limited  
at Auckland - 28.3.1979 at 2.11 o'c

*C. Shellen*

A.L.R.

496412.1 Mortgage to Robert Robert Lungridge -  
19.6.1979 at 2.17 o'c

B.035072.1

A.L.R.

496412.2 Mortgage to Australia and New Zealand  
Banking Group Limited - 19.6.1979 at 2.17 o'c

B.035072.2

A.L.R.

B.035072.3 Mortgage to MFL Mutual Fund Limited -  
19.2.1982 at 2.17 o'c

B.035072.3

A.L.R.

DISCHARGED  
19 FEB 1988  
DISCHARGED  
19 FEB 1988

DISCHARGED  
8/12/87  
*C. Shellen*  
A.L.R.

No. 57D / 1171



010

Transfer No.  
N/C. Order No. B.513711.6

### CERTIFICATE OF TITLE UNDER LAND TRANSFER ACT

This Certificate dated the 7th day of March one thousand nine hundred and eighty six under the seal of the District Land Registrar of the Land Registration District of NORTH AUCKLAND

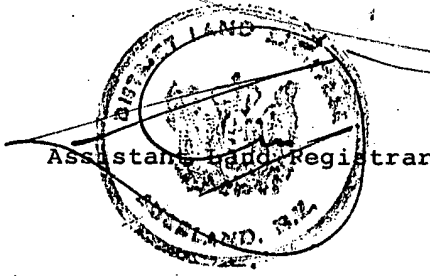
WITNESSETH that ROY HACKETT COTTERALL LIMITED at Auckland

is seized of an estate in fee-simple (subject to such reservations, restrictions, encumbrances, liens, and interests as are notified by memorial underwritten or endorsed hereon) in the land hereinafter described, delineated with bold black lines on the plan hereon, be the several admeasurements a little more or less, that is to say: All that parcel of land containing 14.0627

ctares more or less being Lot 2 Deposited Plan 104972 and being part Allotments 73 and 73B Parish of Mahurangi

*CT Plan 751*

*ADJOINING land.*



Interests at date of issue:

Fencing covenant in Transfer 660375 (affects Part)

K115215 Compensation Certificate against part by the Minister of Works and Development 9.8.1963 at 1.37 o/c

B. 670.3 Mortgage to MFL Mutual Fund Limited 2.1982 at 11.43 o/c

*DISCHARGED 23/1/87 A.L.R.*

*A.L.R.*

B.678701.2 Transfer to Keith Allan Scott medical practitioner and Linda Ann Scott mother both of Kaukapakapa - 23.6.1987 at 1.30 oc.

*Rao*

A.L.R.

B.678701.3 Transfer granting a right of way over part herein appurtenant to Lot 1 D.P. 100471 (C.T.54C/1458) - 23.6.1987 at 1.30 oc.

*Rao*

A.L.R.

B.678701.4 Mortgage to Bank of New Zealand - 23.6.1987 at 1.30 oc.

*Rao*

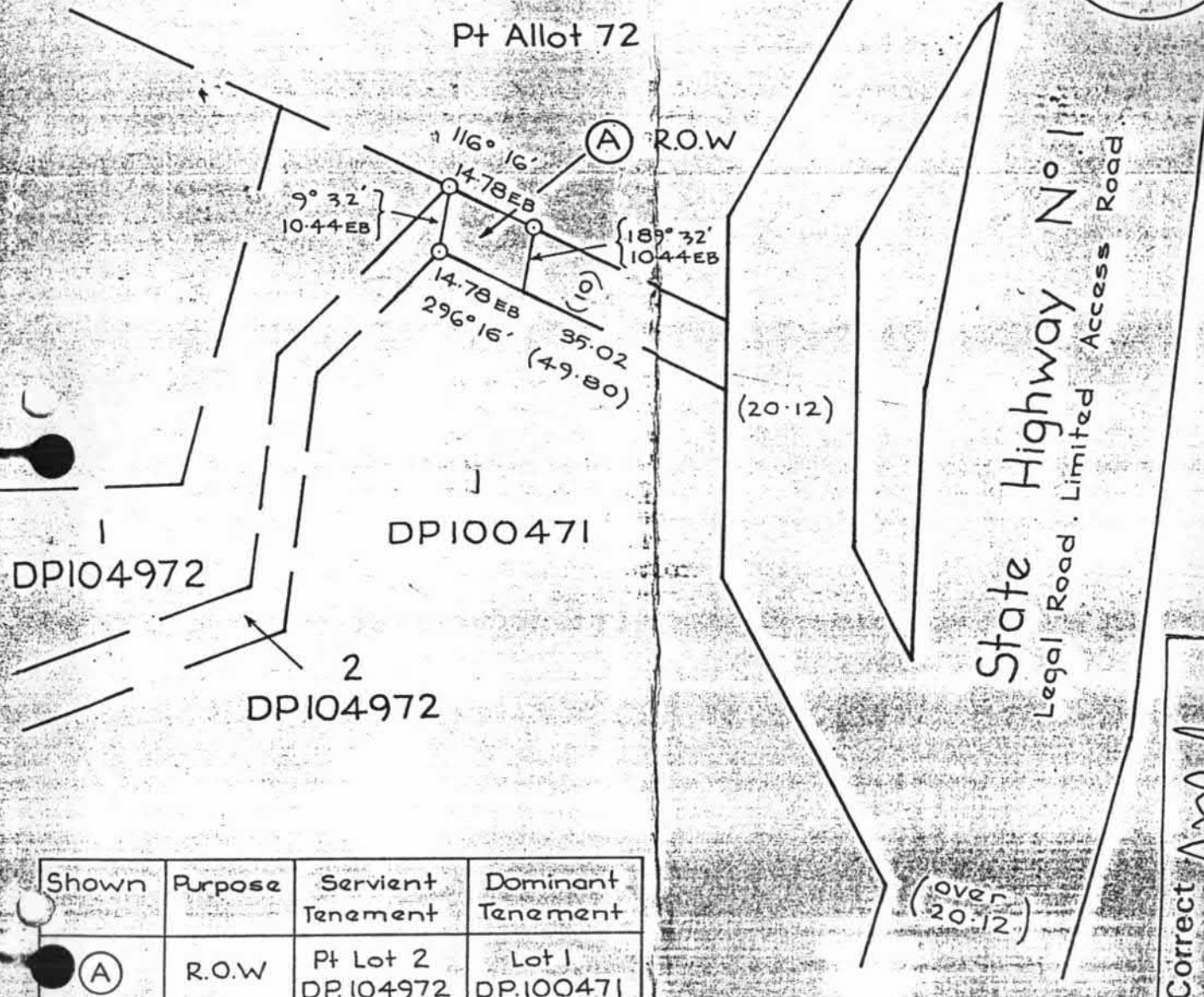
A.L.R.

Blk VI Mahurangi S.D.  
 North Auckland L.D.  
 Rodney County.

009



Pt Allot 72



Shown	Purpose	Servient Tenement	Dominant Tenement
(A)	R.O.W	Pt Lot 2 DP.104972	Lot 1 DP.100471

Correct *[Signature]*

Scale 1:1000

Prepared by R.H. Buckton.

*[Signature]*

Date 28/4/86

Registered Surveyor.

Pursuant to a resolution of the Rodney County Council passed on the 19TH day of AUGUST 1986 approving pursuant to Section 348 of the Local Government Act 1974 the right of way shown hereon the Common Seal of the Rodney County Council was affixed hereto in the presence of:



*[Signature]*  
 Chairman

*[Signature]*  
 County Clerk.

R1390

## SCHEDULE OF AREAS

1 Horticultural Lots (2-7)	49.4ha
2 Rural Residential Lots (1&8)	3.2ha
3 Not suitable for horticulture (Lot 14)	15.9ha
4 Road to vest (9&10)	0.4ha
5 Common Access Lots (11-13)	1.75ha
	70.65ha

I, Keith Frederick Benton Registered Surveyor hereby certify that this scheme plan has been prepared by me in accordance with the provisions of the local Government Act 1974 and the Code of Subdivision of the Rodney District Council made under Section 313 of that Act.

*K.F. Benton* 10/10/91

**Rankine & Hill Limited**  
Engineers, Surveyors and Planners  
804 9762 NEWMARKET AUCKLAND

JJ COTTERALL &  
COTTERALL FARM LTD  
S. H. 1<sup>st</sup> WARKWORTH

CT. 20 B / 107, CT. 57 D / 170, CT. 77 V / 238, CT. 61 D / 612  
TOTAL AREA (C&T) 64.3724 ha (Lhd as to parcel)  
APPROX TRUE AREA 71ha

RODNEY DISTRICT COUNCIL  
NORTH AUCKLAND LAND DISTRICT  
VI & X MAHURANGI

PROPOSED  
SUBDIVISION OF LOT 1  
DP 104 972, ALLOT 441 & PT  
ALLOTS 62, 72 & 73 Parish  
of Mahurangi.

MARCH 1991	1-3000	A2
SURVEYOR DESIGNED	KFB	
DRAWN	LC	
CHECKED		
APPROVED		

864037/1

## SCHEDULE OF PROPOSED EASEMENTS

Purpose	Show	Serv Ten	Dom. Ten.
ROW	(A)	Lot 5 hereon	Lots 6 & 7 hereon
	(B)	Lot 6 hereon	Lot 7 hereon
	(C)	Lot 2 hereon	Lot 1 hereon

## PROPOSED COVENANT AREA

Show	Description	Approx. Area
(D)	Lot 12 hereon	4000m <sup>2</sup>

## AMALGAMATION CONDITIONS

Joint Access Lot No.	Undivided Shares	To be held with Lots
11	3	5-7
13	2	2&3
12	3	5-7

1 - R/R  
2 - Neat  
3 - R/R  
n/a Neat  
n/a UPAL  
n/a not available.



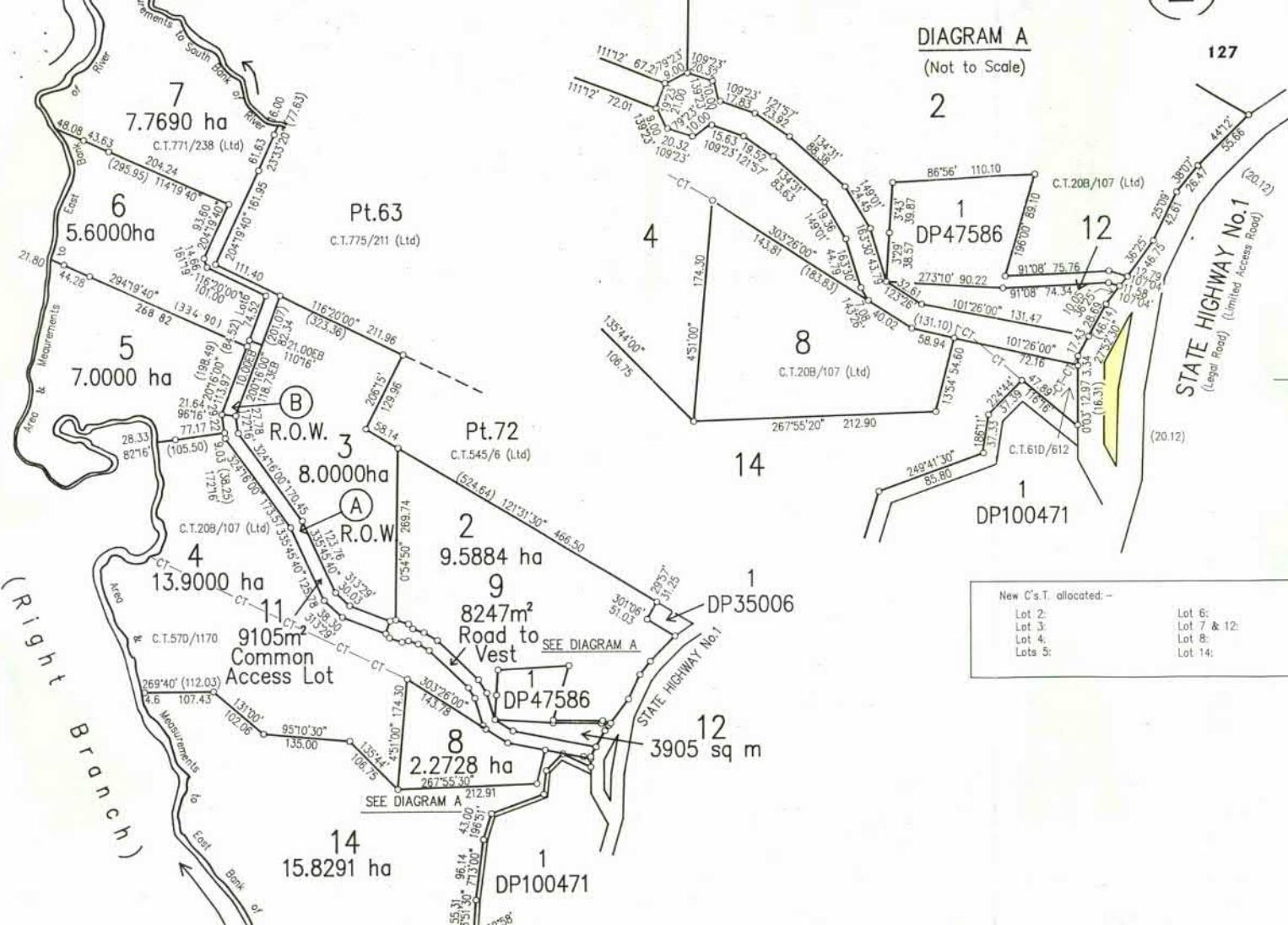
R15635

D.P. 104,972



DIAGRAM A

(Not to Scale)



New C's.T. allocated -

Lot 2:	Lot 6:
Lot 3:	Lot 7 & 12:
Lot 4:	Lot 8:
Lot 5:	Lot 14:

## Rose Hermans

---

**From:** Claire Lacina <claire.lacina@aucklandcouncil.govt.nz> on behalf of RECContamination <recontamination@aklc.govt.nz>  
**Sent:** Thursday, 18 October 2018 5:02 PM  
**To:** Joanne McClean  
**Cc:** RECContamination  
**Subject:** RE: 46 Valerie Close, Warkworth

Hi Joanne,

This email is in response to your recent enquiry requesting available site contamination information held within the Environmental Health Unit of the Licensing and Compliance Services Department (LCS).

Council's regulatory records indicate that there could be the potential for historic, and/or current, land use activities on or adjacent to this site that falls within the Hazardous Activities and Industries List (HAIL) published by the Ministry for the Environment.

Our records indicate the site 46 Valerie Close Warkworth is used for horticultural activity (vineyard), as shown below.



Please note that only council's soil contamination records within the LCS department and GIS map have been checked. There may be other soil contamination information held within:

1. Contaminated Site Enquiry team: [ContaminatedSites@aucklandcouncil.govt.nz](mailto:ContaminatedSites@aucklandcouncil.govt.nz)

A Contaminated Sites Enquiry report contains the following information only:

- Pollution Incidents (incl. air discharges, oil or diesel spills)
- Bores
- Contaminated site, air discharge and industrial trade process consents
- Closed Landfills (council- owned closed landfill sites only)
- Air quality permitted activities

2. Property File for viewing reports or all relevant information relating to the property -Requested from the local service centre, by phone, 09 3010101.

Kind regards,

**Claire Lacina | Technical Officer – Contamination, Air & Noise  
Specialist Input | Resource Consents**

Ph 09 3522621 (Int 465621) | Mob 021 718 038

Auckland Council, Level 2, 35 Graham Street, Auckland

Visit our website: [www.aucklandcouncil.govt.nz](http://www.aucklandcouncil.govt.nz)

---

**From:** Joanne McClean [mailto:jmcclean@riley.co.nz]

**Sent:** Monday, 15 October 2018 11:43 a.m.

**To:** RECContamination

**Subject:** 46 Valerie Close, Warkworth

Hi Claire,

I am carrying out a site investigation and would like to know if you have any contamination information for this site.

The property is a vineyard, and prior to that it was rural. Please see the attached plan.

Please phone if you have any queries

Many Thanks and Regards

Joanne McClean

Ext 524

0274873370



CAUTION: This email message and any attachments contain information that may be confidential and may be LEGALLY PRIVILEGED. If you are not the intended recipient, any use, disclosure or copying of this message or attachments is strictly prohibited. If you have received this email message in error please notify us immediately and erase all copies of the message and attachments. We do not accept responsibility for any viruses or similar carried with our email, or any effects our email may have on the recipient computer system or network. Any views expressed in this email may be those of the individual sender and may not necessarily reflect the views of Council.

## ***APPENDIX C***

### ***Table 1 Contaminant Concentrations***

**Table 1: Contaminant Concentrations for Soil (mg/kg)**

Analytes	Units	Criteria				Sample IDs														
		Non-Volcanic Soil Background Concentration <sup>1</sup>	AUP-OP Permitted Activity Soil Acceptance Criteria <sup>2</sup>	NES Rural Residential Soil Contaminant Standards <sup>3</sup>	NES Outdoor Worker (Unpaved) Soil Contaminant Standards <sup>4</sup>	S1	V1 Composite (S2,S3,S4)	S5	V2 Composite (S6,S7,S8)	S9	V3 Composite (S10,S11)	V4 Composite (S12,S13)	ST1	V5 Composite (ST2,ST3,ST4)	ST5	V6 Composite (ST6,ST7, ST8)	A-0.1	A-0.35	B-0.1	B-0.5
Location						Surface Samples							Soil Stockpiles				Post Samples			
<b>Heavy Metals Suite</b>																				
Arsenic	mg/kg	12	100	17	70	8.03	2.04	5.24	2.55	2.6	2.52	2.24	3.1	2.62	2.72	3.01	4.49	6.96	2.31	2.44
Cadmium	mg/kg	0.65	7.5	0.8	1300	0.18	0.18	0.26	0.21	0.25	0.27	0.23	0.32	0.2	0.011	0.089	-	-	-	-
Chromium	mg/kg	55	400	<10,000		11.1	10.3	16.4	12	12.8	16.9	10.8	9.87	12.3	44.2	19.9	14.5	17.6	9.46	13.6
Copper	mg/kg	45	325	<10,000		26.2	20.1	13	30.8	27.8	17.5	34.1	19.9	17.9	12.1	8.58	9.49	10.9	10.2	3.32
Lead	mg/kg	65	250	160	3300	5.55	5.65	5.42	5.55	5.6	6.49	5.7	5.4	5.71	8.56	5.74	-	-	-	-
Nickel	mg/kg	35	105			2.88	4	2.04	2.44	2.19	2.03	1.86	1.82	2.36	3.59	2.3	-	-	-	-
Zinc	mg/kg	180	400			33.7	28	26.8	22.6	18.7	18.9	32.5	20.1	17.1	12	12.8	-	-	-	-
<b>Organochlorine Pesticides</b>																				
2,4'-DDD	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
2,4'-DDE	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
2,4'-DDT	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
4,4'-DDD	mg/kg	-	-	-	-	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	-	-	-	-
4,4'-DDE	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
4,4'-DDT	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Total DDT	mg/kg	-	20	45	1,000	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-
alpha-BHC	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Aldrin	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
beta-BHC	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
cis-Chlordane	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
cis-Nonachlor	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
delta-BHC	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Dieldrin	mg/kg	-	-	1.1	160	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
Endosulfan I	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Endosulfan II	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Endosulfan sulphate	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Endrin	mg/kg	-	-	-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	-	-
Endrin aldehyde	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Endrin ketone	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
gamma-BHC	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Heptachlor	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Heptachlor epoxide	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Hexachlorobenzene	mg/kg	-	-	-	-	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	-	-	-	-
Methoxychlor	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
trans-nonachlor	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
trans-Chlordane	mg/kg	-	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	-	-	-	-
Chlordane (sum)	mg/kg	-	-	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	-	-

Notes

Orange shaded results exceed the Auckland non-volcanic soil background concentrations.

Green shaded results exceed the Auckland non-volcanic soil background concentrations and the AUP-Op permitted activity soil acceptance criteria.

**Bold** results exceed the NES soil contaminant standards for residential 10% produce land use

# results exceed the NES soil contaminant standards for outdoor workers (unpaved) landuse.

1 Background concentrations are the maximum concentrations of trace metals measured in non-volcanic soils from the Auckland Region (ARC TP153, October 21

2 Permitted Activity Criteria under the Auckland Unitary Plan - Operative in Part, Nov. 2016.

3 MIE, 2011. NES User's guide soil contaminant standards for rural/residential / lifestyle block 25% produce landuse.

4 MIE, 2011. NES User's guide soil contaminant standards for commercial/industrial outdoor worker (unpaved) landuse.

***APPENDIX D***

***Laboratory Certificates***



## Certificate of Analysis

Riley Consultants Ltd  
 Level 1, 4 Fred Thomas Drive  
 Auckland  
 Attention: Joanne McClean  
 Phone: 09 489 7872  
 Email: jmclean@riley.co.nz

Lab Reference: 18-34369  
 Submitted by: Joanne McClean  
 Date Received: 2/11/2018  
 Date Completed: 9/11/2018  
 Order Number:  
 Reference: 160422

Sampling Site: Valerie Close, Warkworth

### Report Comments

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

### Elements in Soil

Client Sample ID			A-0.1 0.1	A-0.35 0.35	B-0.1 0.1	B-0.5 0.35
Date Sampled			31/10/2018	31/10/2018	31/10/2018	31/10/2018
Analyte	Unit	Reporting Limit	18-34369-14	18-34369-15	18-34369-16	18-34369-17
Arsenic	mg/kg dry wt	0.125	4.49	6.96	2.31	2.44
Copper	mg/kg dry wt	0.075	9.49	10.9	10.2	3.32
Chromium	mg/kg dry wt	0.125	14.5	17.6	9.46	13.6

### Heavy Metals in Soil

Client Sample ID			S1 0.1	S5 0.1	S9 0.1	ST1	ST5
Date Sampled			31/10/2018	31/10/2018	31/10/2018	31/10/2018	31/10/2018
Analyte	Unit	Reporting Limit	18-34369-1	18-34369-5	18-34369-9	18-34369-18	18-34369-22
Arsenic	mg/kg dry wt	0.125	8.03	5.24	2.60	3.10	2.72
Cadmium	mg/kg dry wt	0.005	0.18	0.26	0.25	0.32	0.011
Chromium	mg/kg dry wt	0.125	11.1	16.4	12.8	9.87	44.2
Copper	mg/kg dry wt	0.075	26.2	13.0	27.8	19.9	12.1
Lead	mg/kg dry wt	0.05	5.55	5.42	5.60	5.40	8.56
Nickel	mg/kg dry wt	0.05	2.88	2.04	2.19	1.82	3.59
Zinc	mg/kg dry wt	0.05	33.7	26.8	18.7	20.1	12.0

## Heavy Metals in Soil

Client Sample ID			V1 Composite (S2,S3,S4)	V2 Composite (S6,S7,S8)	V3 Composite (S10,S11)	V4 Composite (S12,S13)	V5 Composite (ST2,ST3,ST4)
Date Sampled							
Analyte	Unit	Reporting Limit	18-34369-26	18-34369-27	18-34369-28	18-34369-29	18-34369-30
Arsenic	mg/kg dry wt	0.125	2.04	2.55	2.52	2.24	2.62
Cadmium	mg/kg dry wt	0.005	0.18	0.21	0.27	0.23	0.20
Chromium	mg/kg dry wt	0.125	10.3	12.0	16.9	10.8	12.3
Copper	mg/kg dry wt	0.075	20.1	30.8	17.5	34.1	17.9
Lead	mg/kg dry wt	0.05	5.65	5.55	6.49	5.70	5.71
Nickel	mg/kg dry wt	0.05	4.00	2.44	2.03	1.86	2.36
Zinc	mg/kg dry wt	0.05	28.0	22.6	18.9	32.5	17.1

## Heavy Metals in Soil

Client Sample ID			V6 Composite (ST6,ST7,ST8)
Date Sampled			
Analyte	Unit	Reporting Limit	18-34369-31
Arsenic	mg/kg dry wt	0.125	3.01
Cadmium	mg/kg dry wt	0.005	0.089
Chromium	mg/kg dry wt	0.125	19.9
Copper	mg/kg dry wt	0.075	8.58
Lead	mg/kg dry wt	0.05	5.74
Nickel	mg/kg dry wt	0.05	2.30
Zinc	mg/kg dry wt	0.05	12.8

## Organochlorine Pesticides - Soil

Client Sample ID			S1 0.1	S5 0.1	S9 0.1	ST1	ST5
Date Sampled			31/10/2018	31/10/2018	31/10/2018	31/10/2018	31/10/2018
Analyte	Unit	Reporting Limit	18-34369-1	18-34369-5	18-34369-9	18-34369-18	18-34369-22
2,4'-DDD	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	0.003	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005



### Organochlorine Pesticides - Soil

Client Sample ID			S1 0.1	S5 0.1	S9 0.1	ST1	ST5
Date Sampled			31/10/2018	31/10/2018	31/10/2018	31/10/2018	31/10/2018
Heptachlor epoxide	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	118.2	124.9	124.7	124.4	122.2

### Organochlorine Pesticides - Soil

Client Sample ID			V1 Composite (S2,S3,S4)	V2 Composite (S6,S7,S8)	V3 Composite (S10,S11)	V4 Composite (S12,S13)	V5 Composite (ST2,ST3,ST4)
Date Sampled							
Analyte	Unit	Reporting Limit	18-34369-26	18-34369-27	18-34369-28	18-34369-29	18-34369-30
2,4'-DDD	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDD	mg/kg dry wt	0.003	<0.003	<0.003	<0.003	<0.003	<0.003
4,4'-DDE	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4,4'-DDT	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total DDT	mg/kg dry wt	0.02	<0.02	<0.02	<0.02	<0.02	<0.02
alpha-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aldrin	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
beta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Chlordane	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
cis-Nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
delta-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dieldrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endosulfan I	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endosulfan II	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan sulphate	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Endrin	mg/kg dry wt	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Endrin aldehyde	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin ketone	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
gamma-BHC	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methoxychlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-nonachlor	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
trans-Chlordane	mg/kg dry wt	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlordane (sum)	mg/kg dry wt	0.02	<0.020	<0.020	<0.020	<0.020	<0.020
TCMX (Surrogate)	%	1	110.6	122.5	124.0	121.7	104.8

### Organochlorine Pesticides - Soil

Client Sample ID			V6 Composite (ST6,ST7,ST8)
Date Sampled			
Analyte	Unit	Reporting Limit	18-34369-31
2,4'-DDD	mg/kg dry wt	0.005	<0.005
2,4'-DDE	mg/kg dry wt	0.005	<0.005

## Organochlorine Pesticides - Soil

Client Sample ID		V6 Composite (ST6,ST7,ST8)	
Date Sampled			
2,4'-DDT	mg/kg dry wt	0.005	<0.005
4,4'-DDD	mg/kg dry wt	0.003	<0.003
4,4'-DDE	mg/kg dry wt	0.005	<0.005
4,4'-DDT	mg/kg dry wt	0.005	<0.005
Total DDT	mg/kg dry wt	0.02	<0.02
alpha-BHC	mg/kg dry wt	0.005	<0.005
Aldrin	mg/kg dry wt	0.005	<0.005
beta-BHC	mg/kg dry wt	0.005	<0.005
cis-Chlordane	mg/kg dry wt	0.005	<0.005
cis-Nonachlor	mg/kg dry wt	0.01	<0.01
delta-BHC	mg/kg dry wt	0.005	<0.005
Dieldrin	mg/kg dry wt	0.05	<0.05
Endosulfan I	mg/kg dry wt	0.005	<0.005
Endosulfan II	mg/kg dry wt	0.01	<0.01
Endosulfan sulphate	mg/kg dry wt	0.005	<0.005
Endrin	mg/kg dry wt	0.05	<0.05
Endrin aldehyde	mg/kg dry wt	0.01	<0.01
Endrin ketone	mg/kg dry wt	0.005	<0.005
gamma-BHC	mg/kg dry wt	0.005	<0.005
Heptachlor	mg/kg dry wt	0.005	<0.005
Heptachlor epoxide	mg/kg dry wt	0.005	<0.005
Hexachlorobenzene	mg/kg dry wt	0.005	<0.005
Methoxychlor	mg/kg dry wt	0.01	<0.01
trans-nonachlor	mg/kg dry wt	0.01	<0.01
trans-Chlordane	mg/kg dry wt	0.01	<0.01
Chlordane (sum)	mg/kg dry wt	0.02	<0.020
TCMX (Surrogate)	%	1	113.7

## ONOPs in Soil

Client Sample ID			V2 Composite (S6,S7,S8)	V4 Composite (S12,S13)
Date Sampled				
Analyte	Unit	Reporting Limit	18-34369-27	18-34369-29
3-Hydroxycarbofuran	mg/kg dry wt	0.05	<0.05	<0.05
Acephate	mg/kg dry wt	0.05	<0.05	<0.05
Acetochlor	mg/kg dry wt	0.05	<0.05	<0.05
Alachlor	mg/kg dry wt	0.05	<0.05	<0.05
Aldicarb	mg/kg dry wt	0.05	<0.05	<0.05
Aldicarb sulfone	mg/kg dry wt	0.05	<0.05	<0.05
Aldicarb sulfoxide	mg/kg dry wt	0.05	<0.05	<0.05
Ametryn	mg/kg dry wt	0.05	<0.05	<0.05
Atrazine	mg/kg dry wt	0.05	<0.05	<0.05
Atrazine-desethyl	mg/kg dry wt	0.05	<0.05	<0.05
Atrazine-desisopropyl	mg/kg dry wt	0.05	<0.05	<0.05
Avermectin B1a	mg/kg dry wt	0.05	<0.05	<0.05
Azaconazole	mg/kg dry wt	0.05	<0.05	<0.05
Azinphos-methyl	mg/kg dry wt	0.05	<0.05	<0.05
Azoxystrobin	mg/kg dry wt	0.05	<0.05	<0.05
Benalaxyl	mg/kg dry wt	0.05	<0.05	<0.05
Bendiocarb	mg/kg dry wt	0.05	<0.05	<0.05
Bitertanol	mg/kg dry wt	0.05	<0.05	<0.05

## ONOPs in Soil

Client Sample ID		V2 Composite (S6,S7,S8)	V4 Composite (S12,S13)
Date Sampled			
Bromacil	mg/kg dry wt	0.05	<0.05
Bupirimate	mg/kg dry wt	0.05	<0.05
Buprofezin	mg/kg dry wt	0.05	<0.05
Butachlor	mg/kg dry wt	0.05	<0.05
Carbaryl	mg/kg dry wt	0.05	<0.05
Carbendazim	mg/kg dry wt	0.05	<0.05
Carbofuran	mg/kg dry wt	0.05	<0.05
Chlorfluazuron	mg/kg dry wt	0.05	<0.05
Chlorpyrifos	mg/kg dry wt	0.05	<0.05
Chlorpyrifos-methyl	mg/kg dry wt	0.05	<0.05
Chlortoluron	mg/kg dry wt	0.05	<0.05
Cyanazine	mg/kg dry wt	0.05	<0.05
Cyfluthrin	mg/kg dry wt	0.05	<0.05
Cyhalothrin (lambda)	mg/kg dry wt	0.05	<0.05
Cypermethrin	mg/kg dry wt	0.05	<0.05
Cyproconazole	mg/kg dry wt	0.05	<0.05
Cyprodinil	mg/kg dry wt	0.05	<0.05
Deltamethrin	mg/kg dry wt	0.05	<0.05
Diazinon	mg/kg dry wt	0.05	<0.05
Dichlofluanid	mg/kg dry wt	0.05	<0.05
Dichlorvos	mg/kg dry wt	0.05	<0.05
Difenoconazole	mg/kg dry wt	0.05	<0.05
Dimethoate	mg/kg dry wt	0.05	<0.05
Diuron	mg/kg dry wt	0.05	<0.05
Emamectin B1a	mg/kg dry wt	0.05	<0.05
Fenarimol	mg/kg dry wt	0.05	<0.05
Fenpropimorph	mg/kg dry wt	0.05	<0.05
Fenpyroximate	mg/kg dry wt	0.05	<0.05
Fenvalerate	mg/kg dry wt	0.05	<0.05
Fluazifop-butyl	mg/kg dry wt	0.05	<0.05
Fluometuron	mg/kg dry wt	0.05	<0.05
Flusilazole	mg/kg dry wt	0.05	<0.05
Fluvalinate (tau)	mg/kg dry wt	0.05	<0.05
Furalaxyl	mg/kg dry wt	0.05	<0.05
Haloxifop-methyl	mg/kg dry wt	0.05	<0.05
Hexaconazole	mg/kg dry wt	0.05	<0.05
Hexazinone	mg/kg dry wt	0.05	<0.05
Imazalil	mg/kg dry wt	0.05	<0.05
Imidacloprid	mg/kg dry wt	0.05	<0.05
Indoxacarb	mg/kg dry wt	0.05	<0.05
IPBC	mg/kg dry wt	0.05	<0.05
Iprodione	mg/kg dry wt	0.05	<0.05
Kresoxim-methyl	mg/kg dry wt	0.05	<0.05
Linuron	mg/kg dry wt	0.05	<0.05
Lufenuron	mg/kg dry wt	0.05	<0.05
Malathion	mg/kg dry wt	0.05	<0.05
Metalaxyl	mg/kg dry wt	0.05	<0.05
Methamidophos	mg/kg dry wt	0.05	<0.05
Methiocarb	mg/kg dry wt	0.05	<0.05
Methomyl	mg/kg dry wt	0.05	<0.05
Metolachlor	mg/kg dry wt	0.05	<0.05
Metribuzin	mg/kg dry wt	0.05	<0.05
Mevinphos	mg/kg dry wt	0.05	<0.05

## ONOPs in Soil


Client Sample ID			V2 Composite (S6,S7,S8)	V4 Composite (S12,S13)
Date Sampled				
Molinate	mg/kg dry wt	0.05	<0.05	<0.05
Monocrotophos	mg/kg dry wt	0.05	<0.05	<0.05
Myclobutanil	mg/kg dry wt	0.05	<0.05	<0.05
Naled	mg/kg dry wt	0.05	<0.05	<0.05
Norfluazuron	mg/kg dry wt	0.05	<0.05	<0.05
Omethoate	mg/kg dry wt	0.05	<0.05	<0.05
Oxyflurofen	mg/kg dry wt	0.05	<0.05	<0.05
Paclobutrazol	mg/kg dry wt	0.05	<0.05	<0.05
Parathion-ethyl	mg/kg dry wt	0.05	<0.05	<0.05
Pendimethalin	mg/kg dry wt	0.05	<0.05	<0.05
Permethrin	mg/kg dry wt	0.05	<0.05	<0.05
Pirimicarb	mg/kg dry wt	0.05	<0.05	<0.05
Pirimiphos-methyl	mg/kg dry wt	0.05	<0.05	<0.05
Prochloraz	mg/kg dry wt	0.05	<0.05	<0.05
Procymidone	mg/kg dry wt	0.05	<0.05	<0.05
Prometryn	mg/kg dry wt	0.05	<0.05	<0.05
Propachlor	mg/kg dry wt	0.05	<0.05	<0.05
Propanil	mg/kg dry wt	0.05	<0.05	<0.05
Propazine	mg/kg dry wt	0.05	<0.05	<0.05
Propiconazole	mg/kg dry wt	0.05	<0.05	<0.05
Pyrimethanil	mg/kg dry wt	0.05	<0.05	<0.05
Pyriproxyfen	mg/kg dry wt	0.05	<0.05	<0.05
Quizalofop-ethyl	mg/kg dry wt	0.05	<0.05	<0.05
Simazine	mg/kg dry wt	0.05	<0.05	<0.05
Simetryn	mg/kg dry wt	0.05	<0.05	<0.05
Sulfentrazone	mg/kg dry wt	0.05	<0.05	<0.05
TCMTB	mg/kg dry wt	0.05	<0.05	<0.05
Tebuconazole	mg/kg dry wt	0.05	<0.05	<0.05
Terbufos	mg/kg dry wt	0.05	<0.05	<0.05
Terbumeton	mg/kg dry wt	0.05	<0.05	<0.05
Terbuthylazine	mg/kg dry wt	0.05	<0.05	<0.05
Terbuthylazine-desethyl	mg/kg dry wt	0.05	<0.05	<0.05
Terbutryn	mg/kg dry wt	0.05	<0.05	<0.05
Tetrachlorvinphos	mg/kg dry wt	0.05	<0.05	<0.05
Tetraconazole	mg/kg dry wt	0.05	<0.05	<0.05
Thiabendazole	mg/kg dry wt	0.05	<0.05	<0.05
Thiacloprid	mg/kg dry wt	0.05	<0.05	<0.05
Thiobencarb	mg/kg dry wt	0.05	<0.05	<0.05
Tolylfluanid	mg/kg dry wt	0.05	<0.05	<0.05
Triazophos	mg/kg dry wt	0.05	<0.05	<0.05
Triflumuron	mg/kg dry wt	0.05	<0.05	<0.05
Triphenylphosphate (Surrogate)	%	1	70.2	75.5

## Moisture Content

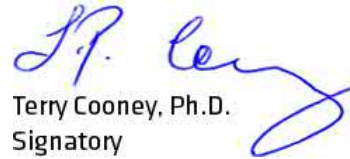
Client Sample ID			V2 Composite (S6,S7,S8)	V4 Composite (S12,S13)
Date Sampled				
Analyte	Unit	Reporting Limit	18-34369-27	18-34369-29
Moisture Content	%	1	28	24

## Method Summary

<b>Elements in Soil</b>	Acid digestion followed by ICP-MS analysis. (US EPA method 200.8).
<b>OCP in Soil</b>	Samples are extracted with hexane, pre-concentrated then analysed by GC-MSMS. (In-house procedure). (Chlordane (sum) is calculated from the main actives in technical Chlordane: Chlordane, Nonachlor and Heptachlor)
<b>Total DDT</b>	Sum of DDT, DDD and DDE (4,4' and 2,4 isomers)
<b>ONOPs in Soil</b>	Fresh soil is extracted in acetonitrile and analysed by GC-MS/MS and LC-MS/MS.
<b>Moisture</b>	Moisture content is determined gravimetrically by drying at 103 °C.

  
Karam Wadi, B.E. (Hons)  
Technologist

  
Nathan Howse, B.Sc.  
Senior Technician

  
Terry Cooney, Ph.D.  
Signatory

***APPENDIX E***

***RILEY Dwg: 160422-7***

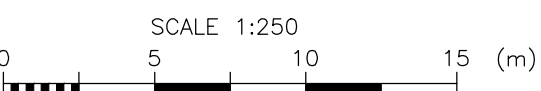


LOT 11 DP 155544 EXISTING RIGHT OF WAY IN FAVOUR OF LOT 3 DP 155544 CREATED BY EASEMENT CERTIFICATE C509598.5

**LEGEND**

- · — LOT BOUNDARY
- x — PROPOSED FENCE
- ST7 STOCKPILE SOIL SAMPLE NUMBER & LOCATION
- ⊙ S8 SURFACE SAMPLE LOCATION & NUMBER
- ⊙ A POST HOLE SOIL SAMPLE LOCATION

NOTE: DRAWING INFORMATION BASED ON AUCKLAND COUNCIL GIS



**FOR INFORMATION**

DESIGN	CHECKED	DATE
JM	JGM	13.11.18
DRAWN	CHECKED	DATE
WY	JM	NOV 2018
BY	DATE	

APPROVED FOR ISSUE:  
**B BLACK**  
DATE: 22/11/18

**RILEY CONSULTANTS**  
P.O. BOX 100 253  
NORTH SHORE  
AUCKLAND 0745  
TEL. 09-4897872  
FAX. 09-4897873

TITLE  
**WARKWORTH ESTATE LTD**  
**46 VALERIE CLOSE, WARKWORTH**  
**CONTAMINATION SITE INVESTIGATION PLAN**

CADFILE	160422-7
SCALES (A3)	1:250
DRAWING No.	160422-7
REV.	1